Northeast Region Standardized Bycatch Reporting Methodology

An Omnibus Amendment to the Fishery Management Plans of the Mid-Atlantic and New England Regional Fishery Management Councils

June 2007

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Amendment 2 to the Atlantic Bluefish Fishery Management Plan (FMP);
Amendment 2 to the Atlantic Herring FMP;
Amendment 2 to the Atlantic Salmon FMP;
Amendment 12 to the Atlantic Sea Scallop FMP;
Amendment 1 to the Deep-Sea Red Crab FMP;
Amendment 12 to the Mackerel, Squid, and Butterfish FMP;
Amendment 3 to the Monkfish FMP;
Amendment 15 to the Northeast Multispecies FMP;
Amendment 1 to the Northeast Skate Complex FMP;
Amendment 1 to the Spiny Dogfish FMP;
Amendment 16 to the Summer Flounder, Scup, and Black Sea Bass FMP;
Amendment 14 to the Surfclam and Ocean Quahog FMP; and
Amendment 2 to the Tilefish FMP

Including an
Environmental Assessment,
a Regulatory Flexibility Act Assessment,
and a Regulatory Impact Review

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Prepared by the

New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950

Mid-Atlantic Fishery Management Council
300 South New Street, Room 2115
Dover, DE 19904

National Marine Fisheries Service
Northeast Regional Office
One Blackburn Drive
Gloucester, MA 01930

National Marine Fisheries Service
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543

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Executive Summary

This is an omnibus amendment to the fishery management plans (FMPs) of the Mid-Atlantic and New England Fishery Management Councils. This omnibus amendment was developed to address the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to include, in all FMPs, a standardized bycatch reporting methodology (SBRM). A public hearing draft was prepared to provide the public an opportunity to review the preferred alternatives of the Councils and NOAA's National Marine Fisheries Service (NMFS) and to comment on the document and/or the actions proposed by the Councils and NMFS. Following the formal public review phase, revisions were made to the document to address and respond to the comments provided by the public.

The purpose of the amendment is to: Explain the methods and processes by which bycatch is currently monitored and assessed for Northeast Region fisheries; determine whether these methods and processes need to be modified and/or supplemented; establish standards of precision for bycatch estimation for all Northeast Region fisheries; and, thereby, document the SBRM established for all fisheries managed through the FMPs of the Northeast Region. An objective of the SBRM is to establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision. The scope of the amendment is limited to those fisheries that are prosecuted in the Federal waters of the Northeast Region and managed through an FMP developed by either the Mid-Atlantic or New England Council.

There are 13 FMPs to be amended through this action, and these FMPs address fisheries for 39 species. Five FMPs were developed by the Mid-Atlantic Council, six by the New England Council, and two were developed jointly by both Councils. Many of these FMPs have a long history dating back to the time the Magnuson-Stevens Act was first enacted, while others are relatively new and have only been in place for a few years. There have been a variety of amendments, framework adjustments, and other actions to modify the management measures implemented under these FMPs.

Although management measures are typically developed and implemented on an FMP-by-FMP basis, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic. For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under the aegis of one or more FMPs, the Northeast Region SBRM is designed around "fishing modes" defined by the type of fishing gear used and the area from which the vessels depart. There are 39 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine.

Information related to discards in a fishery can be collected and monitored in a variety of ways, but the primary sources of information on discards are at-sea fishery observers, recreational fisheries surveys, and fishing vessel trip reports. Information gained from primary sources on fishery discards is used in conjunction with information from fishery independent surveys, seafood dealer purchase reports, and fishing vessel trip reports to conduct stock assessments and provide scientific advice to fishery managers. Although their application is generally quite limited, supplemental information on discards and fisheries can be obtained from industry-based surveys, study fleets, and alternate monitoring platforms. In addition to these sources of information, there are several new and developing technologies that could one day be used to collect information related to discards, and these include electronic video monitoring, image capture and processing, and other specialized monitoring programs.

Generally, an SBRM can be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The Northeast Region SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Several specific analyses are conducted to calculate a measure of the variance associated with the data collected by fisheries observers and to determine the most appropriate fisheries observer coverage levels and the optimal allocation of observer effort across the fisheries in order to minimize the variance to the degree practicable. Given a target level of data precision desired by fisheries scientists and managers, fisheries observer coverage levels can be calculated that would be expected to provide data of the desired precision. Both precision and accuracy are addressed in analyses conducted using observer data and to determine the appropriateness of the data for use in stock assessments and by fishery managers.

Northeast Region fisheries were stratified into 39 fishing modes and discard rates of 60 species/species groups of fish, sea turtles, marine mammals, and sea birds were examined using 2004 Northeast Fisheries Observer Program (NEFOP) and fishing vessel trip report (FVTR) data. Two ratio estimators were used: Discard-to-days–absent (d/da) and discard-to–kept (d/k) pounds of all species. Three computational methods were employed to derive these ratio estimates: A separate ratio method; a combined ratio method; and a simple expansion method. In general, estimation of total discards was comparable for each ratio estimator and method.

The precision associated with all six estimates for each fleet and species/species group combination was examined. Again, precision levels were comparable for each estimator and method. In the end, the combined ratio method was selected using discard-to-kept pounds. Data for kept pounds are more easily verified than data for days absent, and the combined ratio method better utilized information associated with kept pounds. A coefficient of variation (CV) of 30 percent was selected as a standard level of precision based upon the recommendation of the National Working Group on Bycatch. The number of observed sea days (and trips) necessary to achieve a CV of 30 percent for species was derived for each fishing mode and species/species group combination. The total estimated number of sea days necessary to achieve a 30 percent CV exceeded 71,000 days, but this amount can be substantially reduced through the application of several "importance filters." Analyses were performed to evaluate potential sources of bias in the 2004 NEFOP data. In general, there was no evidence of a systematic bias in the amount of kept pounds, trip duration, or area fished between the NEFOP and FVTR data.

To meet the purpose and need for this amendment, the Councils considered alternatives for seven principal components of the Northeast Region SBRM: (1) Bycatch reporting and monitoring mechanisms; (2) analytical techniques and allocation of fisheries observer effort; (3) a performance standard for the SBRM; (4) an SBRM reporting and review process; (5) framework adjustment provisions; (6) a process to prioritize the observer coverage allocations calculated based on the SBRM; and (7) provisions to allow industry-funded observers and/or observer set-aside programs. In addition to the status quo bycatch reporting and monitoring mechanisms, the Councils considered whether to implement electronic video monitoring to supplement or replace at-sea fisheries observers. The Councils considered four alternatives relative to the process used to determine the appropriate allocation of fisheries observer effort: The status quo; the integrated allocation approach; the integrated allocation approach with importance filters; and an alternative that would establish the target observer coverage levels at 20 percent for fisheries that catch common species and 50 percent for fisheries that catch rare species.

Currently, there is no formal SBRM performance standard, so in addition to the status quo, the Councils considered adoption of a coefficient of variance (CV) of 30 percent of the total discards as the performance standard for the Northeast Region SBRM. Although there is currently no required process to provide periodic evaluations of the effectiveness of the SBRM, the Councils considered requiring specific information to be provided at regular intervals for all of the subject FMPs. In addition, the Councils considered incorporating elements of the Northeast Region SBRM into the framework adjustment and annual specification provisions of each FMP. The Councils also considered an appropriate process to prioritize the observer allocations calculated based on the SBRM in cases where the available Federal budget or other resources are insufficient to fully implement the SBRM across all fishing modes. In anticipation of future management actions, the Councils also considered creating a framework for industry-funded observer programs including the development of observer set-aside programs.

The preferred alternatives (shaded) of the Mid-Atlantic and New England Councils are identified below.

<table>
<tr><th>SBRM Element</th><th colspan="12">Alternatives Under Consideration</th></tr>
<tr><td>1. Bycatch Reporting and Monitoring Mechanisms</td><td colspan="6">Status quo</td><td colspan="6">Implement electronic video monitoring</td></tr>
<tr><td>2. Analytical Techniques and Allocation of Observers</td><td colspan="3">Status quo</td><td colspan="3">Integrated allocation approach</td><td colspan="3">Integrated allocation approach w/ importance filter</td><td colspan="3">Minimum percent observer coverage</td></tr>
<tr><td>3. SBRM Performance Standard</td><td colspan="6">Status quo</td><td colspan="6">Establish a CV standard</td></tr>
<tr><td>4. SBRM Review/ Reporting Process</td><td colspan="4">Status quo</td><td colspan="4">Specify an SBRM review process</td><td colspan="4">Require periodic discard reports</td></tr>
<tr><td>5. Framework Adjustment Provisions</td><td colspan="4">Status quo</td><td colspan="4">Framework adjustment</td><td colspan="4">Frameworks and annual adjustments</td></tr>
<tr><td>6. Prioritization Process</td><td colspan="6">Status quo</td><td colspan="6">Council consultation</td></tr>
<tr><td>7. Industry-Funded Observer Programs</td><td colspan="4">Status quo</td><td colspan="4">Observer provider approval</td><td colspan="4">Framework provisions</td></tr>
</table>

Consideration of the potential and expected environmental impacts of the alternatives described in this amendment illustrates that, because this amendment is focused entirely on the procedural elements (i.e., the methodology) associated with the development and implementation of an SBRM for the Northeast Region, there are no direct, indirect, or cumulative effects expected on biological resources (including fishery resources, protected resources, or other non-fishery resources), or on the physical environment (including essential fish habitat) for any of the alternatives, and there are no expected socio-economic effects associated with any of the preferred alternatives. Economic impacts on fishing vessel permit holders associated with the non-preferred alternative to implement electronic video monitoring could be substantial, as the cost to purchase, install, and maintain these systems is still quite high.

List of Acronyms and Abbreviations

ACCSP	Atlantic Coastal Cooperative Statistics Program
ACFCMA	Atlantic Coastal Fishery Cooperative Management Act
APA	Administrative Procedure Act
ASMFC	Atlantic States Marine Fisheries Commission
CEQ	Council of Environmental Quality
CFDBS	Commercial Fisheries Database System
CV	Coefficient of Variation
CZMA	Coastal Zone Management Act
d/da	Discard-to-days-absent ratio
d/e	Discard-to-effort ratio
d/k	Discard-to-kept ratio
DAS	Days-at-sea
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act
FMP	Fishery Management Plan
FOIA	Freedom of Information Act
FONSI	Finding Of No Significant Impact
FVTR	Fishing Vessel Trip Report
GPS	Global Positioning System
ICNAF	International Commission for the Northwest Atlantic Fisheries
IQA	Information Quality Act (also known as the Data Quality Act or DQA)
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual Transferable Quota
km	Kilometer
lb	Pounds
MA	Mid-Atlantic
MAFMC	Mid-Atlantic Fishery Management Council

MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistics Survey
NAFO	Northwest Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NE	New England
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEMAP	Northeast Area Monitoring and Assessment Program
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council of the National Academies of Science
NWGB	National Working Group on Bycatch
OLE	NMFS Office of Law Enforcement
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PSP	Paralytic Shellfish Poisoning
QA/QC	Quality Assurance/Quality Control
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SAFIS	Standard Atlantic Fisheries Information System
SAP	Special Access Program
SAW/SARC	Stock Assessment Workshop/Stock Assessment Review Committee
SBRM	Standardized Bycatch Reporting Methodology
SFCPO	State-Federal Constituent Programs Office
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TAL	Total Allowable Level
U.S.	United States
USFWS	United States Fish and Wildlife Service
VMS	Vessel Monitoring System

Table of Contents

APPENDICES

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Table of Figures

Table of Tables

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Chapter 1
Introduction and Background

1.1. Introduction

This document amends the fishery management plans (FMPs) of the Northeast Region developed according to the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) under the jurisdiction afforded by the Magnuson-Stevens Act to the Mid-Atlantic and New England Fishery Management Councils (Councils). These FMPs (see Table 1) were developed by the Councils in the years since the original Fishery Conservation and Management Act was established in 1976, and represent the primary means by which commercial and recreational fishing activities are managed in the Federal waters of the U.S. Exclusive Economic Zone (EEZ).

The fisheries of the Northeast Region represent a wide variety of target species, fishing operations, and public interests. In many of these fisheries, some proportion of the fish that are caught are not kept to be sold or consumed, but are instead returned to the ocean (discarded). These discards are also known as bycatch, and the Magnuson-Stevens Act directs the Councils and NMFS to address bycatch in all FMPs. This amendment will examine, for these Northeast Region fisheries, how information on bycatch is collected and assessed, explore alternative methods of collecting information on bycatch, and consider whether any changes to current methods are warranted.

Although this amendment has been prepared primarily in response to the requirements of the Magnuson-Stevens Act, it also addresses the requirements of the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Regulatory Flexibility Act (RFA), the Paperwork Reduction Act (PRA), the Coastal Zone Management Act (CZMA), Executive Orders (EO) 12866 and 13132, the Administrative Procedure Act (APA), and the Information Quality Act (IQA, also known as the Data Quality Act, or DQA). These other applicable laws and directives help ensure that, in developing a fishery management action, the Councils and NMFS fully consider the expected impacts the action may have on the marine environment, living marine resources, and human communities. This integrated amendment document contains all elements of an FMP amendment, an Environmental Assessment (EA), a Regulatory Impact Review (RIR), and a Regulatory Flexibility Assessment.

1.2. The Magnuson-Stevens Act, National Standard 9, and the Required Provisions

In 1996, President Clinton signed into law the Sustainable Fisheries Act that, among other things, added three new National Standards to address fishing communities, bycatch, and safety at sea, put additional emphasis on conserving fish stocks, and added provisions related to essential fish habitat (EFH). The Sustainable Fisheries Act amendments to the Magnuson-Stevens Act included defining the term "bycatch," adding National Standard 9 to require bycatch to be minimized to the extent practicable, and requiring FMPs to establish a standardized bycatch reporting methodology (SBRM) to assess bycatch.

The Magnuson-Stevens Act now defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards." The Magnuson-Stevens Act expands upon this to say "[bycatch] does not include fish released alive under a recreational catch and release fishery management program." Also, the Magnuson-Stevens Act defines fish as "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds." Thus, under the Magnuson-Stevens Act, the term bycatch includes all regulatory and economic discards of finfish, shellfish and other invertebrates, sea turtles, marine plants, corals, etc., but does not include marine mammals or seabirds.

National Standard 9 states that "conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." Section 303(a) identifies the required provisions of any FMP prepared by a Council or NMFS (acting on behalf of the Secretary of Commerce) and includes (at § 303(a)(11)) the requirement to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority—(A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided." The focus of this amendment is on the requirement to establish an SBRM for each fishery managed under a Mid-Atlantic or New England Council FMP.

In January 2007, President Bush signed the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Magnuson-Stevens Reauthorization Act) into law. This Act reauthorized the Magnuson-Stevens Act and, among other things, requires the use of annual catch limits and accountability measures to prevent overfishing, provides for widespread market-based fishery management through limited access privilege programs, strengthens the role of science in decision-making, and calls for increased international cooperation. Although the Magnuson-Stevens Reauthorization Act touches on many aspects of fisheries management, nothing in the Act changes the SBRM provisions of the Magnuson-Stevens Act, or any of the associated provisions relevant to this amendment (National Standard 9, definitions of bycatch and fish). Thus, even though this amendment was begun prior to the implementation of the Magnuson-Stevens Reauthorization Act, no changes to the amendment are required.

1.3. Statement of the Problem

For most, if not all, fisheries, some proportion of discards die as a result of being caught and/or being discarded. The mortality rate of discarded catch is not known for many resource species and can vary under different conditions. Bycatch can affect fisheries and fishery resources in several important ways: (1) Uncertainty related to the amount and mortality of discards increases the uncertainty associated with stock assessments, diminishing managers' ability to accurately set and achieve optimum yield from a fishery; (2) time spent sorting and discarding unwanted catch reduces the efficiency of fisheries; and (3) mortality of discarded fishery resources precludes other, more valuable, uses of those resources (as future landings, prey for other species, etc.).

In some fisheries, catch rates of unwanted fish, or the mortality rates of discarded fish, may be sufficiently low that bycatch problems are minimal. In other fisheries, however, if both the catch rates of unwanted fish and the mortality of the discards are sufficiently high, bycatch problems may warrant significant management attention. The first step in understanding the scope and extent of any bycatch problems that may be associated with a fishery is to establish the means by which information on bycatch in the fishery can be collected. Scientists and managers must be able to ensure that the bycatch information collection program is adequately reliable and accurate to identify and address the relevant scientific and management needs (e.g., that the lack of information on bycatch and bycatch mortality does not compromise the ability to conduct stock assessments on which to base management decisions). Therefore, the primary purpose of bycatch reporting and monitoring is to collect information that can be used reliably as the basis for making sound fisheries management decisions.

1.4. Purpose and Need

This amendment is needed to ensure that all FMPs of the Northeast Region, developed under the jurisdiction of the New England and Mid-Atlantic Councils, comply with the SBRM requirements of the Magnuson-Stevens Act. The purpose of this amendment is to:

(1) Explain the methods and processes by which bycatch is currently monitored and assessed for Northeast Region fisheries;

(2) Determine whether these methods and processes need to be modified and/or supplemented;

(3) Establish standards of precision for bycatch estimation for all Northeast Region fisheries; and, thereby,

(4) Document the SBRMs established for all fisheries managed through the FMPs of the Northeast Region.

The scope of this amendment is limited to those fisheries that are prosecuted in the Federal waters of the Northeast Region and managed through an FMP developed by either the Mid-Atlantic or the New England Council (see Table 1). This amendment does not address fisheries managed through an FMP developed by any other regional fishery management council, the Highly Migratory Species branch of NMFS, the Atlantic States

Marine Fisheries Commission (ASMFC) (except those joint FMPs established by both the ASMFC and either the Mid-Atlantic or New England Council), or under the aegis of the Atlantic Coastal Fishery Cooperative Management Act (ACFCMA) (including American lobster and northern shrimp).

It is an objective of the SBRM to be implemented through this amendment that the resulting biological sampling programs be designed to minimize bias to the extent practicable, thus promoting the accuracy of the data, while maintaining a high level of precision.[1] Although throughout this document the Northeast Fisheries Observer Program (NEFOP) will be repeatedly referenced as the primary source of discard data on which the SBRM is based, the purpose and need (objectives) of this amendment should not be confused with the objectives of the Observer Program. The objectives of the Observer Program are broad and extend well beyond the scope of this amendment, including: Estimating takes of species protected under the Marine Mammal Protection Act and/or the Endangered Species Act; collecting biological information about fisheries catches; monitoring experiments and experimental fishing; learning about the economics of fishing; measuring fishing gear performance and characteristics; monitoring international fishing in U.S. waters; and maintaining links between scientists, managers, and fishermen. The objectives of the SBRM Amendment, however, are quite specific to meeting the SBRM-related provisions of the Magnuson-Stevens Act. For more information about the objectives and operations of the NEFOP, see the Fisheries Observer Program Manual (NMFS 2005a) and the Biological Sampling Manual (NMFS 2006a).

[1] For a more detailed discussion of sampling design, bias (accuracy), and precision, please see Chapter 5 of this document.

FMP	Managed Species
Atlantic Bluefish	Atlantic bluefish (*Pomatomus saltrix*)
Atlantic Herring	Atlantic herring (*Clupea harengus*)
Atlantic Salmon	Atlantic salmon (*Salmo salar*)
Deep-Sea Red Crab	deep-sea red crab (*Chaceon quinquedens*)
Mackerel, Squid, and Butterfish	Atlantic mackerel (*Scomber scombrus*) longfin squid (*Loligo pealeii*) shortfin squid (*Illex illecebrosus*) butterfish (*Peprilus triacanthus*)
Monkfish	monkfish (*Lophius americanus*)
Northeast Multispecies	LARGE-MESH American plaice (*Hippoglossoides platessoides*) Atlantic cod (*Gadus morhua*) Atlantic halibut (*Hippoglossus hippoglossus*) haddock (*Melanogrammus aeglefinus*) ocean pout (*Zoarces americanus*) pollock (*Pollachius virens*) redfish (*Sebastes faciatus*) white hake (*Urophycis tenuis*) windowpane (*Scopthalmus aquosus*) winter flounder (*Pseudopleuronectes americanus*) witch flounder (*Glyptocephalus cynoglossus*) yellowtail flounder (*Limanda ferruginea*) SMALL-MESH offshore hake (*Merluccius albidus*) red hake (*Urophycis chuss*) silver hake/whiting (*Merluccius bilinearis*)
Northeast Skate Complex	barndoor skate (*Dipturus laevis*) clearnose skate (*Raja eglanteria*) little skate (*Leucoraja erinacea*) rosette skate (*Leucoraja garmani*) smooth skate (*Malacoraja senta*) thorny skate (*Amblyraja radiata*) winter skate (*Leucoraja ocellata*)
Sea Scallop	Atlantic sea scallop (*Placopecten magellanicus*)
Spiny Dogfish	spiny dogfish (*Squalus acanthias*)
Summer Flounder, Scup, Black Sea Bass	black sea bass (*Centropristis striata*) scup (*Stenotomus chrysops*) summer flounder (*Paralichthys dentatus*)
Surfclam and Ocean Quahog	Atlantic surfclam (*Spisula solidissima*) ocean quahog (*Arctica islandica*)
Tilefish	golden tilefish (*Lopholatilus chamaeleonticeps*)

Table 1. List of affected FMPs and managed species.

1.5. Issues to be Resolved

What is the reason this amendment is being developed?

In 2003, the New England Council submitted to NMFS (acting on behalf of the Secretary of Commerce) Amendment 13 to the Northeast Multispecies FMP and, separately, Amendment 10 and Framework Adjustment 16 to the Atlantic Sea Scallop FMP. Both amendments and the framework adjustment proposed substantial changes to the management structures for the groundfish and sea scallop fisheries, including new areas closed to fishing, changes to and reductions in allowable fishing days-at-sea (DAS), and new fishing gear requirements, among other things. Both amendments and the framework adjustment were approved in 2004, and plaintiffs Oceana, the Conservation Law Foundation, and the Natural Resources Defense Council filed suit in the U.S. District Court for the District of Columbia challenging several aspects of Amendment 13. Oceana also later filed suit challenging several aspects of Amendment 10 and Framework 16. In both suits, the Court found the SBRM elements of the amendments and the framework to be inconsistent with the provisions of the Magnuson-Stevens Act.

In *Oceana, Inc., et al.,* v. *Donald L. Evans, et al.*, challenging Amendment 13 (*Oceana* v. *Evans I*), the Court found that the amendment failed to fully evaluate reporting methodologies to assess bycatch, did not mandate an SBRM, and failed to respond to potentially important scientific evidence. In *Oceana, Inc.,* v. *Donald L. Evans, et al.*, challenging Amendment 10 and Framework 16 (*Oceana* v. *Evans II*), the Court similarly found that the amendment and framework did not fully evaluate reporting methodologies, did not sufficiently address potentially important scientific evidence, and did not mandate a methodology for bycatch monitoring. In both cases, the Court remanded to the Secretary for further action the SBRM aspects of Amendment 13 and Amendment 10.

In order to comply with the two Court orders, NMFS and the New England Council must therefore amend the Northeast Multispecies and Atlantic Sea Scallop FMPs to ensure they comply with the SBRM provisions of the Magnuson-Stevens Act. Because many bycatch reporting and monitoring methods apply to and are interrelated with all Northeast Region fisheries, and because some of the weaknesses in the SBRM aspects of Amendment 13 and Amendment 10 may exist in other Northeast Region FMPs, NMFS and both Councils have agreed to amend all Northeast Region FMPs in one “omnibus” amendment.

What is meant by a “standardized” bycatch reporting methodology?

Although the Magnuson-Stevens Act includes the requirement for an SBRM, it does not define or explain what is meant by a “standardized” reporting methodology. The NOAA Office of General Counsel provided additional guidance on this issue by explaining that the provision does not require regional or national standardization, but rather that the requirement applies to each FMP for the fishery managed under it (NOAA Office of General Counsel 1997). The methodology used could, therefore, vary from one gear type to another, as long as the bycatch reports yield compatible data. For example, under one FMP, a dock intercept interview survey may be the most appropriate methodology to collect bycatch data in a shore-side recreational fishery, while an at-sea observer program may be the most appropriate methodology used to collect bycatch data from commercial fishing vessels. Under this definition, as long as the bycatch data reporting/collection is standardized for each reporting/collection method (i.e., the dock intercept survey is done the same way for all participants in the relevant fishery), then the Magnuson-Stevens Act requirement for an SBRM would be satisfied.

What types of discards are we concerned with?

Fish are discarded for a variety of reasons. Some fish are discarded because the regulations prohibit their retention under all circumstances (e.g., barndoor skates), other fish are discarded because they are smaller than the regulated minimum size (e.g., summer flounder smaller than 14 inches), and some fish are discarded because a possession limit for one species has already been reached but fishing has continued for other species. In other cases, some fish are discarded because there is no market for that species (e.g., sculpin), other fish are discarded because they have low economic/market value relative to other fish the fishermen would rather catch and land (e.g., small skates for the bait market versus large skates for the wing market), and some fish are discarded (particularly by recreational fishermen) simply because they are less desirable than the target species. Fish that are discarded consistent with regulations are called regulatory discards, while fish that are discarded based on economic decisions or personal choices made by the fisherman are called economic discards. Both types of discards represent bycatch that must be accounted for, and all bycatch reporting methods considered in this amendment must address both types. Where practicable, it is useful for the bycatch reporting mechanism to indicate the reason for the discards (regulatory or economic).

What is the focus of this amendment?

While it is important to understand the distinction between regulatory and economic discards, and to account for the reason behind the discards to the extent practicable in the bycatch reporting, the reasons fish are discarded and, therefore, measures that could be used to reduce discards, are not the focus of this amendment. The reasons for discards will not be addressed in detail in this amendment, other than to ensure that the resulting bycatch reporting methods are appropriate and sufficiently sensitive to capture information on both types of discards. Section 303(a)(11) of the Magnuson-Stevens Act addresses both the requirement to establish an SBRM for each FMP and the requirement to include conservation and management measures to minimize bycatch and bycatch mortality to the extent practicable, but this amendment is focused solely on the former requirement. Although these two issues are related, in the ruling on *Oceana v. Evans I*, the D.C. Circuit Court held that “the only part of Amendment 13 [to the Northeast Multispecies FMP] remanded to the Secretary concerns the bycatch reporting methodology” and also concluded that “this provision is severable from the balance of the Amendment.” Therefore, the focus of this amendment is limited to the SBRM provision of the Magnuson-Stevens Act. Any further action(s) that may be warranted to address bycatch reduction in one or more of the subject FMPs will be the subject of separate action by the Mid-Atlantic and/or New England Councils and NMFS.

Will this amendment address the reporting of protected species caught as bycatch?

As noted above, the Magnuson-Stevens Act specifically excludes marine mammals and seabirds from its definitions of fish and bycatch, but includes sea turtles. Thus, for the purposes of this amendment, the SBRM discussed herein will not specifically address reporting methodologies for marine mammals or seabirds. However, NMFS has similar obligations under the MMPA and ESA, so where these obligations are interrelated with the provisions of the Magnuson-Stevens Act, this amendment will identify existing methods used to identify, report, and monitor interactions with marine mammals and seabirds. Because sea turtles are specifically included in the Magnuson-Stevens Act definitions of fish and bycatch, this amendment will address the reporting and monitoring of sea turtles caught as bycatch in the subject fisheries.

1.6. Structure of the Amendment

This document amends all existing Northeast Region FMPs that have been developed by either the Mid-Atlantic or the New England Council. This amendment is focused on identifying, evaluating, and, where appropriate, strengthening the SBRM that applies to all relevant fisheries in the Northeast Region. In order to present the information contained in this “omnibus” amendment in as clear a manner as possible, the amendment is organized as follows.

Chapter 2 is organized by FMP, and provides a brief overview of each Northeast Region FMP. This overview briefly describes the history and management structure associated with the FMP, characterizes where and when the fisheries managed under the FMP primarily take place, identifies the relationship of the primary fishery(ies) to other fisheries in the region, identifies the proportion of catch associated with the recreational and commercial fishery(ies) managed under the FMP, and identifies the primary ports associated the fishery(ies). This chapter also identifies the fishing gears that are used to catch the relevant species and further identifies the primary fishing modes used in the fishery(ies). This last section is intended to serve as a bridge between the consideration of an FMP as the operational unit for Magnuson-Stevens Act compliance and the primary fishing modes as the operational unit for an SBRM.

Chapter 2 is the only one organized by FMP. Chapter 3 introduces the concept of the fishing mode, which, for the purposes of this amendment, is defined as a category of fishing activity (gear- and/or area-based) that can be used to distinguish the common elements of one fishery from those of another. Whereas a single FMP may cover multiple fisheries with substantial differences among them that would affect the design of the most effective SBRM for that FMP, a fishing mode would share many of the relevant characteristics that can be exploited to design an SBRM to be as effective as possible. For example, the Mid-Atlantic Council’s Summer Flounder, Scup, and Black Sea Bass

FMP encompasses a large-mesh otter trawl commercial fishery (for summer flounder, scup, and, to some degree, black sea bass), a handline/rod and reel commercial fishery (for black sea bass and, to a lesser extent, scup), a commercial pot fishery (for black sea bass), and a variety of recreational fisheries. Other than the target species, these fisheries have more in common with other fisheries that employ the same gear types and occur in the same areas than with each other, and this is true for many FMPs. For example, the Atlantic mackerel pair trawl fishery shares more traits with the Atlantic herring pair trawl fishery than with the squid fisheries, which themselves share many traits with the silver hake fishery managed under the Northeast Multispecies FMP. In some cases, a fishing mode may represent only one FMP, which itself is limited to only one fishing mode (the crab pot/trap fishery and the Deep-Sea Red Crab FMP is an example). In most other cases, however, each fishing mode incorporates subset fisheries managed under multiple FMPs, such as the New England gillnet mode, which includes subset fisheries managed under the Northeast Multispecies, Monkfish, and Northeast Skate FMPs (by "subset," we mean that each of these FMPs is also represented in other fishing modes).

The development of an SBRM must consider how, where, and when it is most appropriate to collect information on and monitor bycatch occurring in a fishery, and the most effective SBRM will be designed at the appropriate operational level. Thus, the organization of this amendment reflects this objective and focuses on fishing modes rather than on the subject FMPs. Chapter 3 describes the fishing modes that are the focus of the rest of the amendment. This chapter identifies the various species caught in each fishing mode, linking back to the description of the FMPs in chapter 2.

Chapter 4 introduces a variety of bycatch reporting and monitoring mechanisms that have been or are being employed in various fisheries around the U.S. and around the world. This chapter does not evaluate the efficacy of these mechanisms (this is done in a later chapter), but simply serves to provide background information and to establish that there are a variety of techniques that can be used to collect this information.

Chapter 5 addresses the analytical components of an SBRM to describe how assessments are done once data are collected and how bycatch data are used to determine the appropriate allocation of at-sea observer effort. The chapter discusses the concepts of precision and accuracy and identifies various problems that can affect the precision and accuracy of bycatch estimates. This chapter focuses largely, but not exclusively, on data collected by at-sea observers, and explains the various techniques that are used to maximize precision and minimize bias.

Chapter 6 identifies the specific management alternatives, including the preferred alternatives, under consideration in this amendment. This chapter presents alternatives regarding setting a bycatch reporting standard for each fishery, and describes the processes that are to be used to determine whether the standards are being met. This chapter also describes briefly the alternatives that were considered but rejected from further analysis.

Chapter 7 presents the expected environmental consequences of the alternatives under consideration in this amendment. This chapter describes the affected environment, the impacts associated with the preferred alternative and the other alternatives, and the expected cumulative effects associated with the action.

Chapter 8 describes the relationship of this action to all other applicable laws and directives, including NEPA, the RFA, the CZMA, the ESA, and the MMPA. This chapter documents compliance with these other laws and directives, and includes a Finding of No Significant Impact (FONSI) statement, an assessment under the RFA, and an RIR. Chapter 9 presents a glossary of terms used in this amendment, and chapter 10 lists all the reference materials cited in the amendment. In addition to the main amendment document, there are several appendices.

This structure was selected in order to avoid the duplication and redundancy that would result from maintaining an FMP-based structure throughout the whole amendment. Some degree of duplication is unavoidable in a document such as this, given the many subject FMPs and the multiple legal requirements that apply to its development.

1.7. Proposed Action

The Councils propose management measures and provisions such that, upon implementation of the Omnibus SBRM Amendment to all Northeast Region FMPs, the following elements would comprise the Northeast Region SBRM, as more fully described in chapters 4, 5, and 6:

1. Bycatch reporting and monitoring mechanisms – This element addresses the methods by which data and information on discards occurring in Northeast Region fisheries are collected and obtained. The amendment proposes to maintain the status quo. The Northeast Region SBRM shall employ sampling designs developed to minimize bias to the maximum extent practicable. The NEFOP shall serve as the primary mechanism to obtain data on discards in all Northeast Region commercial fisheries managed under one or more of the subject FMPs. All subject FMPs shall continue to require vessels permitted to participate in said fisheries to carry an at-sea observer upon request, and all data obtained by the NEFOP under this SBRM shall be collected according to the techniques and protocols established and detailed in the Fisheries Observer Program Manual (NEFOP 2006a) and the Biological Sampling Manual (NEFOP 2006b). Data collected by the NEFOP shall include, but not be limited to, the following items: Vessel name; date/time sailed; date/time landed; steam time; crew size; home port; port landed; dealer name; fishing vessel trip report (FVTR) serial number; gear type(s) used; number/amount of gear; number of hauls; weather; location of each haul (beginning and ending latitude and longitude); species caught; disposition (kept/discarded); reason for discards; and weight of catch.[2] These data shall be collected on all species of biological organisms caught by the fishing vessel and brought on board, including species

[2] For detailed lists of the data elements collected by NEFOP observers, by type of fishing trip, see the Fisheries Observer Program Manual (NEFOP 2006a).

managed under the subject FMPs but also including species of non-managed fish, invertebrates, and marine plants.[3] To obtain information on discards occurring in recreational fisheries subject to a Northeast Region FMP, the Northeast Region SBRM shall fully incorporate, to the extent practicable and appropriate for the Region, all surveys and data collection mechanisms implemented by NMFS and affected states as a result of the agency-wide redesign of the Marine Recreational Fisheries Statistics Survey (MRFSS) Program.

2. Analytical techniques and allocation of at-sea fisheries observers – This element addresses the methods by which the data obtained through the mechanisms included above are analyzed and utilized to determine the appropriate allocation of at-sea observers across the subject fishing modes. The amendment proposes to substantially expand and refine the status quo methods to fully incorporate all managed species and all relevant fishing gear types in the Northeast Region. At-sea fisheries observers shall, to the maximum extent possible and subject to available resources, be allocated and assigned to fishing vessels according to the procedures established through this amendment, as described in chapter 5 to the amendment and in Rago et al. (2005) and Wigley et al. (2006). All appropriate filters identified in chapters 5 and 6 shall be applied to the results of the analysis to determine the observer coverage levels needed to achieve the objectives of the SBRM.

3. SBRM performance standard – The amendment proposes to ensure that the data collected under the Northeast Region SBRM are sufficient to produce a coefficient of variation (CV) of no more than 30 percent, in order to ensure that the effectiveness of the Northeast Region SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days. Each year, the Regional Administrator and the Science and Research Director shall allocate sufficient at-sea observer coverage to the applicable fisheries of the Northeast Region in order to achieve a level of precision (measured as the CV) no greater than 30 percent for each applicable species and/or species group, subject to the use of the filters noted above and described in chapters 5 and 6.

4. SBRM review and reporting process – The amendment proposes to require an annual report on discards occurring in Northeast Region fisheries to be prepared by NMFS and provided to the Councils, and also to require a report every 3 years that evaluates the effectiveness of the Northeast Region SBRM. Every 3 years, the Regional Administrator and the Science and Research Director shall appoint appropriate staff to work with staff appointed by the Executive Directors of the Councils to obtain and review available data on discards and to prepare a report assessing the effectiveness of the Northeast Region SBRM. This report shall include, at a minimum: (1) A review of the recent levels of observer coverage in each applicable fishery; (2) a review of recent observed

[3] For a complete list of the species for which the above listed data elements are collected, see Appendix A and Appendix R of the Fisheries Observer Program Manual (NEFOP 2006a).

encounters with each species in each fishery, and a summary of observed discards by weight; a review of the CV of the discard information collected for each fishery; (4) an estimate of the total discards associated with each fishery; (5) an evaluation of the effectiveness of the SBRM at meeting the performance standard for each fishery; (6) a description of the methods used to calculate the reported CVs and to determine observer coverage levels, if those methods are different from those described and evaluated in the SBRM Amendment; (7) an updated assessment of potential sources of bias in the sampling program and analyses of accuracy; and (8) an evaluation of the implications for management of the discard information collected under the SBRM, for any cases in which the evaluation performed for item 5 indicates that the performance standard is not met (see Appendix F). Once per annum, the Science and Research Director shall present to the Councils a report on catch and discards occurring in Northeast Region fisheries, as reported to the NEFOP by at-sea fisheries observers. This annual discard report shall include: (1) The number of observer sea days scheduled for each fishery, by area and gear type, in each quarter; (2) the percent of total trips observed, by gear type, in each quarter; (3) the distribution of sea sampling trips by gear type and statistical area in each fishery; (4) the observed catch and discards of each species, by gear type and fishery, in each quarter; and (5) the observed catch and discards of each species, by gear type and fishery, in each statistical area (see Appendix G).

5. Framework adjustment and/or annual specification provisions – The amendment proposes a measure to enable the Councils to make changes to certain elements of the SBRM through framework adjustments and/or annual specification packages rather than full FMP amendments. All subject FMPs shall provide for an efficient process to modify aspects of the Northeast Region SBRM, as relates to each specific FMP, should the need arise and the appropriate Council determine that a change to the SBRM is warranted and needed to address a contemporary management or scientific issue. Depending on the provisions of each FMP, changes to the SBRM may be effected either through a framework adjustment to the FMP or through annual or periodic specifications. Such changes to the SBRM may include modifications to the CV-based performance standard, the means by which discard data are collected/obtained in the fishery, reporting on discards or the SBRM, or the stratification (modes) used as the basis for SBRM-related analyses. Such changes may also include the establishment of a requirement for industry-funded observers and/or observer set-aside provisions.

6. Prioritization process – The amendment proposes a process to provide the Councils, and the public, with an opportunity to consider, and provide input into, the decisions regarding prioritization of at-sea observer coverage allocations, if the expected resources necessary may not be available. In any year in which external operational constraints would prevent NMFS from fully implementing the required at-sea observer coverage levels, the Regional Administrator and Science and Research Director shall consult with the Councils to determine the most appropriate prioritization for how the available

resources should be allocated. In order to facilitate this consultation, in these years, the Regional Administrator and the Science and Research Director shall provide the Councils, at the earliest practicable opportunity: (1) The at-sea observer coverage levels required to attain the SBRM performance standard in each applicable fishery; (2) the coverage levels that would be available if the resource shortfall were allocated proportionately across all applicable fisheries; (3) the coverage levels that incorporate the recommended prioritization; and (4) the rationale for the recommended prioritization. The recommended prioritization should be based on: Meeting the data needs of upcoming stock assessments; legal mandates of the agency under other applicable laws, such as the MMPA and the ESA; meeting the data needs of upcoming fishery management actions, taking into account the status of each fishery resource; improving the quality of discard data across all fishing modes; and/or any other criteria identified by NMFS and/or the Councils. The Councils may choose to accept the proposed observer coverage allocation or to recommend revisions or additional considerations for the prioritized observer allocations ultimately adopted and implemented by the Regional Administrator and the Science and Research Director.

7. Industry-funded observers and observer set-aside program provisions – The amendment proposes to implement consistent, cross-cutting observer service provider approval and certification procedures and to enable the Councils to implement either a requirement for industry-funded observers and/or an observer set-aside program through a framework adjustment rather than an FMP amendment.

This amendment proposes no additional actions other than those summarized above and described in chapter 6 of this document. No other regulatory changes or management actions are proposed or intended to be implemented at this time. Any further actions or changes to management measures would require an additional action (i.e., annual specifications, framework adjustment, or amendment) by a Council.

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Chapter 2
Description of the Fisheries

All of the FMP summaries below incorporate data from the seafood dealer purchase report database, from 2000-2005, inclusive. For some FMPs, the fishing year is offset from the calendar year, and starts on March 1 (Sea Scallops and Deep-Sea Red Crab), May 1 (Northeast Multispecies, Spiny Dogfish, and Skates), or on November 1 (Tilefish). For ease of analysis and consistency of presentation, the landings data for these FMPs are summarized based on calendar year, not fishing year.

2.1. Atlantic Bluefish FMP

Bluefish is a migratory pelagic species found in most temperate and tropical marine waters throughout the world. Along the U.S. Atlantic coast, bluefish commonly are found in estuarine and continental shelf waters. Bluefish are a schooling species that migrate in response to seasonal changes, moving north and inshore during spring and south and offshore in the late autumn. The Atlantic bluefish fishery exploits what is considered to be a single stock of fish.

The Mid-Atlantic Council began developing the Atlantic Bluefish FMP in 1979 in response to a petition by concerned fishermen reacting to developments in international markets for bluefish. The final FMP was adopted as a joint plan between the Council and the ASMFC in 1989. The FMP was approved and implemented in 1990. There has only been one amendment to the FMP, developed in response to the Sustainable Fisheries Act amendments to the Magnuson-Stevens Act and implemented in 2000.

The FMP established a state-by-state commercial quota system and a coastwide recreational harvest limit. The Council and the ASMFC decide annually on a total allowable landings (TAL) level, that is divided between the commercial and recreational sectors (the commercial quota is further allocated to the states from Maine through Florida based on percentage shares specified in the FMP). The FMP calls for 83 percent of the TAL to be allocated to the recreational sector and 17 percent allocated to the commercial sector, but provides for a transfer of quota to the commercial sector from the recreational sector within certain limits. The Bluefish FMP is the only Northeast Region FMP that allocates specific quota to the states of South Carolina, Georgia, and Florida.

Amendment 1 to the FMP established a plan to rebuild the stock within 9 years through a gradual reduction in fishing mortality rate. In recent years, commercial catch has ranged from 8.0 million lb in 2001 down to 6.0 million lb in 2005, and recreational catch has ranged from 11.4 million lb in 2002 up to 16.5 million lb in 2005 (see Table 2). The major ports associated with bluefish are listed in Table 3.

The primary gear types used in the commercial fisheries that land bluefish include gillnets, rod and reel, and otter trawls, although there are small localized fisheries, such as the beach seine fishery that operates along the Outer Banks of North Carolina, that also catch bluefish. Many of these fisheries do not fish exclusively for bluefish, but target a combination of species including croaker, mullet, Spanish mackerel, spot, striped bass, and weakfish. Recreational fishing, which dominates the catch of bluefish, is almost exclusively rod and reel, and includes shoreside recreational anglers, party/charter boats, and private recreational boats. There is a lot of seasonality to both the commercial and recreational fisheries for bluefish due to the migratory nature of the species.

	Commercial Landings	Recreational Landings
2001	8,040,000 lb	13,230,000 lb
2002	6,427,000 lb	11,371,000 lb
2003	6,745,000 lb	13,136,000 lb
2004	7,512,000 lb	15,146,000 lb
2005	6,025,000 lb	16,473,000 lb

Table 2. Recent commercial and recreational landings of bluefish.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Wanchese, NC	2,485,000 lb	$653,000
Long Beach/Barnegat Light, NJ	908,000 lb	$467,000
Hampton Bays, NY	884,000 lb	$385,000
Greenport, NY	390,000 lb	$114,000
Point Judith, RI	366,000 lb	$103,000
Point Pleasant, NJ	350,000 lb	$100,000
Amagansett, NY	293,000 lb	$77,000

Table 3. Primary ports associated with the bluefish fishery (values are averaged for 2000-2005).

2.2. Atlantic Herring FMP

Atlantic herring are distributed along the Atlantic coast from North Carolina to the Canadian Maritime provinces. Schooling, or the formation of large aggregations for feeding and migration, is characteristic of herring species. This behavior begins as early as the onset of metamorphosis during larval development. Although herring schools are sometimes visible at the water's surface during the day, they typically undertake diurnal vertical migrations, sinking to the seafloor during the day and rising to the surface after dusk. Schools of adult herring make extensive migrations to areas where they feed, spawn, and overwinter.

Atlantic sea herring stocks were first managed in 1972 through the International Commission for the Northwest Atlantic Fisheries (ICNAF),[4] which regulated the high-seas international fishery. Upon implementation of the original Magnuson Fishery Conservation and Management Act in 1976, the New England Council developed an FMP for herring. This FMP was implemented in late 1978; however, the FMP was withdrawn in 1982 due to concerns over the lack of enforcement of state waters quotas. In 1996, the Council began development of a new FMP for herring that was intended to closely coordinate Federal management with that of the ASMFC. This FMP was implemented in 2000.

The Atlantic Herring FMP established total allowable catches (TACs) for each of four management areas in the Gulf of Maine and Georges Bank. This FMP established requirements for vessel, dealer, and processor permits, as well as reporting requirements and restrictions on the size of vessels that can catch herring. Amendment 1 to the FMP was completed in 2006 and implemented a limited access qualification program, changes to management areas, and improved monitoring of catch.

Although some herring are caught incidentally in recreational fisheries for Atlantic mackerel and silver hake, this is limited to coastal New Jersey, and almost all herring are caught for commercial purposes. There are two primary uses of commercially-caught herring: As bait (in either the tuna fishery or the lobster fishery) or as a food fish. Other than tuna vessels catching their own herring to use as bait, almost all herring is caught with either mid-water trawls (single and paired) or purse seines. The majority of herring landings are made with mid-water trawls; purse seines accounted for approximately one-fifth of landings from 2000-2004.

While herring is caught over a wide range, there are seasonal patterns to the fishery. During the winter months (December-March), the fishery is most active in the coastal waters south of New England, as adult herring move into this area. The fishery generally moves offshore and into the Gulf of Maine as spring approaches, and by late summer or early fall, the fishery concentrates on the coastal waters of Maine, New Hampshire, and Massachusetts as herring move into these areas prior to spawning. The Georges Bank fishery is most active in summer and early fall. Table 4 lists recent landings, and Table 5 identifies the major herring ports.

[4] ICNAF formerly coordinated management of many fisheries off the east coast of North America. ICNAF lasted until 1979, when it was partly replaced by Northwest Atlantic Fisheries Organization (NAFO).

	Commercial Landings	Recreational Landings
2001	215,410,000 lb	52,000 lb
2002	150,773,000 lb	11,000 lb
2003	214,171,000 lb	56,000 lb
2004	187,387,000 lb	27,000 lb
2005	191,413,000 lb	65,000 lb

Table 4. Recent commercial and recreational landings of herring.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Gloucester, MA	43,607,000 lb	$2,948,000
Portland, ME	36,382,000 lb	$2,533,000
Rockland, ME	26,843,000 lb	$2,047,000
New Bedford, MA	12,331,000 lb	$860,000
North Kingston/Wickford, RI	11,230,000 lb	$1,136,000
Newington, NH	11,045,000 lb	$748,000
Stonington, ME	9,709,000 lb	$713,000
Bath, ME	9,643,000 lb	$624,000

Table 5. Primary ports associated with the herring fishery (values are averaged for 2000-2005).

2.3. Atlantic Salmon FMP

Atlantic salmon are a migratory anadromous fish with a complex life history, going through several distinct phases marked by changes in physiology and behavior. Spawning and juvenile development of Atlantic salmon occur in fresh water New England streams, with adults undergoing a highly migratory life on the open ocean and returning to fresh water to reproduce. Atlantic salmon in the Gulf of Maine are either migratory stocks, undergoing long ocean migrations, or resident stocks, with more limited ocean migrations. Northern Canadian stocks are residential, while New England stocks tend to be migratory, traveling vast distances across open ocean to feeding grounds off the coast of southwestern Greenland and later returning to their New England spawning grounds. Although rivers from Maine to Connecticut once supported healthy populations of Atlantic salmon, native Atlantic salmon have since become extirpated in all but a select few rivers in Maine.

The New England Council developed an FMP for Atlantic salmon that was implemented by NMFS in 1988. The FMP established explicit U.S. management authority over all Atlantic salmon of U.S. origin. The plan was intended to complement state management programs in coastal and inland waters and Federal management authority on the high seas (conferred to the U.S. as a signatory nation to the North Atlantic Salmon Conservation Organization).

The FMP prohibits possession of Atlantic salmon and any directed or incidental (bycatch) commercial fishery for Atlantic salmon in Federal waters. The Council's Atlantic salmon plan strengthens the efforts of local groups, such as the Connecticut River Atlantic Salmon Commission, that are working towards the restoration of salmon stocks in New England river systems. The only change to the Atlantic Salmon FMP, Amendment 1, was implemented in 1999 to designate essential fish habitat and provide for a framework adjustment mechanism related to aquaculture.

The Atlantic salmon fishery expanded during the late 1800s from a reported 183 weirs and nets capturing 7,320 salmon in 1867 to 230 weirs and 36 gillnets capturing over 10,016 salmon in 1880. The catch peaked in 1889 with over 17,000 salmon and began a steady decline during the 20th century, with landings falling to as low as 40 salmon in 1947 (Collette and Klein-MacPhee 2002). Because no reporting requirements were established for the fishery, landings data are incomplete. In 1989, all state and Federal commercial salmon fisheries in New England were closed by law. Recreational salmon fishing continues in the Gulf of Maine under strict regulation. In spite of the decline of wild salmon populations, Atlantic salmon remains an important fishery resource in New England through the development of fish farming efforts (aquaculture and mariculture). Salmon mariculture is especially important in Maine, where revenues for farmed Atlantic salmon reached $58.2 million in 2001.

2.4. Atlantic Sea Scallop FMP

The Atlantic sea scallop is a bivalve mollusk that is highly valued for the meat in the large adductor muscle that holds the top and bottom portions of the shell together. Sea scallops are semi-mobile, bottom dwelling organisms. They are most abundant on coarse sand, gravel, and cobble. Mature females are highly fecund and produce millions of eggs during the late summer and autumn months. The Atlantic sea scallop is managed as a single unit throughout its range in United States waters. Five stock components are recognized: The Gulf of Maine; eastern Georges Bank; the Great South Channel; the New York Bight; and the waters adjacent to Delaware, Maryland, and Virginia.

The Atlantic Sea Scallop FMP, prepared by the New England Council, was implemented in 1982 to restore adult scallop stocks and reduce year-to-year fluctuations in stock abundance caused by variation in recruitment. Amendments 4 and 7 significantly reduced fishing effort by limiting access to the resource, instituting DAS allocations (limiting the number of days a vessel is allowed to fish for scallops each year), implementing gear restrictions to improve escapement of small scallops and finfish, and limiting crew size. Area closures in New England and the Mid-Atlantic and above-average recruitment have resulted in increased scallop biomass both within and outside of the groundfish closed areas. Under current regulations, the scallop fleet can be differentiated by vessel permit category: Limited access vessels that are subject to area-specific DAS controls and trip allocations; and general category vessels that are not subject to DAS controls, but are subject to a 400 lb possession limit per fishing trip.

The Sea Scallop FMP has been further refined through multiple framework adjustments and amendments. The most recent amendment, Amendment 10, established a long-term, comprehensive program to manage the sea scallop fishery through an area rotation management program to maximize scallop yield. Areas are defined and closed and reopened to fishing on a rotational basis, depending on the condition and size of the scallop resource in the areas. As a result of Amendment 10, controls on scallop effort differ depending on whether a fishing trip occurs in an access area or in an open area. Amendment 10 also included updated DAS allocations, measures to minimize bycatch to the extent practicable, measures to minimize the effects of scallop fishing on essential fish habitat to the extent practicable, and other measures to make the management program more effective, efficient, and flexible. Due to concerns about the rapid expansion of participation in the open access general category scallop fleet, the Council approved Amendment 11 to control capacity in this sector.

Scallops are harvested primarily through the use of scallop dredges and trawls. In recent years (2000-2004), over 90 percent of all scallop landings are by dredge vessels. During the 2000-2004 fishing years, trawl vessels landed another 7-8 percent, with other gear types contributing only trace amounts of scallop landings.

The Atlantic sea scallop fishery is rebuilt to sustainable levels, following declines in fishing mortality from effort reductions, gear restrictions, and closed areas, combined with above average recruitment in some areas and in multiple years since 1999. Since 1998, when new area closures were established, total commercial landings and revenue have nearly tripled without increasing the mortality rate (see Table 6). Revenues from commercial scallop landings for New England and Mid-Atlantic states in the year 2000 were estimated at $161 million. Increased landings were made possible by an increase in scallop biomass and favorable recruitment. The majority of limited access vessels are based in Massachusetts, Virginia, New Jersey, and North Carolina, and the primary scallop ports are located in New Bedford, MA, and Newport News, VA (see Table 7).

	Commercial Landings	Ex-vessel Value
2001	46,694,000 lb	$173,784,000
2002	52,686,000 lb	$202,383,000
2003	56,039,000 lb	$229,347,000
2004	64,506,000 lb	$320,696,000
2005	56,170,000 lb	$429,782,000

Table 6. Recent commercial landings of Atlantic sea scallops.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
New Bedford, MA	23,456,000 lb	$119,794,000
Newport News, VA	7,603,000 lb	$33,920,000
Cape May, NJ	6,184,000 lb	$29,467,000
Seaford, VA	5,040,000 lb	$25,263,000
Long Beach/Barnegat Light, NJ	3,925,000 lb	$22,784,000
Hampton, VA	3,255,000 lb	$14,075,000

Table 7. Primary ports associated with the sea scallop fishery (values are averaged for 2000-2005).

2.5. Deep-Sea Red Crab FMP

The deep-sea red crab is a deep-water brachyuran crab that occurs in a patchy distribution on the continental shelf and slope from Nova Scotia to Florida. Though the species is found primarily within a 200-1800 meter depth band along the continental shelf and slope, red crabs have also been located in some deep-water canyons along the coast and can also be found in the Gulf of Maine. Preferred depth depends, in part, on the characteristics of individual crabs. Young crabs dwell in considerably deeper water than adults and males are typically found deeper than females. The red crab is a slow-growing species that may not spawn annually. It is long-lived, with some individuals surviving for up to 15 years. These characteristics make it particularly susceptible to depletion by overfishing.

There has been a small directed fishery off the coast of New England and in the Mid-Atlantic for deep-sea red crab since the early 1970s. Though the size and intensity of this fishery has fluctuated, it has remained consistently small relative to more prominent New England fisheries such as groundfish, sea scallops, and lobster. Landings increased substantially after 1994, when implementation of Amendment 5 to the Northeast Multispecies FMP may have led some fishing effort to redirect onto “under-exploited” fishery resources such as red crab.

In 1999, at the request of members of the red crab fishing industry, the New England Council began development of an FMP to prevent overfishing of the red crab resource and address a threat of overcapitalization of the red crab fishery. A control date was established in 2000 to discourage "speculative entry," or rapid entry of new vessels into the fishery and, in 2001, NMFS implemented emergency regulations to prevent overfishing of the resource during the time the FMP was being developed. The FMP was implemented in 2002. The primary management control was to establish a limited access permit program for qualifying vessels with documented history in the fishery. Other measures implemented under the FMP included DAS limits, trip limits, gear restrictions, and limits on processing crabs at sea. The only change to the FMP, implemented as Framework Adjustment 1, provided for a 3-year, rather than annual, specification-setting process.

Although there is an open access permit category, the small possession limit of 500 lb per trip has kept this sector of the fishery very small. The directed red crab fishery is limited to using parlor-less crab pots, and is considered to have little, if any, incidental catch of other species. There is no known recreational fishery for deep-sea red crab. Landings of red crab varied somewhat before the implementation of the FMP, but have stabilized since (see Table 8). All vessels with limited access permits now fish out of Fall River, MA.

	Commercial Landings	Ex-vessel Value
2001	8,826,000 lb	$8,090,000
2002	4,724,000 lb	$3,997,000
2003	3,712,000 lb	$3,624,000
2004	3,952,000 lb	$4,214,000
2005	3,676,000 lb	$3,981,000

Table 8. Recent commercial landings of deep-sea red crabs.

2.6. Mackerel, Squid, and Butterfish FMP

Atlantic mackerel, *Illex* and *Loligo* squid, and butterfish are all schooling pelagic species that range from at least the Gulf of St. Lawrence south to at least Cape Lookout, NC.[5] Butterfish and the two squids are fast-growing, short-lived species, while Atlantic mackerel grows more slowly and lives several years longer. All four species are most abundant from Georges Bank to Cape Hatteras, NC, and follow seasonal migration patterns based largely on water temperature.

The FMP was developed by the Mid-Atlantic Council and was implemented in 1983. Early amendments to the FMP changed permit and reporting requirements, the fishing year, quota adjustment mechanisms, foreign fishing and joint venture provisions, and implemented limited access systems for butterfish and the two squid fisheries. Amendment 8, implemented in 1999, was developed to bring the FMP into compliance with the Sustainable Fisheries Act. Amendments to the FMP currently under development are intended to address limited access for the *Illex* squid fishery and bycatch (Amendment 9), develop a rebuilding plan for butterfish and address bycatch (Amendment 10), and address limited access for Atlantic mackerel (Amendment 11).

[5] Atlantic mackerel ranges from the Gulf of St. Lawrence to Cape Lookout, NC; *Loligo* squid ranges from Newfoundland to the Gulf of Venezuela; *Illex* squid ranges from the Labrador Sea to the Florida Straits; and butterfish range from the Gulf of St. Lawrence to the coast of Florida.

The mackerel, squid, and butterfish fisheries are all managed by directly controlling harvest. The directed mackerel fishery can be closed when landings are projected to reach 80 percent of the total domestic harvest. The mackerel incidental catch fishery can be closed when landings are projected to reach 100 percent of the total domestic harvest. The directed *Loligo* fishery is managed via quarterly or trimester quota allocations and the directed fishery is closed when 80 percent of the quota allocations or 95 percent of the total domestic harvest is projected to be landed. The directed *Illex* or butterfish fisheries close when 95 percent of the total domestic harvest is projected to be landed. During closures of the directed *Loligo*, *Illex*, or butterfish fisheries, incidental catch fisheries for these species are permitted.

Although 1 percent of butterfish landed from 2000-2004 were reported as caught with gillnets, and trace amount of these species were reported as caught with a variety of fishing gears, more than 98 percent of reported landings or all four species during this period were caught with otter trawls (midwater and bottom). Management measures implemented under this FMP restrict only the commercial fishing sectors, although there is a recreational fishery for Atlantic mackerel.

Fishing for Atlantic mackerel occurs year-round, although most fishing activity occurs from January through April. The *Illex* squid fishery occurs largely from June through October, although this can vary somewhat from year to year. In some years, the *Loligo* squid fishery remains relatively consistent throughout the year, but in most years, landings peak during October through April. Butterfish are landed year-round, with no apparent seasonal patterns. Table 9 lists the estimated recreational landings of Atlantic mackerel from 2001-2005. Table 10 and Table 11 identify the recent landings, ex-vessel value, and primary ports for these fisheries.

	Recreational Landings
2001	3,386,000 lb
2002	2,852,000 lb
2003	1,698,000 lb
2004	1,134,000 lb
2005	2,289,000 lb

Table 9. Recreational landings of Atlantic mackerel.

	Atlantic mackerel		Butterfish		Illex squid		Loligo squid	
	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)
2001	27,206	$2,223	9,709	$3,237	8,838	$1,937	31,388	$20,772
2002	58,489	$6,178	1,922	$1,007	6,062	$1,414	36,832	$23,542
2003	75,614	$7,922	1,181	$661	14,091	$3,980	26,313	$19,909
2004	121,239	$13,084	1,187	$724	56,045	$16,763	34,057	$25,745
2005	93,039	$10,025	866	$691	25,836	$8,077	36,942	$27,632

Table 10. Recent commercial landings in the Atlantic mackerel, butterfish, and squid fisheries.

Atlantic mackerel		Butterfish		Illex squid		Loligo squid	
Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value
Cape May, NJ	$2,430,000	N. Kingstown, RI	$339,000	N. Kingstown, RI	$9,881,000	Point Judith, RI	$8,667,000
N. Kingstown/ Wickford, RI	$1,998,000	Point Judith, RI	$324,000	Cape May, NJ	$1,764,000	N. Kingstown/ Wickford, RI	$4,303,000
Portsmouth, RI	$1,244,000	Montauk, NY	$162,000	Point Judith, RI	$341,000	Hampton Bays, NY	$3,058,000
Gloucester, MA	$1,043,000	Hampton Bays, NY	$76,000	Newport, RI	$158,000	Montauk, NY	$2,922,000
New Bedford, MA	$1,000,000	Greenport, NY	$65,000			Cape May, NJ	$1,688,000

Table 11. Primary ports associated with the Atlantic mackerel, butterfish, and squid fisheries (values are averaged for 2000-2005).

2.7. Monkfish FMP

The monkfish (also known as goosefish) is a member of the anglerfish family Lophiidae, fishes distinguished by an appendage on the head known as the illicium which has a fleshy end (esca) that acts as a lure to attract prey to within range of its large mouth. Monkfish have a large, bony head and are harvested for their livers and the tender meat in their tails. The species is distributed widely throughout the Northwest Atlantic, from the northern Gulf of St. Lawrence to Cape Hatteras, NC, and is known to inhabit waters from the tide-line to depths as great at 840 meters across a wide range of temperatures.

Adults have been found on a variety of substrate types including hard sand, gravel, broken shell, and soft mud. Spawning occurs in May and June from Cape Hatteras to southern New England. Mature females, which are slightly larger than males, produce a non-adhesive, mucoid egg raft or veil which can reach 20-40 feet in length and ½-5 feet in width. During spawning, this large mass of eggs can account for up to 50 percent of a female's body mass. Monkfish are managed as two stocks, a northern stock from Maine to Cape Cod, MA, and a southern stock from Cape Cod to North Carolina.

During the early 1990s, fishermen and dealers in the monkfish fishery addressed both the New England and Mid-Atlantic Councils with concerns about the increasing amount of small fish being landed, the increasing frequency of gear conflicts between monkfish vessels and those in other fisheries, and the expanding directed trawl fishery. In response, the Councils developed a joint FMP that was implemented in 1999. The FMP was designed to stop overfishing and rebuild the stocks through a number of measures, including: Limiting the number of vessels with access to the fishery and allocating DAS to those vessels; setting trip limits for vessels fishing for monkfish; minimum fish size limits; gear restrictions; mandatory time out of the fishery during the spawning season; and a framework adjustment process.

Reported landings of monkfish increased dramatically from the late 1970s until the mid-1990s and have remained high (see Table 12). Burgeoning markets for monkfish tails and livers in the 1980s allowed fishermen to fish profitably for monkfish, landing increasingly smaller monkfish as the stocks became depleted. Since the implementation of the FMP, however, vessels are more commonly landing large, whole monkfish for export to Asian markets. Revenues have generally increased since the mid-1980s and the relative value of monkfish is currently at its highest point since 1996 (see Table 12 and Table 13).

	Commercial Landings	Ex-vessel Value
2001	27,700,000 lb	$44,194,000
2002	28,506,000 lb	$37,393,000
2003	30,046,000 lb	$38,758,000
2004	23,036,000 lb	$33,332,000
2005	21,991,000 lb	$42,041,000

Table 12. Recent commercial landings of monkfish.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
New Bedford, MA	5,287,000 lb	$9,203,000
Long Beach/Barnegat Light, NJ	4,016,000 lb	$5,560,000
Portland, ME	3,210,000 lb	$5,994,000
Gloucester, MA	2,609,000 lb	$4,335,000
Point Judith, RI	1,585,000 lb	$2,496,000
Chatham, MA	1,444,000 lb	$1,904,000
Boston, MA	1,241,000 lb	$1,974,000
Portsmouth, NH	1,014,000 lb	$1,481,000
Point Pleasant, NJ	972,000 lb	$1,309,000

Table 13. Primary ports associated with the monkfish fishery (values are averaged for 2000-2005).

Although the proportion of commercial landings by gear type varies by management area, overall, landings of monkfish are fairly evenly split between gillnets and otter trawls, which together account for 95 percent of landings (according to the fishing vessel trip report database, 2000-2004). Scallop dredges also catch monkfish, but in much smaller amounts (5 percent of reported landings, 2000-2004). No other gear types account for more than trace landings of monkfish. There is no recreational component to this fishery.

There are only two amendments to the Monkfish FMP: Amendment 1, which implemented the EFH provisions of the Magnuson-Stevens Act; and Amendment 2, which was implemented in 2005 and included restrictions on otter trawls in certain areas, made the minimum fish size consistent in all areas, closed two offshore canyons to monkfish fishing, created a monkfish research DAS set-aside program, and created new permit categories for fishing in designated areas, among other measures. A framework adjustment implemented in 2003 established a process to determine an annual TAC and appropriate fishing measures for each management area. Due to concern about the ability of the stocks to rebuild to target levels by the end of the rebuilding period under this process, the Councils developed a framework adjustment to modify the management measures in the northern management area and to change the annual adjustment process.

2.8. Northeast Multispecies FMP

Fifteen species of groundfish are managed under this FMP (see Table 1). Twelve species are managed as part of the large-mesh complex, based on fish size and type of gear used to harvest the fish, and three species are included in this FMP as the small-mesh complex but are managed under a separate small-mesh multispecies program. While these fifteen groundfish species exhibit unique body types, behaviors, and habitat preferences, all are demersal, living near the bottom and feeding on benthic organisms. Groundfish are found throughout New England waters, from the Gulf of Maine to southern New England.

In 1977, the New England Council's first groundfish FMP, including only cod, haddock, and yellowtail flounder, was implemented. This plan was primarily developed by NMFS and its individual species quotas were a continuation of the ICNAF quota-based management system. Although the quotas did reduce the catch of these species, the system had a number of serious flaws. Because there was no limit on the number of participants, the number of vessels increased dramatically as the stocks improved between 1977 and 1980. The increasing number of vessels caught the quota in less time causing the fishery to be closed more frequently and for longer periods of time. The quotas forced vessels to catch fish as fast as possible to get the largest possible share before the fishery was closed (known as a "derby" fishery). In 1977, the Gulf of Maine cod quota was taken in 5 months and the Georges Bank quota was caught in 6 months.

The Council implemented a system of individual vessel trip limits that helped to prevent long closures that disrupted market supplies. This action was also intended to mitigate the derby fishery, which caused safety concerns, and to give small boats a greater chance to catch a share of fish proportional to their traditional participation levels. Limits were set for each species and stock area for each of three vessel categories. Because of problems associated with data reliability, enforcement, and equity among the vessel sectors, the Council eliminated the quota-based management system when it adopted the Interim Groundfish FMP in 1982. This plan replaced the catch quotas with minimum fish size and codend mesh size regulations for Georges Bank and the Gulf of Maine. It also allowed small-mesh fishing to continue throughout the Gulf of Maine. Closed areas intended to protect spawning haddock were left in place.

What we now consider the Northeast Multispecies FMP was implemented in 1986. It was the first plan in the world to set biological targets in terms of maximum spawning potential. This mechanism allows the Council to meet its biological objectives either by increasing the age-at-first capture (size of fish caught) or by controlling fishing mortality. The plan also greatly expanded the number of species included in the management unit. In its first year, the plan set minimum fish sizes for some species and changed minimum fish sizes for others. The plan also enlarged one of the haddock spawning closed areas, Area I, and established a large closed area off of southern New England to protect spawning yellowtail and to help reduce fishing mortality. The Exempted Fisheries Program substantially reduced the area and time period available for small-mesh fishing in the Gulf of Maine.

In 1987, the Council adopted Amendment 1 to the FMP, which decreased the area for the silver hake exempted fishery, increased the large-mesh area to include some important yellowtail flounder grounds to the south, and tightened existing mesh size regulations and regulations for the southern New England yellowtail flounder area. Amendment 2 eliminated a scheduled increase in codend mesh size, and implemented the following measures: (1) Trip bycatch limits and stricter non-reporting penalties in the Exempted Fisheries Program; (2) increased some minimum fish sizes; (3) established a seasonal large-mesh area on Nantucket Shoals to protect cod; (4) applied mesh size regulations to the whole nets rather than only to the codend; (5) set all recreational minimum sizes to be consistent with commercial minimum sizes; and (6) excluded trawlers from Closed Area II during the closure to improve enforcement of the closure.

Amendment 3, implemented in 1989, established the Flexible Area Action System. Its purpose was to enable the Council and NMFS to respond quickly to protect large concentrations of juvenile, sub-legal (smaller than the minimum legal size) and spawning fish. Amendment 4 was implemented in 1991 and added more restrictions to the Exempted Fisheries Program; established a procedure for the Council to make recommendations for modifying northern shrimp gear to reduce the bycatch of groundfish; expanded the management unit to include silver hake, ocean pout, and red hake; established management measures for the Cultivator Shoals silver hake fishery; further tightened restrictions on the carrying of small mesh while fishing in the Regulated Mesh Area; and established a minimum mesh size in the southern New England yellowtail flounder area.

Amendment 5 was implemented in 1994 to address the overfishing of principal groundfish stocks that occurred in the late 1980s and early 1990s and reflected a significant turning point in the management of the Northeast multispecies fishery. Amendment 5 established a moratorium on new vessel permits during the rebuilding period (creating the current limited access permit system based on history in the fishery), implemented a DAS effort reduction program (the first of its kind), added additional mesh size restrictions, and also included interim gillnet regulations to reduce harbor porpoise bycatch, a mandatory vessel trip reporting system for landings, a prohibition on pair-trawling, a requirement for a finfish excluder device for shrimp fishery, changed some minimum fish sizes, and expanded the size of Closed Area II. Amendment 6 followed shortly after to implement additional haddock conservation measures.

Amendment 7, implemented in 1996, accelerated the DAS effort reduction program established in Amendment 5, eliminated significant exemptions from the current effort control program, provided incentives to fish exclusively with mesh larger than the minimum required, broadened the area closures to protect juvenile and spawning fish, and increased the haddock possession limit. It established a rebuilding program for Georges Bank and Southern New England yellowtail flounder, Georges Bank and Gulf of Maine cod, and Georges Bank haddock based primarily on DAS controls, area closures, and minimum mesh size. Additionally, the amendment changed existing permit categories and initiated several new ones, including an open access multispecies permit for limited access sea scallop vessels. Amendment 7 also created a program for reviewing the management measures annually and making changes to the regulations through the framework adjustment process to insure that plan goals would be met.

Amendment 8 was implemented to address gear conflict issues between the mobile gear participants of the groundfish and scallop fisheries and the fixed gear participants of the lobster fishery. Amendment 9 established new status determination criteria (overfishing definitions) and set optimum yield for twelve groundfish species to bring the plan into compliance with the Sustainable Fisheries Act. Amendment 9 also added Atlantic halibut to the FMP's management unit. Amendment 10, known as the "consistency amendment," was developed to make the vessel upgrading and replacement provisions consistent across all New England and Mid-Atlantic Council FMPs. Amendment 11 addressed the Sustainable Fisheries Act EFH requirements. Amendment 12 addressed the Sustainable Fisheries Act requirements for silver hake, red hake, and offshore hake through a separate small-mesh multispecies management program implemented in 2000.

In addition to the amendments implemented prior to Amendment 13, the FMP was modified through a number of framework adjustments designed to achieve the Amendment 7 fishing mortality targets or to fulfill the requirement for annual adjustments to management measures. Several joint frameworks with the Sea Scallop FMP were implemented to provide scallop vessels access to the groundfish closed areas. Frameworks 32, 35, 37, and 38 instituted additional changes to management of the small-mesh fishery, including several new small-mesh gear exemption areas and elimination of default rebuilding measures.

The Council began work in Amendment 13 in February 1999. The purpose for this amendment included a need to develop rebuilding programs to meet the Amendment 9 status determination criteria and to address problems identified with the effort control program (DAS). After this amendment was begun, the Council submitted Framework 33 to meet the Amendment 7 requirement for an annual adjustment to the FMP. This framework was implemented May 1, 2000. On May 19, 2000, a coalition of conservation organizations challenged Framework 33 alleging that it failed to implement programs necessary to rebuild groundfish stocks to the Amendment 9 targets and did not meet bycatch requirements of the Magnuson-Stevens Act (*Conservation Law Foundation et al*. v. *Evans et al*.). The Court found in favor of the plaintiffs on December 28, 2001. After a series of negotiations among various parties, interim measures were adopted by the Court in 2002 and NMFS was instructed to submit a management plan that complied with the Magnuson-Stevens Act. Amendment 13–already in development–was recognized as the most appropriate vehicle to meet the Court's requirement.

Amendment 13 was implemented in 2004, and included several new management features. The amendment classified multispecies DAS into three categories (unrestricted A DAS, restricted use B DAS, and C DAS, which cannot be used at this time); enables the Council to create/allow "special access programs" (SAPs)[6] for healthy stocks, such as Georges Bank haddock; allows sectors of the groundfish fishing industry to develop their own sector allocation plan; includes an adaptive approach for rebuilding groundfish stocks that requires biennial adjustments to management measures; and implements several provisions of the U.S./Canada Resource Sharing Understanding.[7] Since Amendment 13 was implemented, several framework adjustments have been developed to modify, fully implement, and/or comply with various provisions of Amendment 13. Several environmental groups challenged Amendment 13, claiming that the rebuilding programs did not comply with the Magnuson-Stevens Act, the management measures would be ineffective, an SBRM was not included, and the amendment did not consider a sufficiently broad range of alternatives. The Court upheld the amendment with the exception of the reference to the SBRM.

There are a variety of fishing gears used in the commercial groundfish fishery. Otter trawls are the primary gear type used for all species in both the large-mesh and small-mesh complexes and flatfish and silver hake are caught almost exclusively with otter trawls. Based on fishing vessel trip report data for 2000-2004, gillnets contribute substantial amounts of Atlantic cod, pollock, redfish, and white hake. Other gears identified in the fishing vessel trip report data associated with landings of groundfish include handlines, longlines, and fish pots. Recreational fishing for groundfish is focused primarily Atlantic cod, pollock, haddock, red hake, and winter flounder. Recreational fishing is conducted by shore-based anglers and anglers with private boats, as well as by anglers aboard party/charter vessels. See below for recent commercial and recreational landings of large-mesh (Table 14) and small-mesh (Table 16) multispecies, aggregated across the complexes. Table 15 and Table 17 identify the primary ports associated with the large-mesh and small-mesh multispecies complexes, respectively, along with the average recent landings and ex-vessel values for each of the primary ports.

[6] There are three SAPs currently in place: The Closed Area I Hook Gear Haddock SAP is open to NE multispecies DAS vessels fishing with hook gear in a portion of Closed Area I; the Eastern U.S./Canada Haddock SAP Pilot Program is open to NE multispecies DAS vessels using a haddock "separator" trawl in portions of the Eastern U.S./Canada Area and Closed Area II; and the Closed Area II Yellowtail Flounder SAP is open to NE multispecies DAS vessels fishing for yellowtail flounder in the southern portion of Closed Area II.

[7] The U.S./Canada Resource Sharing Understanding (Understanding) was reached between the United States and Canada regarding the management of Georges Bank cod, Georges Bank haddock, and Georges Bank yellowtail flounder resources found within the waters of both countries in an area known as the U.S./Canada Management Area. Amendment 13 implements certain measures consistent with the Understanding, including a requirement to use VMS, an area declaration requirement, and specific gear requirements (flatfish net or haddock separator trawl).

	Commercial Landings	Recreational Landings[8]
2001	102,232,000 lb	10,252,000 lb
2002	91,757,000 lb	6,294,000 lb
2003	88,331,000 lb	6,588,000 lb
2004	83,523,000 lb	5,383,000 lb
2005	70,968,000 lb	4,154,000 lb

Table 14. Recent commercial and recreational landings of large-mesh multispecies (aggregated).

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
New Bedford, MA	32,884,000 lb	$35,003,000
Gloucester, MA	15,472,000 lb	$18,019,000
Portland, ME	11,632,000 lb	$14,873,000
Chatham, MA	3,681,000 lb	$4,865,000
Boston, MA	2,921,000 lb	$3,387,000

Table 15. Primary ports associated with the large-mesh multispecies fishery (values are aggregated and averaged for 2000-2005).

	Commercial Landings	Recreational Landings[9]
2001	32,149,000 lb	19,000 lb
2002	19,514,000 lb	17,000 lb
2003	20,858,000 lb	4,000 lb
2004	19,387,000 lb	35,000 lb
2005	14,338,000 lb	68,000 lb

Table 16. Recent commercial and recreational landings of small-mesh multispecies (aggregated).

[8] There are no data currently available on the recreational landings of Atlantic halibut, American plaice, witch flounder, or redfish.
[9] 2005 recreational landings data on silver hake are not currently available.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Point Judith, RI	4,773,000 lb	$1,692,000
New Bedford, MA	3,110,000 lb	$1,305,000
Montauk, NY	2,834,000 lb	$1,924,000
New London, CT	1,498,000 lb	$901,000
Gloucester, MA	1,137,000 lb	$556,000

Table 17. Primary ports associated with the small-mesh multispecies fishery (values are aggregated and averaged for 2000-2005).

2.9. Northeast Skate FMP

There are seven species included in the Northeast skate complex: Barndoor skate, clearnose skate, little skate, rosette skate, smooth skate, thorny skate, and winter skate. The Northeast skate complex is distributed along the coast of the northeastern United States from near the tide line to depths exceeding 700 meters. Within the complex, the ranges of the individual species vary. The center of distribution for little and winter skates is Georges Bank and southern New England. Barndoor skate is most common in the offshore Gulf of Maine, on Georges Bank, and in southern New England. Thorny and smooth skates are commonly found in the Gulf of Maine. Clearnose and rosette skates have a more southern distribution, and are found in southern New England and the Chesapeake Bight. Skates are not known to undertake large-scale migrations, but they do move seasonally in response to changes in water temperature, moving offshore in summer and early autumn and returning inshore during winter and spring.

A Skate FMP was developed by the New England Council and was implemented in 2003. The regulations implementing the FMP require the Council to monitor the status of the subject skates and the fishery on an annual basis. The regulations include the following: Permit requirements for vessels possessing skates and dealers purchasing skates; reporting requirements; a possession limit for skate wings; an exemption from the wing possession limit for vessels fishing only for skates for the bait market; and prohibitions on the possession of smooth skates from or in the Gulf of Maine, and barndoor and thorny skates throughout their range. The FMP also incorporates a baseline of management measures implemented under other FMPs (Northeast Multispecies, Sea Scallops, and Monkfish) that directly or indirectly control fishing effort on skates. Any proposed changes to these FMPs that could result in an increase in fishing effort on skates are required to first undergo a “skate baseline review” to determine whether, and to what degree, the change may have an impact on skate conservation. Mitigation is required for any proposed action that would likely increase fishing mortality on one of the skate species under a formal rebuilding program. The FMP was developed, in part, to collect more complete and accurate information on the catch and disposition of skates in

Northeast fisheries, at the species level. Prior to the FMP, all skate catch was categorized generally as "skate spp." Stock assessments and efforts to manage fishing mortality have been hampered by a lack of species-specific catch information.

In early 2007, winter skate was determined to be overfished. Pursuant to the requirements of the Magnuson-Stevens Act, the New England Council is currently developing Amendment 2 to the Skate FMP to address the overfished status of this species and to implement a rebuilding program.

Skates are harvested for two very different commercial markets—one market supplies whole skates to be used as bait in the lobster fishery, and one market supplies skate wings for human consumption. The skate bait fishery is a directed fishery and is more traditional, involving vessels primarily from southern New England ports that target a combination of little skates (>90 percent) and, to a much lesser extent, juvenile winter skates (<10 percent). The vessels supplying skates for the bait market tend to make dedicated trips targeting skates and land large quantities of skates per trip.

The skate wing fishery developed in the 1990s when skates were promoted as "underutilized species," and fishermen shifted effort from groundfish and other fisheries to skates and spiny dogfish. The wing fishery is largely an incidental catch fishery that involves vessels that also participate in the groundfish and/or monkfish fisheries. Although some vessels will make trips specifically targeting skates for the wing market, most skates caught for this market are retained by vessels engaged in other fisheries. Most skates are caught using an otter trawl (according to the FVTR database for 2000-2004, almost 80 percent of landings were from an otter trawl), although gillnets are also used (the remaining 20 percent of 2000-2004 landings were from gillnets). Small amounts of landings are associated with hook and line gear and scallop dredges.

Even though skates are now managed under a Federal FMP, reported landings remain incomplete at the species level. Although some skates are caught by recreational fishermen, recreational landings of skates are negligible both in the context of all recreational fisheries (0.015 percent of all Atlantic coast recreational landings) and in the context of the overall skate fisheries (0.085 percent of all skate landings). Thus, Table 18 reports recent commercial landings and the ex-vessel value of skates aggregated across all species. Table 19 identifies the primary ports associated with the skate fishery.

	Commercial Landings	Ex-vessel Value
2001	18,171,000 lb	$3,354,000
2002	18,052,000 lb	$3,546,000
2003	19,912,000 lb	$4,087,000
2004	20,388,000 lb	$5,073,000
2005	18,080,000 lb	$5,020,000

Table 18. Recent commercial landings of skates (aggregated).

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Point Judith, RI	2,021,000 lb	$157,000
Tiverton, RI	1,675,000 lb	$110,000
New Bedford, MA	1,582,000 lb	$690,000
Chatham, MA	1,361,000 lb	$471,000
Newport, RI	269,000 lb	$29,000

Table 19. Primary ports associated with the skate fishery (2000-2005 values are averaged).

2.10. Spiny Dogfish FMP

Spiny dogfish are the most abundant sharks in the western North Atlantic, and range from Labrador to Florida, although they are most abundant from Nova Scotia to Cape Hatteras, North Carolina. Spiny dogfish are highly migratory, often traveling in large packs, and they move northward in the spring and summer and southward in the fall and winter. Spiny dogfish are known to attack and consume whatever is at hand, be it cod, haddock, mackerel, herring, flatfish, and sculpins, as well as jellyfish, crabs, octopods, and sea cucumbers, among other prey items. Although dogfish do have a varied diet, most of what they eat are invertebrates (ctenophores in particular) and a recent study of 40,000 stomachs found that less than 10 percent of their diet was composed of gadoids (Link et al. 2002).

In spite of their large numbers and opportunistic feeding, spiny dogfish, like many elasmobranches, suffer from several reproductive constraints. Females may take 7-12 years to reach maturity, growing more than one-third larger than their mature male counterparts before becoming sexually mature. Fertilization and egg development are internal, and gestation takes roughly 2 years, resulting in litters that usually average 6-7 dogfish "pups." As a result of these factors (long time to maturity, long gestation periods, and low fecundity), spiny dogfish are vulnerable to overfishing, particularly if fishing activities focus on the largest individuals, which are almost all mature females.

As a result of increased fishing pressure, spiny dogfish were classified as overfished in 1998. The Mid-Atlantic and New England Councils jointly developed an FMP for spiny dogfish. This plan was partially approved in 1999 and implemented in 2000 and the management measures included an overall commercial quota, allocated into two semiannual periods; restrictive trip limits; a prohibition on finning; an annual quota adjustment process; and permit and reporting requirements. The most significant effect of the measures is the elimination of the directed dogfish fishery in Federal waters.[10]

[10] Directed fishing for spiny dogfish continued in state waters until 2004, by which time the states had followed suit to implement restrictive trip limits and eliminate the directed dogfish fishery.

Framework Adjustment 1 to the FMP provided for a multi-year, rather than annual, specification-setting process.

By far most spiny dogfish landings are the result of commercial fishing activities, as reported recreational landings comprise less than 2 percent of the total catch. Because of the restrictive commercial trip limits designed to eliminate the directed dogfish fishery, all dogfish landings are the byproduct of other commercial fisheries. Sink gillnets, bottom longlines, and bottom otter trawls are the primary commercial fishing gears that catch spiny dogfish and these three gear types accounted for 97 percent of all dogfish landed in 2000-2004. Over the last several years, commercial landings ranged from 4.8 million lb in 2001 to as low as 1.9 million lb in 2004 (see Table 20). For fishing years 2000-2004 combined, the majority of commercial landings were made in Massachusetts ports (72 percent), with another percent made in New Jersey and North Carolina. Table 21 identifies the primary ports of spiny dogfish landings from 2000 to 2005.

	Commercial Landings	Ex-vessel Value
2001	4,849,000 lb	$1,099,000
2002	4,645,000 lb	$935,000
2003	2,313,000 lb	$299,000
2004	1,965,000 lb	$299,000
2005	2,236,000 lb	$460,000

Table 20. Recent commercial landings of spiny dogfish.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Chatham, MA	2,186,000 lb	$428,500
Gloucester, MA	458,000 lb	$79,000
Provincetown, MA	258,000 lb	$52,000
Plymouth, MA	256,000 lb	$50,500
Hatteras, NC	149,000 lb	$18,000
Salisbury, MA	143,000 lb	$28,700
Point Judith, MA	126,000 lb	$20,500
Harwichport, MA	123,000 lb	$23,000

Table 21. Primary ports associated with the spiny dogfish fishery (values averaged for 2001-2005).

2.11. Summer Flounder, Scup, and Black Sea Bass FMP

Summer flounder, scup, and black sea bass are three demersal finfish species that occur primarily in the Middle Atlantic Bight from Cape Cod, MA, to Cape Hatteras, NC.[11] All three species exhibit seasonal movement or migration patterns. Summer flounder move inshore to shallow coastal and estuarine waters during warmer months and move offshore during colder months. Scup is a schooling species that undertakes extensive migrations between the coastal waters in the summer and outer continental shelf waters in the winter. Black sea bass are most often found in association with structured habitats, and they migrate offshore and to the south as waters cool in the fall, returning north and inshore to coastal areas and bays as waters warm in the spring.

The FMP was developed by the Mid-Atlantic Council, initially just for summer flounder, and approved by the Secretary of Commerce in 1988. This original Summer Flounder FMP was based largely on the ASMFC plan. The first major amendment, Amendment 2, was implemented in 1993 and it established much of the current management regime, including a commercial quota allocated to the states, a recreational harvest limit, minimum size limits, gear restrictions, permit and reporting requirements, and an annual review process to establish specifications for the coming fishing year. Amendments 4 through 7 made relatively minor adjustments to the management program.

Although initially intended to be separate FMPs, work on the development of the Scup FMP and the Black Sea Bass FMP was folded into the Summer Flounder FMP, which was broadened to incorporate management measures for scup and black sea bass through Amendments 8 and 9, respectively. These amendments included management measures for scup and black sea bass such as commercial quotas and quota periods, commercial fishing gear requirements, minimum fish size limits, recreational harvest limits, and permit and reporting requirements. Both amendments were implemented in 1996. Amendments 10 and 11 made relatively minor changes to the management systems for these fisheries, including removing the sunset provisions related to the limited access (moratorium) permits, gear requirements, and to achieve consistency among all Mid-Atlantic and New England Council FMPs regarding vessel replacement and upgrade provisions.

Amendment 12 was developed to bring the FMP into compliance with the provisions of the Sustainable Fisheries Act. This amendment included revised overfishing definitions for all three species, established rebuilding programs, addressed bycatch and habitat issues, and established a framework adjustment procedure for the FMP to allow relatively minor changes to management measures to be implemented through a streamlined process. Amendment 12 was implemented in 1999, although not all of the elements of the amendment were approved by NMFS. In particular, the EFH provisions for all three species and the rebuilding program for scup were not approved.

[11] Summer flounder range from Nova Scotia to Florida; scup range from the Bay of Fundy to Florida; and black sea bass range from southern Nova Scotia to southern Florida and into the Gulf of Mexico.

Implemented in 2003, Amendment 13 focused primarily on the commercial black sea bass fishery, although it also served to bring the FMP into compliance with the Sustainable Fisheries Act regarding the EFH requirements for all three species. The most significant change to the commercial black sea bass fishery eliminated the quarterly quota system, replaced with an annual coastwide quota. This change provided a framework for the ASMFC to allocate the annual quota on a state-by-state basis.

For each of these three species, an annual TAL is established by the Council and the ASMFC and allocated between the recreational and commercial fishing sectors according to percentages identified in the FMP.[12] The commercial fisheries for all three species are now managed through a combination of limited access (moratorium) fishing vessel permits, annual quotas that result in closures of the fisheries upon reaching the quota, gear restrictions, and minimum fish sizes. The summer flounder and black sea bass commercial quotas are managed on an annual basis, but the scup commercial quota is sub-divided into three quota periods (Winter I, Summer, and Winter II); although the black sea bass and scup quotas are managed on a coastwide basis, the summer flounder quota is managed on a state-by-state basis.[13] The annual specifications for these three fisheries may be set each year or for up to 3 years in advance.

The recreational fisheries are not subject to a “hard” quota, but instead are subject to a set of management measures designed to constrain catch to a target level. Management measures used include minimum fish sizes, bag (possession) limits, and fishing seasons. Party/charter vessels operating in Federal waters are required to obtain Federal permits. Coastwide management measures are established for the black sea bass and scup recreational fisheries operating in Federal waters, but for summer flounder, the states have the option to develop state-by-state measures that, in sum, would achieve the equivalent level of conservation as would the coastwide measures. All decisions regarding annual quotas and management measures for these commercial and recreational fisheries are made in conjunction with the ASMFC.

Amendment 14 to the FMP was submitted by the Council in early 2007 and it addresses the requirement to establish a rebuilding program for scup, which was declared in 2005 to once again be overfished. An upcoming amendment is planned to address a wide range of issues associated with the management of all three species’ fisheries (including the commercial/recreational splits, the state-by-state allocations of summer flounder commercial quota, the allocation of commercial scup quota among the three quota periods, among other issues).

All three of these species support significant recreational as well as commercial fisheries. On average, commercial landings over the last several years accounted for

[12] The summer flounder TAL is allocated 60 percent to the commercial fishery and 40 percent to the recreational. The scup TAL is allocated 78 percent to the commercial fishery, while 22 percent is allocated to the recreational fishery. The black sea bass TAL is allocated 49 percent to the commercial fishery, with 51 percent allocated to the recreational fishery.

[13] Similar to the percentage allocation of the TAL to the commercial and recreational fisheries, the FMP allocates the commercial summer flounder quota among the states from North Carolina to Maine according to specific percentage shares.

slightly more than half of the total landings of these species (see Table 22). The primary gears used in the commercial fisheries for these species vary. Based on fishing vessel trip report data from 2000-2004, summer flounder are caught almost exclusively (95 percent) with bottom otter trawls; scup are caught primarily (75 percent) with bottom otter trawls, but handlines/rod and reel accounted for 16 percent and pots, traps, and weirs accounted for another 6 percent; and black sea bass are caught in roughly equal amounts by handlines/rod and reel (34 percent), bottom otter trawls (35 percent), and pots and traps (30 percent). Recreational fishing for these species is enjoyed by shore-based anglers, private recreational boat anglers, and anglers on party and charter vessels. Table 22 and Table 23 identify the recent commercial and recreational landings as well as the primary ports and ex-vessel value of the commercial fishery.

	Summer Flounder		Scup		Black Sea Bass	
	Commercial Landings	Recreational Landings	Commercial Landings	Recreational Landings	Commercial Landings	Recreational Landings
2001	10,939,000 lb	11,660,000 lb	4,067,000 lb	4,262,000 lb	2,934,000 lb	3,986,000 lb
2002	14,491,000 lb	8,029,000 lb	7,282,000 lb	3,624,000 lb	3,557,000 lb	4,655,000 lb
2003	14,295,000 lb	11,663,000 lb	9,893,000 lb	8,484,000 lb	3,029,000 lb	3,691,000 lb
2004	18,160,000 lb	10,986,000 lb	9,361,000 lb	4,406,000 lb	3,095,000 lb	2,590,000 lb
2005	16,986,000 lb	10,115,000 lb	9,300,000 lb	2,380,000 lb	2,822,000 lb	2,269,000 lb

Table 22. Recent commercial and recreational landings in the summer flounder, scup, and black sea bass fisheries.

Summer Flounder		Scup		Black Sea Bass	
Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value
Point Judith, RI	$3,420,000	Point Pleasant, NJ	$915,000	Ocean City, MD	$934,000
Point Pleasant, NJ	$3,312,000	Point Judith, RI	$874,000	Virginia Beach, VA	$779,000
Hampton, VA	$1,537,000	Montauk, NY	$565,000	Cape May, NJ	$643,000
Wanchese, NC	$1,526,000	Little Compton, RI	$500,000	Point Pleasant, NJ	$409,000
Hampton Bays, NY	$1,363,000	Cape May, NJ	$369,000	Point Judith, RI	$406,000
Belford, NJ	$1,173,000	Hampton Bays, NY	$352,000	Wanchese, NC	$286,000

Table 23. Primary ports associated with the summer flounder, scup, and black sea bass commercial fisheries (values are averaged for 2000-2005).

2.12. Surfclam and Ocean Quahog FMP

The Atlantic surfclam and ocean quahog are both bivalve mollusks that are found in continental shelf waters from Cape Hatteras, NC, north to the Gulf of St. Lawrence/Newfoundland. Major concentrations of surfclams are found on Georges Bank, south of Cape Cod, off Long Island, southern New Jersey, and the Delmarva Peninsula. The greatest concentrations of ocean quahogs are fished in offshore waters south of Nantucket to the Delmarva Peninsula. In general, surfclams are found in water shallower than that in which ocean quahogs are found.

The Mid-Atlantic Council developed the FMP in the mid 1970's (it was the first FMP the Council developed) and the FMP was implemented in 1977. Initially, the FMP instituted a moratorium on participation in the surfclam fishery, while a more detailed limited entry system could be developed, and established quarterly quotas for surfclams and an annual quota for ocean quahogs. The first several amendments dealt mostly with the duration of the management measures and permit moratorium (made indefinite in Amendment 3), reporting requirements, management areas (Amendment 2 divided the surfclam portion of the management unit into the New England and Mid-Atlantic areas) minimum size limits, cage tags, and quota period issues.

Amendment 8 to the FMP, implemented in 1990, established an individual transferable quota (ITQ) system for the fisheries. The fishing vessel owners that received allocation under the ITQ system were those whose vessels had reported landings under the mandatory logbook requirement in place since 1978. The initial allocation was based on the vessel's average historical catch and vessel size, calculated as a percentage of historical quota allocations. Quota share holders are allowed to purchase, sell, or lease quota to and from other share holders. This amendment also merged the Mid-Atlantic and New England management areas back into a single management area.

Amendment 9 revised the overfishing definitions, and Amendment 10 incorporated management measures for the Maine "mahogany clam."[14] Amendment 11 represented the "consistency amendment" to bring all New England and Mid-Atlantic Council FMPs into consistency in regards to vessel replacement and upgrade provisions. Amendment 12 was intended to bring the FMP into compliance with the provisions of the Sustainable Fisheries Act, and included revisions to overfishing definitions, the designation of EFH, a provision allowing framework adjustments to the FMP, and a requirement for an operator permit. Amendment 13 rectified aspects of Amendment 12 that were not approved (surfclam overfishing definition and an analysis of the impacts of fishing on EFH), and included provision for multiple year quota setting. The most recent action for this FMP was a framework adjustment to require VMS for vessels participating in the surfclam or ocean quahog fisheries.

[14] The Maine mahogany clam is the same species as the ocean quahog, but is found in the inshore waters of the State of Maine and supports a small artisanal fishery. This fishery had been operating on an experimental basis since 1990, but was beginning to move offshore into Federal waters.

Both species live in the sediment and are not vulnerable to most types of fishing gears. Almost 100 percent of landings are associated with the hydraulic clam dredge, although the relatively small Maine fishery uses the so-called "dry" dredge. Landings of surfclams and ocean quahogs from recreational fishing are negligible. Table 24 identifies the recent commercial landings and ex-vessel value of both species, and Table 25 identifies the primary ports of landings for both species.

Because of the presence of a toxin known to cause paralytic shellfish poisoning (PSP) in people consuming contaminated clams, eastern Georges Bank has been closed to the harvest of clams since 1990. Other areas in the Gulf of Maine and western Georges Bank were closed recently due to an outbreak of the PSP toxin in these areas.

	Atlantic Surfclam		Ocean Quahog	
	Commercial Landings	Ex-vessel Value	Commercial Landings	Ex-vessel Value
2001	68,864,000 lb	$38,025,000	37,993,000 lb	$23,866,000
2002	71,968,000 lb	$39,988,000	40,001,000 lb	$25,491,000
2003	69,502,000 lb	$39,427,000	41,881,000 lb	$26,030,000
2004	62,449,000 lb	$35,209,000	39,268,000 lb	$23,646,000
2005	49,651,000 lb	$27,534,000	30,408,000 lb	$18,556,000

Table 24. Recent commercial landings and ex-vessel values in the surfclam and ocean quahog fisheries.

Atlantic Surfclam			Ocean Quahog		
Primary Ports	Landings	Ex-vessel Value	Primary Ports	Landings	Ex-vessel Value
Atlantic City, NJ	36,768,000 lb	$19,709,000	Pt Pleasant, NJ	24,316,000 lb	$12,267,000
Pt Pleasant, NJ	16,382,000 lb	$7,531,000	New Bedford, MA	13,000,000 lb	$6,459,000
Ocean City, MD	4,881,000 lb	$3,180,000	Ocean City, MD	3,391,000 lb	$1,927,000
Oceanside, NY	3,496,000 lb	$2,029,000	Atlantic City, NJ	3,177,000 lb	$1,652,000
Wildwood, NJ	3,432,000 lb	$2,096,000	Wildwood, NJ	2,762,000 lb	$1,517,000

Table 25. Primary ports associated with the surfclam and ocean quahog commercial fisheries (values are averaged for 2000-2005).

2.13. Tilefish FMP

The golden tilefish is the largest and longest lived of all the tilefish species, and in U.S. waters ranges from Georges Bank to Key West, FL, and throughout the Gulf of Mexico. Golden tilefish occupy a fairly restrictive band along the outer continental shelf and are most abundant in depths of 100-240 meters. Temperature may also constrain their range, as they are most abundant near the 15° C isotherm. Although this species occupies a variety of habitats, it is somewhat unique in that they create and modify existing vertical burrows in the sediment as their dominant habitat in U.S. waters.

The Tilefish FMP was developed by the Mid-Atlantic Council to implement management measures for the tilefish fishery north of the Virginia/North Carolina border intended to address the overfished status of the species.[15] The FMP was implemented in 2001, and in the FMP's short existence it has been the subject of two legal challenges. *Natural Resources Defense Counsel* v. *Evans* (2001) challenged the essential fish habitat provisions of the FMP, and *Hadaja* v. *Evans* (2001) challenged the ban on trawl gear and the permit category designations. The latter temporarily voided the limited access permit categories in the FMP. The current management of the commercial tilefish fishery relies upon annual quotas allocated to three categories of limited access permit vessels, and an incidental catch possession limit for vessels permitted to retain incidental levels of tilefish.

The commercial tilefish fishery is relatively small, with six vessels accounting for 85 percent of the total commercial tilefish landings between 1995 and 2002. Tilefish are primarily caught with bottom longlines (90 percent of landings reported in the fishing vessel trip report database from 2000-2004), although approximately 10 percent of landings are associated with bottom otter trawls.[16] There is effectively no recreational fishery for this species, with less than 2,200 lb landed annually for the last 25 years and only two fishing trips in the MRFSS database since 2000 reporting tilefish as the primary target species. Table 26 and Table 27 identify the recent commercial landings as well as the primary ports and ex-vessel value of the commercial fishery.

The Mid-Atlantic Council is currently developing Amendment 1 to the Tilefish FMP, and this amendment proposes an individual fishing quota (IFQ) system for the tilefish fishery.

[15] The tilefish fishery south of the Virginia/North Carolina border is currently managed as part of the Snapper-Grouper Complex FMP developed by the South Atlantic Fishery Management Council.
[16] This number may not be reflective of the fishery under the FMP. Due to the ruling in Hajada v. Evans, there was a period during 2003 and 2004 during which there were no limited access permit requirements. During this time, landings by otter trawls may have been higher than would be expected under the FMP, given that the incidental catch permit category (where otter trawls would be used) is allocated 5 percent of the overall tilefish quota.

	Commercial Landings	Ex-vessel Value
2001	1,751,000 lb	$3,286,000
2002	1,714,000 lb	$3,505,000
2003	2,261,000 lb	$3,576,000
2004	2,316,000 lb	$3,328,000
2005	1,222,000 lb	$3,073,000

Table 26. Recent commercial landings of golden tilefish.

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
Montauk, NY	931,000 lb	$1,835,000
Long Beach/Barnegat Light, NJ	805,000 lb	$1,181,000
Hampton Bays, NY	339,000 lb	$701,000
Point Judith, RI	130,000 lb	$125,000
Pine Beach, NJ	31,000 lb	$55,000

Table 27. Primary ports for the golden tilefish fishery (values are averaged for 2000-2005).

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Chapter 3
Description of Fishing Modes

As described in chapters 1 and 2, an FMP is the operational unit used for managing a fishery (or collection of fisheries) that targets the species specifically addressed in the FMP. For example, regulations promulgated under the Summer Flounder, Scup, and Black Sea Bass FMP address commercial and recreational fishing activities along the Atlantic coast of the U.S. that, although they use different gear types, share the characteristic of targeting summer flounder, scup, and/or black sea bass. Thus, the minimum fish size for summer flounder landed by commercial vessels is 14 inches, regardless of whether a fish is caught with an otter trawl, a gillnet, or on hook and line. Similarly, the total allowable catch for black sea bass applies jointly to the commercial and recreational fishing sectors, also without regard to the fishing gear used.

While the FMP works very well as the operational unit for devising and implementing fishing regulations, it is not the most efficient or appropriate operational unit for devising and implementing an SBRM. The most efficient designs for collecting information on and monitoring discards occurring in a fishery recognize and incorporate the unique characteristics of each fishery. The way in which the fishing takes place affects the mechanisms that may be appropriate for collecting relevant bycatch information. Thus, there are information collection tools more appropriate for shore-side recreational fisheries, and other tools more appropriate for offshore commercial fisheries. There are tools appropriate for collecting basic information on discards in a fishery for use in a stock assessment that may not be the most appropriate for real-time monitoring of bycatch against a bycatch quota.

Another factor pertinent to determining the most appropriate operational unit for an SBRM is the efficiencies gained by capitalizing on shared characteristics and overlaps in catch among several fisheries. For example, commercial fishing vessels operating out of New England ports that use gillnets often target, and catch, monkfish, skates, and some groundfish species. Even though monkfish, skates, and groundfish fishing regulations are implemented under three separate FMPs, in many cases the same vessels are catching and landing these species. It would be inefficient to develop three separate bycatch sampling strategies and protocols to implement on these vessels. Instead, the goal would be to develop an SBRM that most effectively captures the discards associated with the New England gillnet fishery. Thus, the operational unit for an SBRM is the fishing “mode,” where a fishing mode is defined according to the fishing gear used and the area from which the vessels depart, rather than by FMP. If a vessel fishes with more than one gear type, it could be represented in more than one fishing mode.

Because the fishing mode is a more appropriate operational unit for the SBRM than the FMP, the expected biological, physical, and socio-economic impacts associated with this amendment are not analyzed at the level of the FMP, but are more broadly considered across the range of fishing modes directly or indirectly affected by this amendment. This chapter will identify and describe the fishing modes that serve as the basis for describing and evaluating the SBRM to be implemented under the subject FMPs. Each relevant combination of area[17] and fishing gear type is described below, and the description includes an overview of the fishery, the species landed in the fishery, and a reference to the pertinent FMPs that regulate the fishing activity. With the exception of the clam dredge fishery, the information summarized in the following sections was derived from FVTR data from 2000-2004, inclusive, to provide a 5-year snapshot to characterize the recent activity in each fishing mode that would most likely be relevant to the SBRM Amendment. For a summary reference of the information presented, see Table 28 at the end of the chapter.

Note that for some fishing modes, substantial fishing effort occurs in state waters by vessels that do not hold any Federal fishing permits and are, therefore, not required to submit Federal trips reports on their fishing activity. Vessels that hold no Federal permits other than for American lobster are also not required to submit Federal trip reports. Because trip reports required under Federal fishing permits are the sole source of information used to develop the summary characterizations below, the information presented below will be incomplete for the fishing modes with substantial participation by vessels with state permits only. Most notably, this applies to Mid-Atlantic crab pots, fish pots, and lobster pots, along with New England lobster pots. The lack of a reporting requirement in the Federal lobster regulations (50 CFR part 697) results in incomplete data on lobster fishing activities, even in Federal waters.

3.1. Clam Dredge Fishery

As noted above, the clam dredge fishery is the only fishing mode for which FVTR data were not the sole source of information used to develop the following fishing activity characterization. The regulations at 50 CFR 648.7(b) exempt vessel owners and operators fishing under a Federal surfclam or ocean quahog permit from the requirement to submit the FVTR required of most other Federal permit holders, except when landing other species besides surfclams and/or ocean quahogs. Instead, the regulations require these permit holders to submit a separate surfclam and ocean quahog log report. The data collected from the surfclam and ocean quahog log reports are maintained separately from the FVTR data, and these data are organized slightly differently, making them difficult to integrate into the FVTR data.

Data from the surfclam and ocean quahog log reports for 2002-2004, inclusive, are summarized below to provide a 3-year snapshot of the fishing activities of vessels using clam dredges. Due to complications associated with the database, this information is not organized based on the port of departure (New England vs. Mid-Atlantic), but is instead presented for the whole Northeast Region. This information focuses on landings of surfclam and ocean quahogs only. Supplemental information derived from the FVTR

[17] For the purposes of the SBRM, the area associated with a fishing mode is based on the port of departure of a fishing vessel, regardless of where the fishing activity occurred. A more detailed explanation of this characteristic is provided in Chapter 5.

database provides information on the relative landings of other species by participating vessels.

Over the 3-year period of 2002-2004, the number of participants in this fishing mode was consistent, with an average of 87 vessels each year. On average, these vessels made between 79 and 84 fishing trips per year. Fishing trips lasted less than 1 day, on average, and although the majority of trips were less than 1 day in duration, longer trips of up to 4 days did occur. As indicated above, surfclams and ocean quahogs are the only species recorded in the primary clam log report database, and ocean quahogs accounted for just over half (56 percent) of the cumulative landings of these species over the 3-year period. Clam dredge vessels landed over 3.8 million bushels of ocean quahogs and almost 3.0 million bushels of surfclams per year, on average.[18]

The majority of clam dredge landings come into three New Jersey ports (Atlantic City, Point Pleasant, and Wildwood, together accounting for 63 percent of average annual landings). Atlantic City (2.2 million bushels per year, on average) and Point Pleasant (1.6 million bushels per year, on average) are the two primary ports for this fishing mode, but New Bedford, MA, also receives over 1 million bushels per year, on average (for 20 percent of total landings). Ocean City, MD, receives a smaller share (660,000 bushels), but still accounts for almost 10 percent of total annual landings. Although there have been up to 23 separate ports of landing in this fishing mode in any 1 year, these five ports account for almost 93 percent of total landings.

In addition to landings of surfclams and ocean quahogs reported on the clam log reports, vessels using clam dredges reported landings of other species on the FVTR. In each year from 2002-2004, there were 22-25 vessels that submitted FVTRs (roughly 27 percent of those reporting via the clam log reports). These vessels reported taking between 16 and 35 trips per vessel each year, on average. These trips account for 7.6 percent, on average, of the trips reported via the clam log report, some proportion of which may be separate trips. The species most commonly reported on the FVTR include sea scallops, monkfish, and blue crabs, although small amounts of whelks, cusk, and summer flounder were also reported during this timeframe. Most of the reported landings were sea scallops, with an average of 93,000 lb per year. Blue crab landings were much less, only 2,300 lb per year, and monkfish landings totaled less than 1,000 lb per year.

Figure 1 displays the top ports and primary fishing areas utilized by participants in this fishing mode. In Figure 1, and in all figures to follow in this chapter, fishing effort in the primary fishing areas is presented by shading in statistical areas according to the average number of "days absent" attributed to each statistical area. The statistical area fished is one of the data elements reported on both the FVTR and the clam log report, and days absent are calculated as the length of each fishing trip. While this is not an absolute measure of the fishing time or effort spent in each statistical area (for example, it does not account for steaming time to and from an area), it represents an approximate relative measure of where most of the fishing effort is concentrated.

[18] Note that landings of surfclams and ocean quahogs are reported in bushels (bu) rather than in pounds (lb). Landings of all other species are reported in pounds.

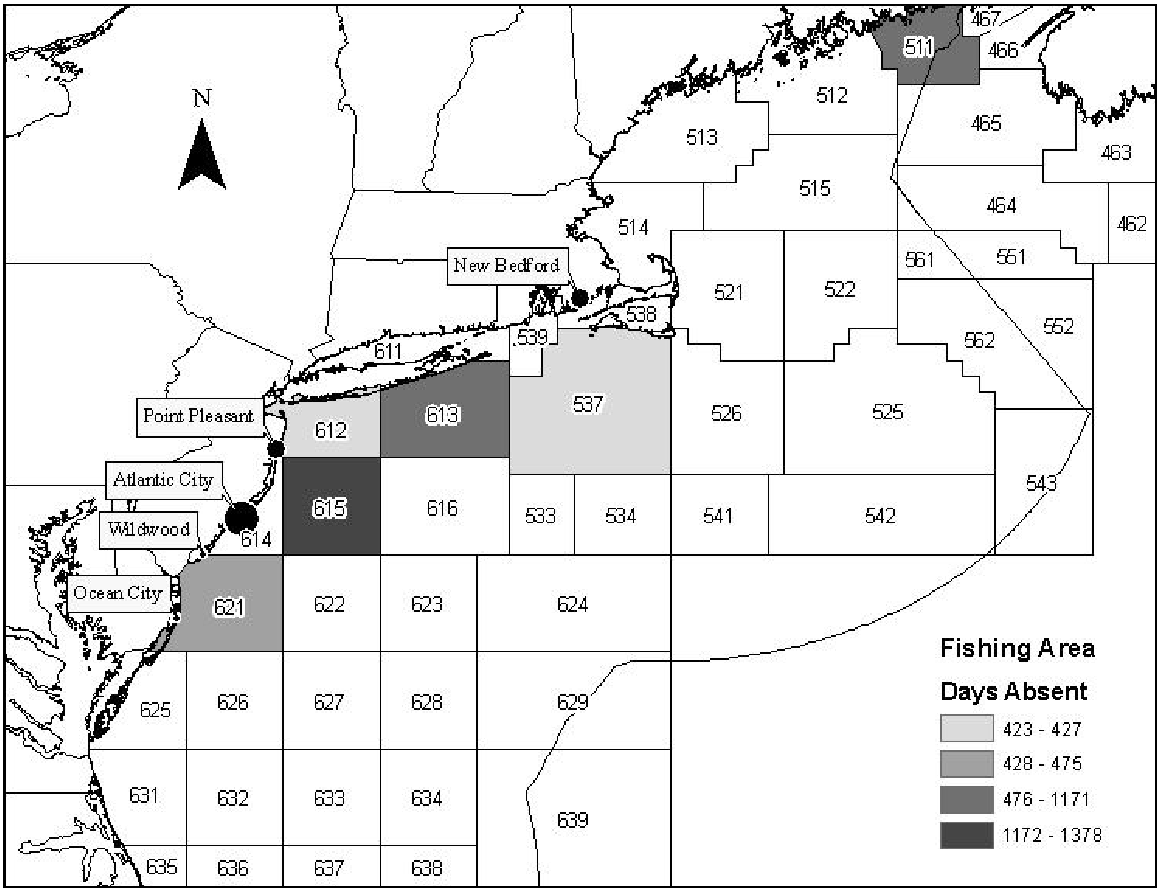

Figure 1. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the clam dredge fishing modes (New England and Mid-Atlantic combined).

3.2. Crab Pot Fishery

3.2.1. New England

The New England crab pot fishing mode is primarily represented by a small, very targeted fishery for deep-sea red crab, although some vessels fish for Jonah or other species of crab. There have been about seven vessels participating in this fishery, on average, over the last 5 years, and each vessel takes an average of 10-11 trips annually. Most fishing trips in this mode are between 6 and 10 days in duration.

As noted, red crab is the primary target species for this fishing mode, with just under 3 million lb of landings per year. This represents 95 percent of the total landings by this fishery, although small amounts of Jonah crab (44,600 lb per year), green crab (26,500 lb per year), rock crab (17,800 lb per year), and other assorted crabs (56,400 lb per year) are also landed. Most landings currently come in to Fall River, MA, (99 percent of total mode landings in 2004), but this is a recent development (in 2004, the active red crab fishing vessels consolidated their landings in Fall River after moving out of Gloucester, New Bedford, and Fairhaven, MA). Figure 2 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

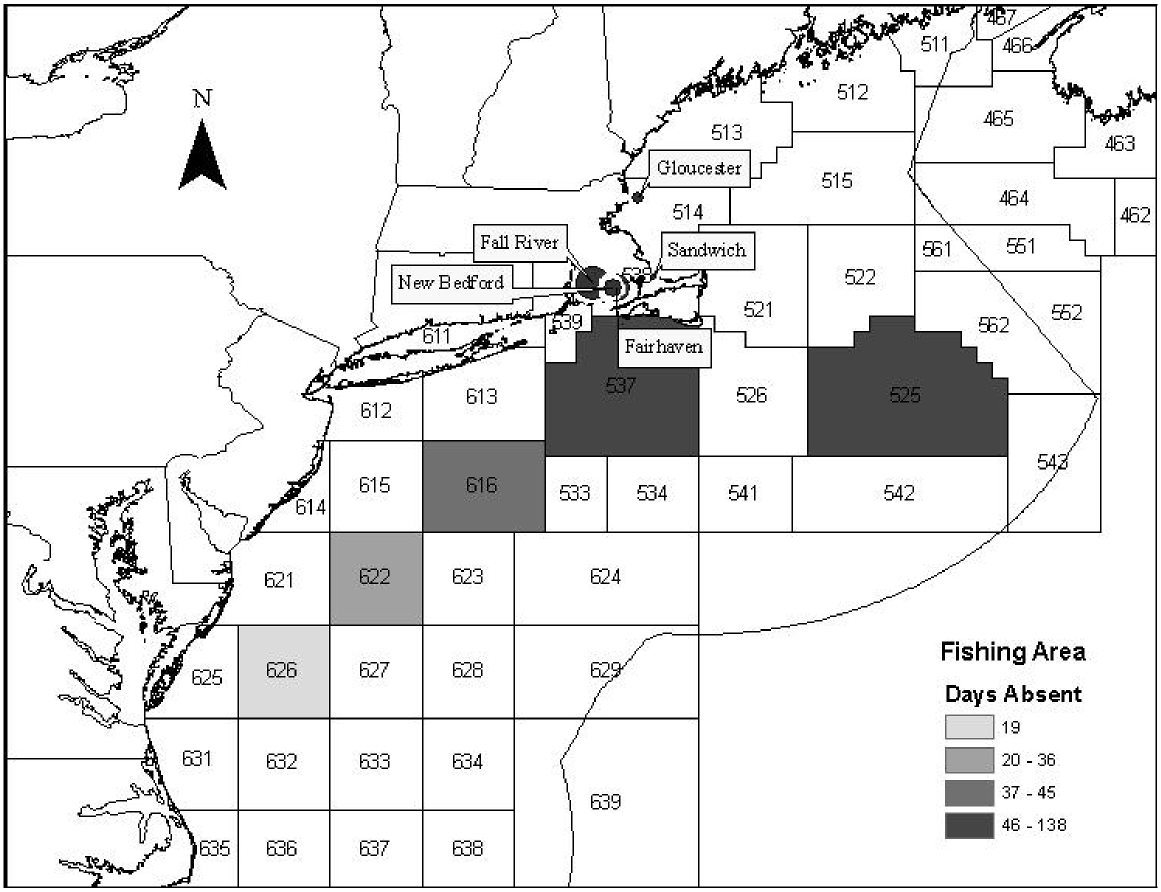

Figure 2. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England crab pot fishing mode.

3.2.2. Mid-Atlantic

Although most of the crab pot fishing effort in this region cannot be quantified using the FVTR database, there are a few federally permitted participants. Federally permitted vessels participating in the Mid-Atlantic crab pot fishery collectively land much smaller amounts of crab than those in New England. From 2000-2004, total landing by federally permitted vessels averaged less than 88,000 lb per year, although landings have increased recently and blue crab landings alone were 180,000 lb in 2004.

Blue crabs comprise most of the landings by federally permitted vessels (almost 84 percent), although red crab, lobster, green crab, and menhaden landings were also reported. The federally permitted vessels land mostly in New York ports (Brookhaven, Freeport, and other locations in Suffolk County), but relatively substantial landings also are made in Cape May, NJ. Figure 3 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

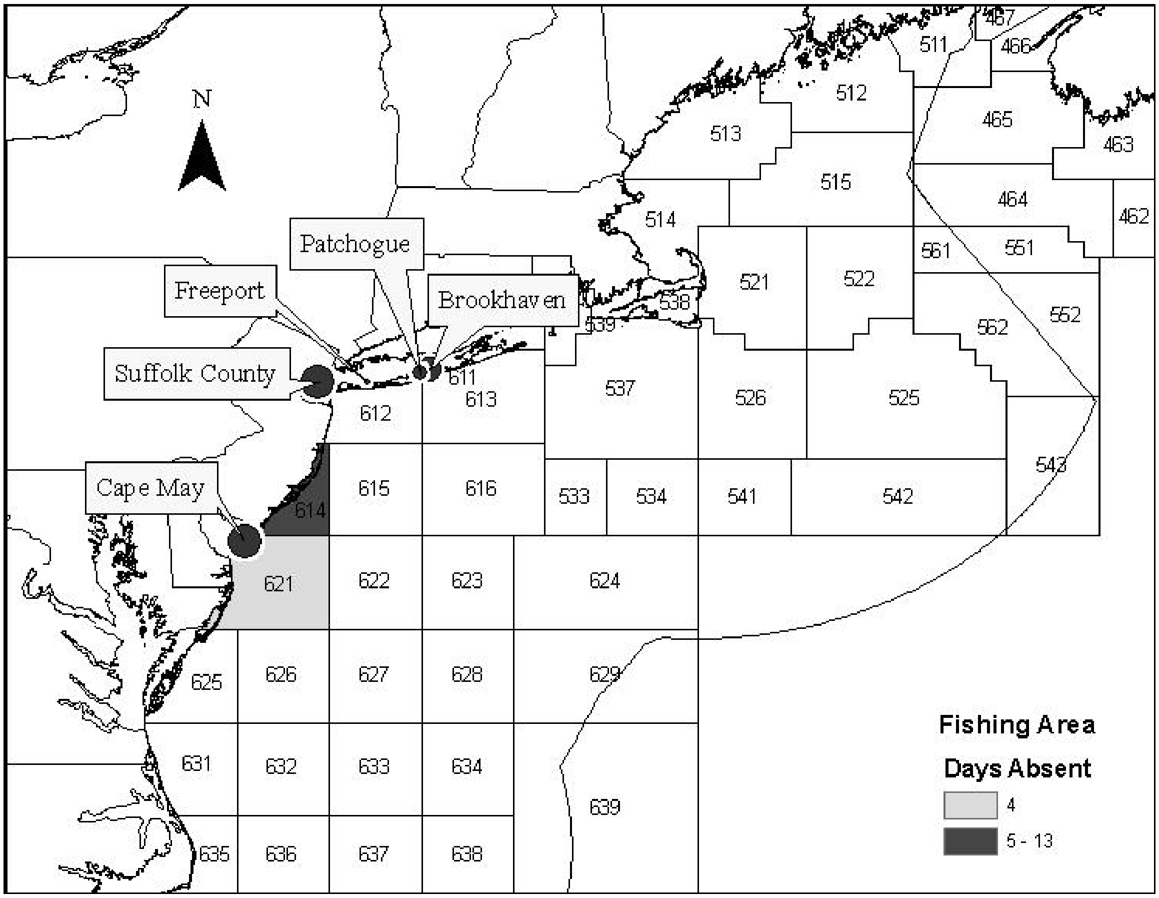

Figure 3. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic crab pot fishing mode.

Overall, the Mid-Atlantic crab fishery is the largest fishery in the region—in 2005, for example, over 25 million lb of blue crabs were landed in North Carolina, and blue crab landings from Chesapeake Bay averaged almost 70 million lb from 2000-2005. However, most of these landings are made by fishing vessels without any Federal permits fishing in state waters. Thus, this summary is not a complete characterization of the crab pot fishery in the Mid-Atlantic and should be viewed with caution, other than to understand the scope of the fishing effort relevant to the Northeast Region SBRM.

3.3. Fish Pot Fishery

3.3.1. New England

The New England fish pot fishing mode has generally been a fairly stable fishery for black sea bass, scup, and tautog, with approximately 42 participating vessels each year. These vessels make an average of nearly 20 short (less than ½ day, on average) fishing trips each year, although longer trips (as long as 28 days) do occur.

Although black sea bass is generally the top species landed by participants in this fishing mode, with an average of 220,000 lb landed annually, there were substantial amounts of hagfish landed and reported in two years (250,000 lb in 2000 and 970,000 lb in 2003). The hagfish landings could be indicative of an increase in fishing activity for this species, or it may be that most hagfish are being landed by vessels without Federal permits (hagfish is not currently subject to an FMP) and so most landings do not appear in the FVTR database. Absent the hagfish landings in 2000 and 2003, black sea bass account for almost 70 percent of the total annual landings in this fishing mode, and scup account for another 16 percent. Including hagfish, however, reduces the proportions by almost half, as the 2000 and 2003 hagfish landings comprise 43 percent of the total landings for this fishing mode during the years 2000-2004. The development of a Hagfish FMP is presently being considered by the New England Council, which may result in an increase in the amount of this species reported for this fishing mode.

It appears that most of the hagfish landings in 2000 and 2003 were made in Gloucester, MA. Absent the 2 years of hagfish landings, Cotuit, Edgartown, and Tisbury, MA, and Little Compton, RI, accounted for the majority of New England fish pot landings. If hagfish landings are included, Gloucester, MA, becomes the top New England fish pot port, with almost 46 percent of all landings from 2000-2004. Figure 4 displays the top ports and primary fishing areas utilized by participants in this fishing mode and includes all hagfish landings.

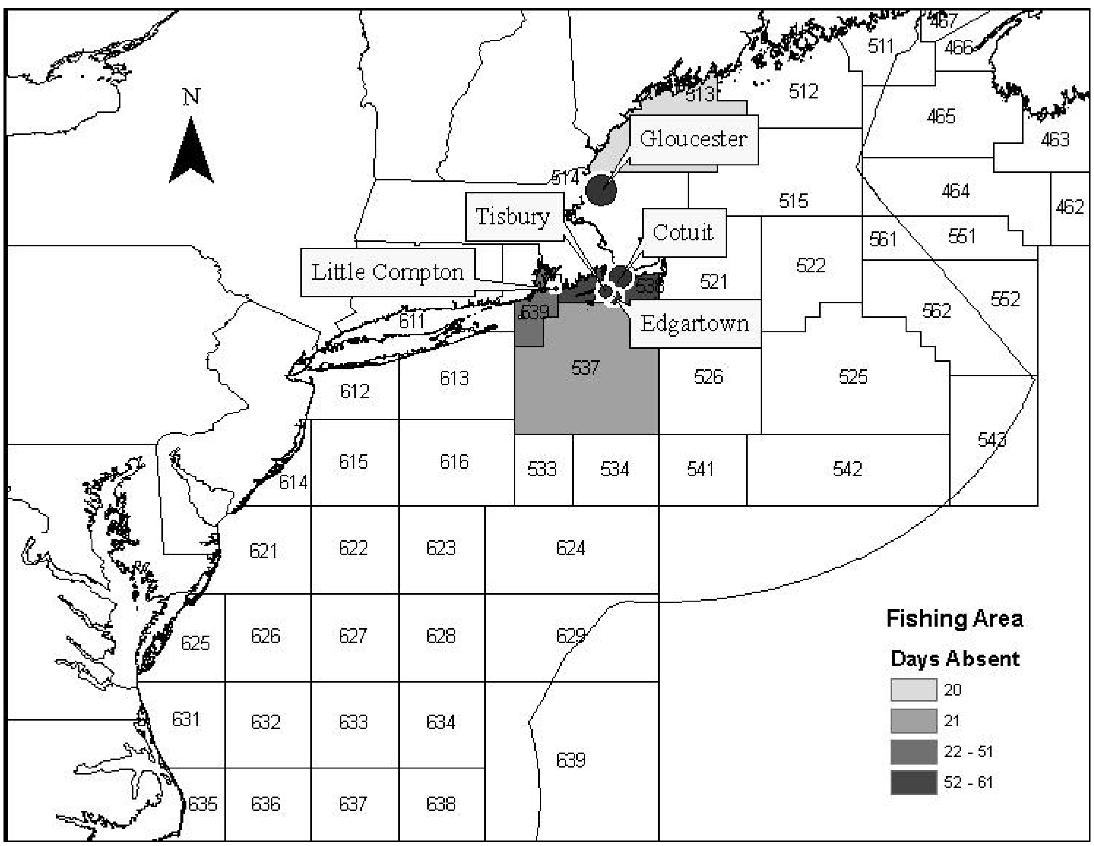

Figure 4. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England fish pot fishing mode. This information includes all hagfish landings.

3.3.2. Mid-Atlantic

Similar to its New England counterpart (absent the hagfish landings), the Mid-Atlantic fish pot fishing mode is primarily a black sea bass fishery, with almost 80 percent of all landings (total landings for this mode average 905,000 lb per year). Participation averaged almost 62 fishing vessels per year, each taking an average of 22 relatively short fishing trips (average trip length is less than ½ day, and the longest trips average only 6 days).

Although over 40 different species are landed each year in this mode, five species account for over 90 percent of all landings by weight. Black sea bass landings, as noted above, predominate, with an average of 723,000 lb per year. Tautog (49,000 lb per year), channeled whelks (35,000 lb per year), eels (21,000 lb per year), and lobster (17,000 lb per year) together comprise 13.5 percent of the total annual landings. Ocean City, MD, is the top port, with over 230,000 lb of landings each year (25 percent of the total landings). Virginia Beach, VA, and Sea Isle City, NJ, are also primary ports for this mode, and together take in 30 percent of the annual landings. Figure 5 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

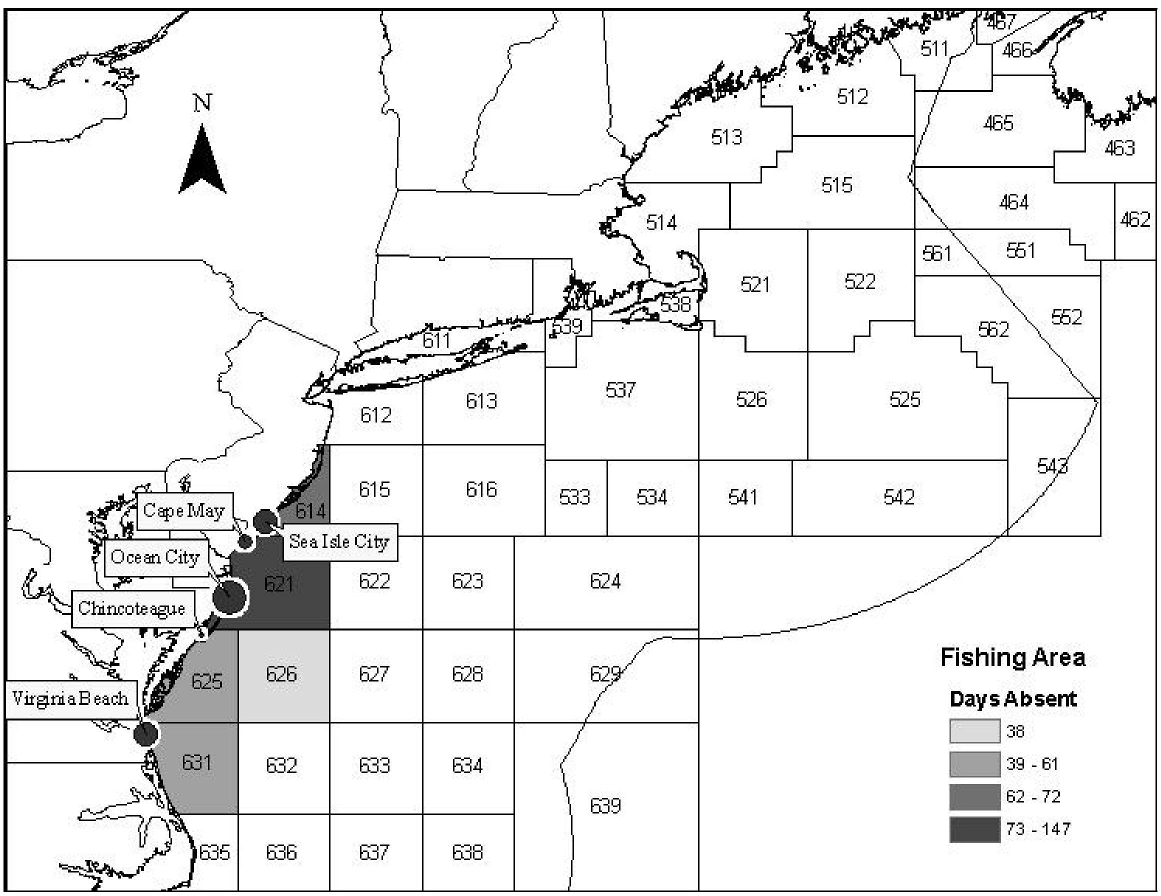

Figure 5. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic fish pot fishing mode.

3.4. Gillnet Fishery

Within the overall gillnet fishery, there are three mesh size categories used to define the fishing modes for the purposes of the SBRM: Small mesh (less than 5.5 inches); large mesh (5.5 inches or greater and less than 8 inches); and extra-large mesh (8 inches and greater). For each mesh size category, the two focus areas (New England and Mid-Atlantic) will be addressed.

3.4.1. Small-Mesh Gillnets

3.4.1.1. New England

The New England small-mesh gillnet fishery is a fairly small fishing mode, with a relatively small fleet that averaged 25 vessels participating in any one year (42 vessels participated in 2000, but since then the number has dropped with either 21 or 23 participating vessels). For the most part, these vessels have taken no more than one to two trips each per year, with trips averaging less than 1 day, but up to 5 days, in duration.

Total landings of fish for this fishing mode have averaged 103,700 lb, a very small component of the overall groundfish-type fisheries in the Northeast Region. Top species landed include pollock (just over 22,000 lb per year, on average), cod (under 18,000 lb per year), monkfish (just over 12,000 lb per year), and skates (just under 11,000 lb per year). Primary ports for this fishing mode include Gloucester and Chatham, MA, with just under half of all landings coming in to these two ports. Figure 6 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

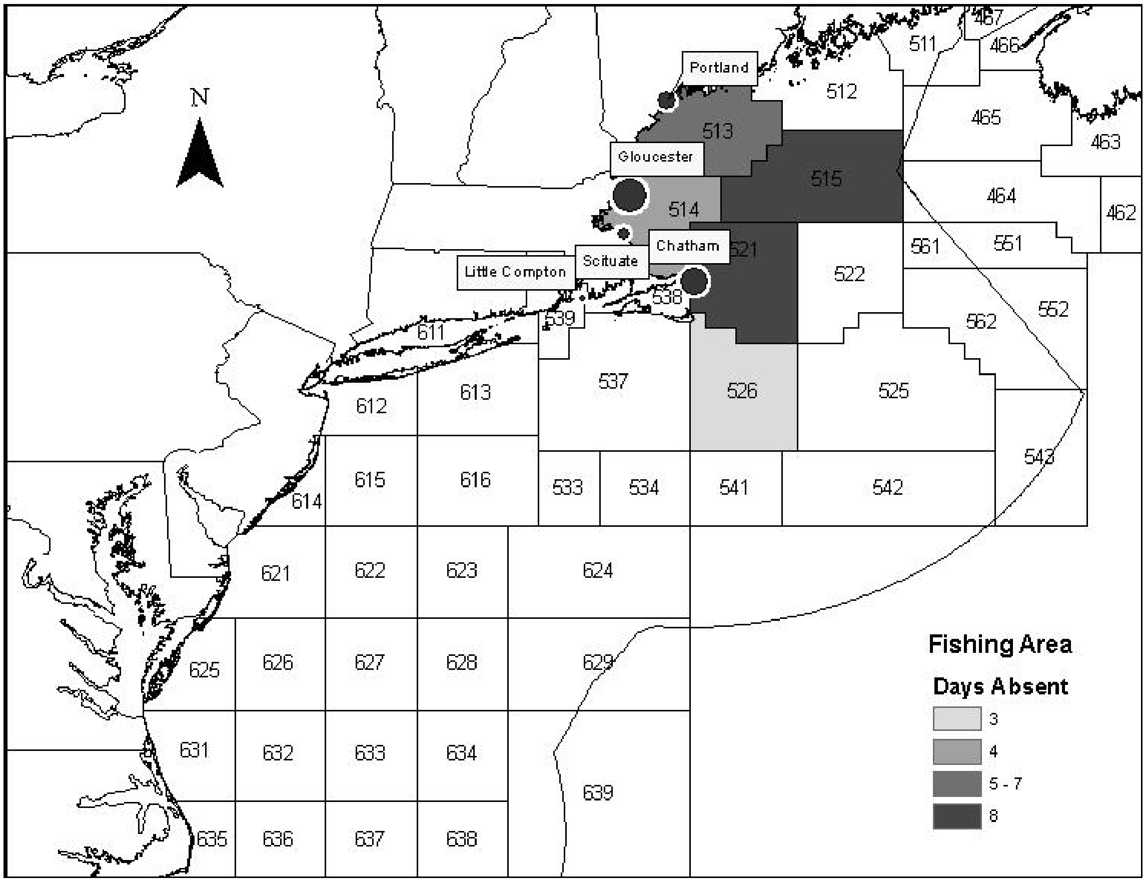

Figure 6. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England small-mesh gillnet fishing mode.

3.4.1.2. Mid-Atlantic

In contrast, the Mid-Atlantic small-mesh gillnet fishery is a much larger fishing mode, with over 100 participating vessels, on average, and average annual landings of almost 3.8 million lb. These vessels together take an average of over 2,700 fishing trips per year (for an average of more than 27 trips per vessel per year). Trips generally last less than 1 day, but can exceed 9 or 10 days in duration. Vessels participating in this fishery primarily land at ports in New Jersey (Long Beach and Point Pleasant), Virginia (Virginia Beach and Chincoteague), and New York (Shinnecock).

Atlantic croaker and bluefish are the primary species landed by participants in this fishing mode, together comprising almost two-thirds of all landings. Landings of croaker exceeded 1.3 million lb, on average, over the 5-year timeframe examined. Bluefish landings were just under 1.1 million lb per year. Landings of menhaden, spot, and weakfish together averaged another 800,000 lb. Figure 7 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

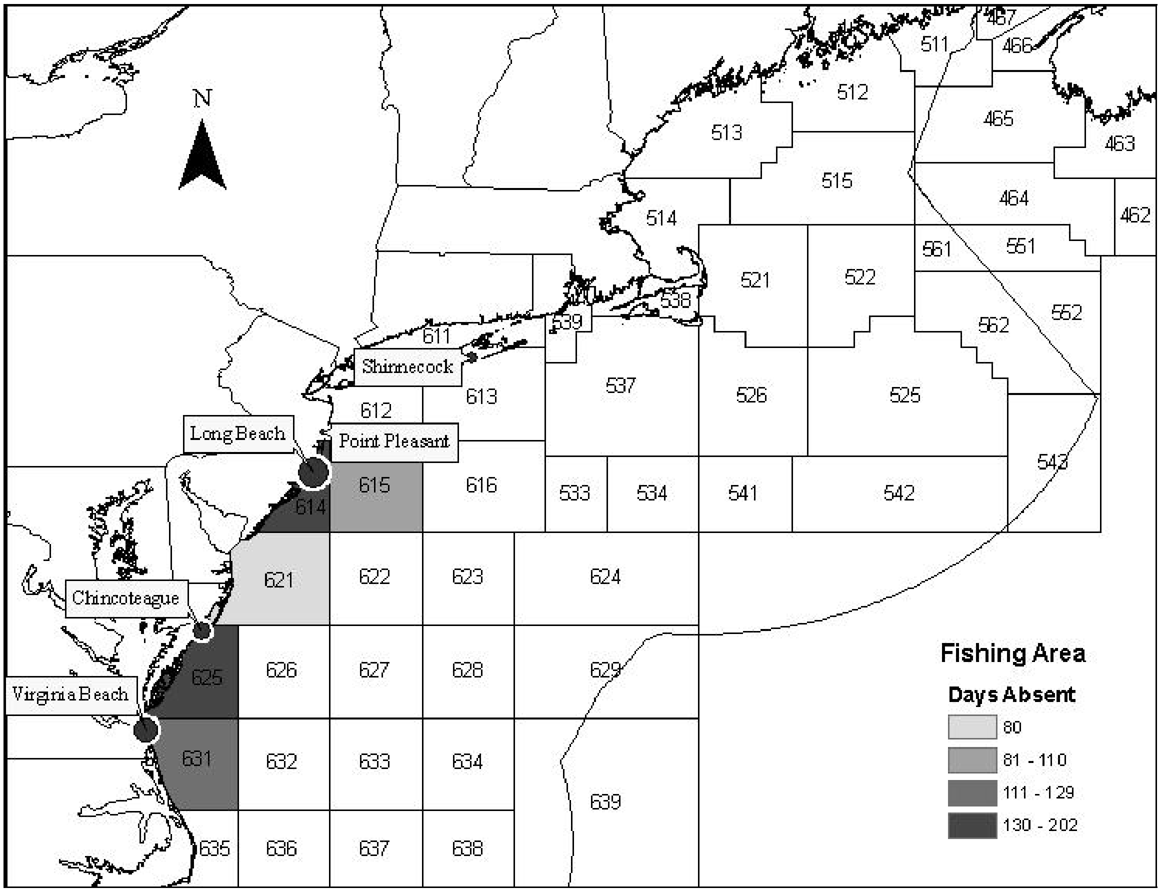

Figure 7. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic small-mesh gillnet fishing mode.

3.4.2. Large-Mesh Gillnets

3.4.2.1. New England

The biggest component of the New England gillnet fishery is the large-mesh gillnet fishing mode. Between 2000 and 2004, an average of 168 vessels participated, although this declined somewhat from 179 in 2000, to 150 in 2004. These vessels averaged 33 trips each year, landing almost 70 different species at over 35 different New England ports. As with other gillnet fisheries, trips averaged less than 1 day in duration, but longer trips, up to 20-25 days in duration, also occurred.

Total landings of fish in this mode exceeded 12.7 million lb per year, with cod and pollock the primary species. Together, cod (4.1 million lb per year) and pollock (almost 3.4 million lb per year) accounted for almost 60 percent of total landings, and spiny dogfish, white hake, and monkfish comprised another 20 percent of total landings for the fishing mode. Most landings were made in Gloucester, MA (almost 27 percent), Chatham, MA (21 percent), and Portland, ME (almost 20 percent). Figure 8 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

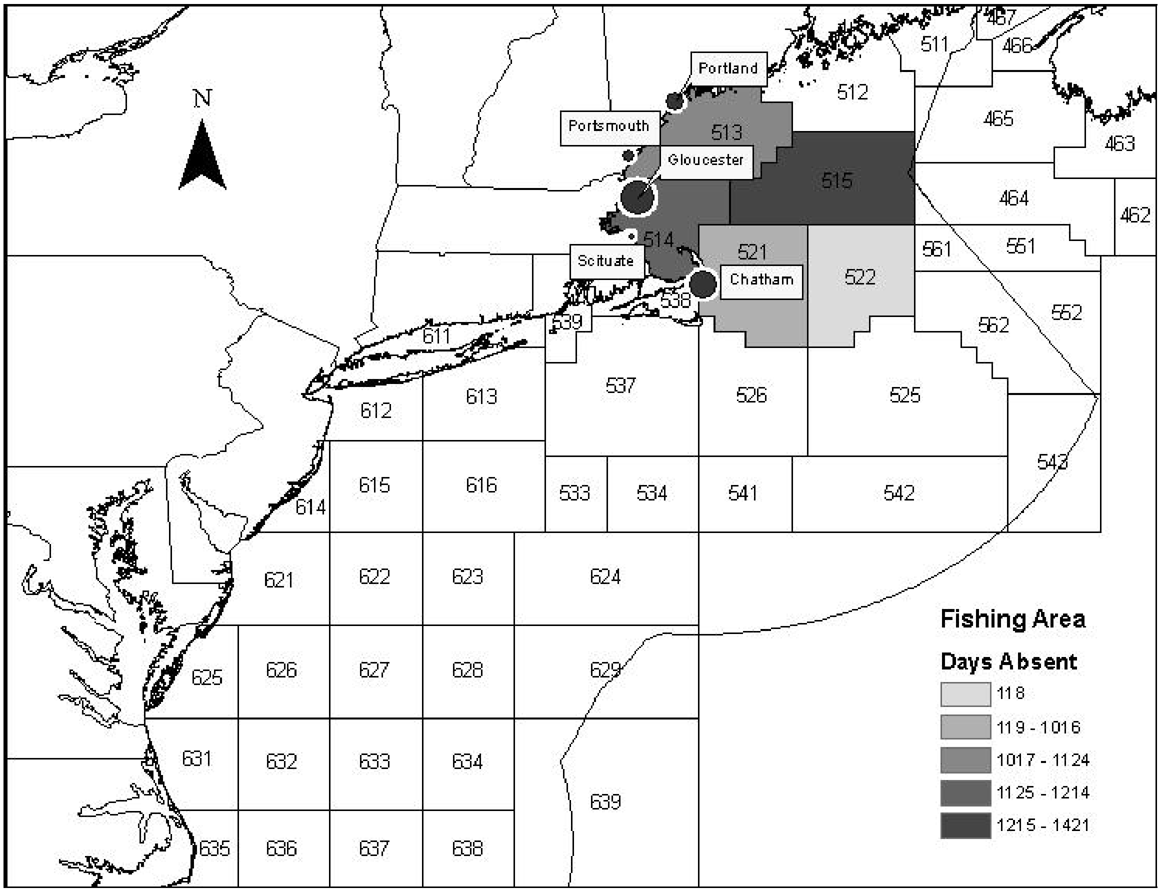

Figure 8. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England large-mesh gillnet fishing mode.

3.4.2.2. Mid-Atlantic

The Mid-Atlantic large-mesh gillnet fishery is smaller than the New England large-mesh gillnet fishery, but remains a substantial fishery nonetheless. An average of 83 vessels participate in this fishing mode each year, making an average of 12 trips each. Average trip duration is less than 1 day, but the longest trips are 10 days or less.

The majority of landings in this fishing mode are of either smooth or spiny dogfish (an average of 532,000 lb and 226,000 lb per year, respectively). Bluefish are also a substantial component of the landings (271,000 lb per year). Together, these three species comprise 69 percent of the 1.5 million lb in total annual landings. Similar to the small-mesh gillnet fishery, most landings are made in Chincoteague, VA (28 percent), Long Beach, NJ (21 percent), Virginia Beach, VA (11 percent), Point Pleasant, NJ (6 percent), or Ocean City, MD (6 percent). Figure 9 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

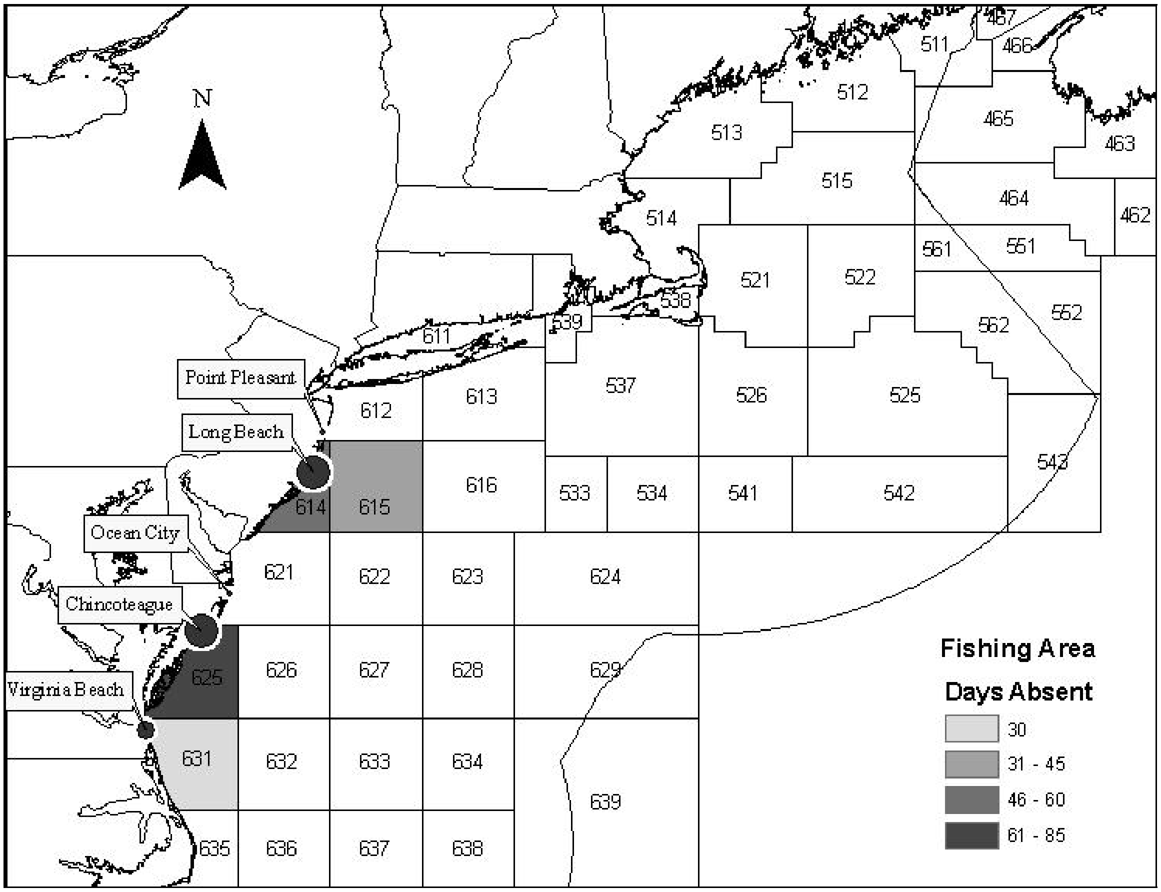

Figure 9. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic large-mesh gillnet fishing mode.

3.4.3. Extra-Large-Mesh Gillnets

3.4.3.1. New England

While participation in the large-mesh gillnet fishery has decreased, the New England extra-large mesh gillnet fishery has grown from 117 participating vessels in 2000 to 146 vessels in 2004. Over this time, participating vessels made an average of just under 33 fishing trips each per year. Trip duration for all participating vessels averaged just under 1 day, with some trips up to 20 days in duration in the last 3 years.

This is a fairly targeted fishing mode, with most landings (over 60 percent) of monkfish alone. There were over 8.5 million lb of monkfish landed, on average, between 2000 and 2004. Skates represented the second largest component of landings, with 3.8 million lb per year (24 percent of total landings). Some Northeast multispecies were also landed, but the primary groundfish species, cod and pollock, together comprised only 8 percent of total landings for this fishing mode. Although participating vessels made landings at an average of 28 ports each year, slightly less than half (45 percent) of the landings, by weight, were made at just three ports in Massachusetts (New Bedford, Chatham, and Gloucester). Figure 10 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

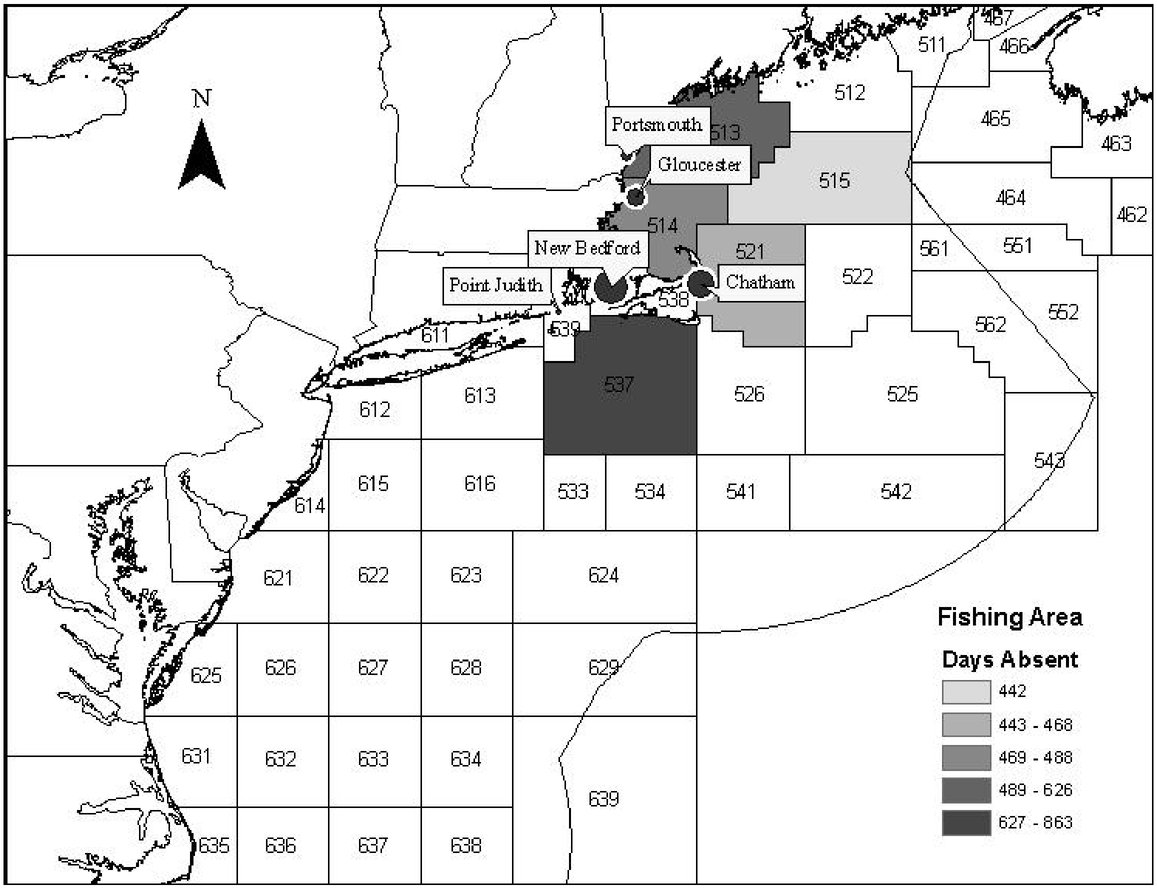

Figure 10. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England extra-large-mesh gillnet fishing mode.

3.4.3.2. <u>Mid-Atlantic</u>

Among the gillnet modes, the extra-large mesh gillnet category has the most similarity between the New England and the Mid-Atlantic components. In the Mid-Atlantic, there were an average of 100 participating fishing vessels that made an average of over 30 trips each per year. Fishing trips, at just over a ½ day in average duration, were shorter in the Mid-Atlantic than in New England.

The strongest similarity between the two regions for this fishing mode is in species landed, with monkfish and skates being the primary species in the Mid-Atlantic as well. The Mid-Atlantic fishery may be considered even more targeted than New England, because over 81 percent of all landings in this mode (over 5 million lb per year) are monkfish. Skates represent another 12 percent of landings, while the rest of the landings are striped bass, Atlantic mackerel, and bluefish (all under 2 percent).

Most of the Mid-Atlantic extra-large mesh gillnet landings are made in Long Beach and Point Pleasant, NJ (together 60 percent), but Chincoteague, VA (7 percent), Shinnecock, NY (5 percent), and Barnegat, NJ (5 percent), also factor among the top five ports of landing. Figure 11 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

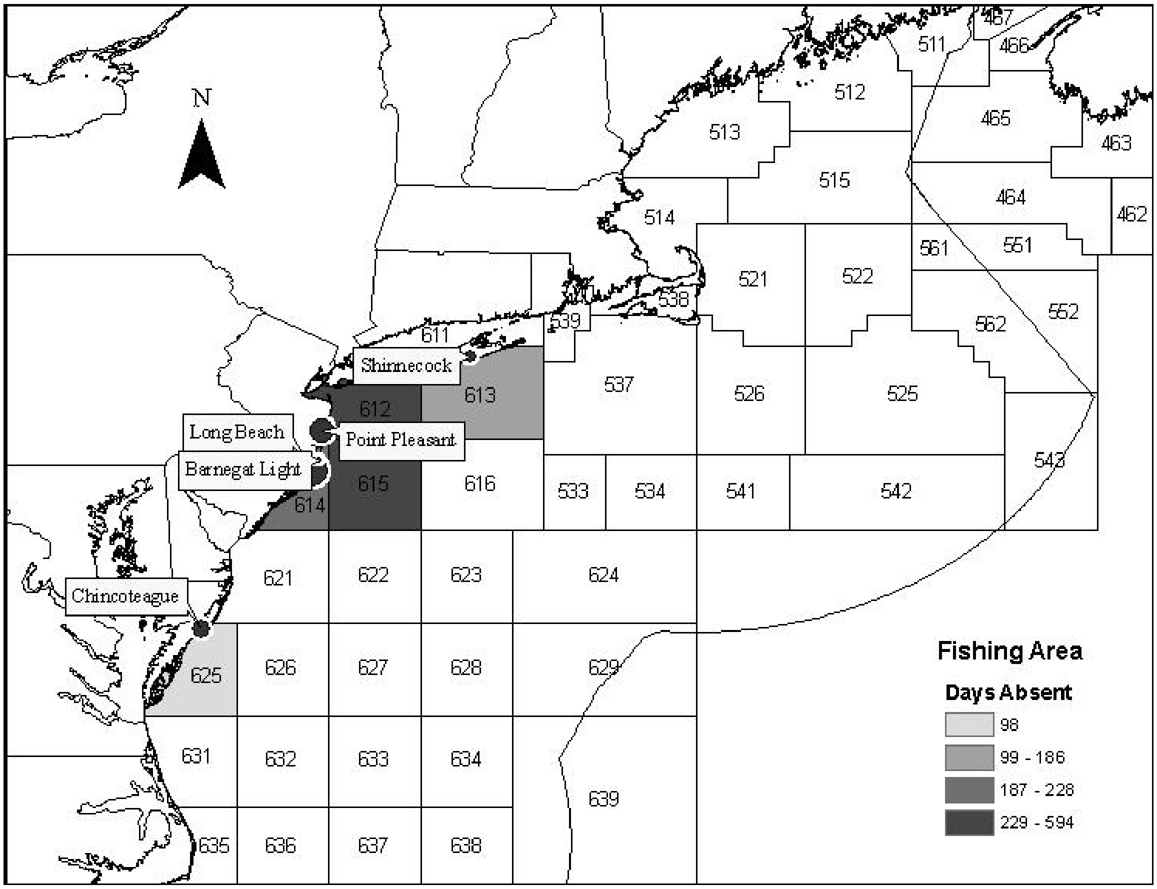

Figure 11. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic extra-large-mesh fishing mode.

3.5. Handline and Rod and Reel Fishery

3.5.1. New England

The New England handline and rod and reel fishing mode has more participants reporting via FVTRs than any other fishing mode, with almost 680 vessels, on average, per year. There has been a fair amount of variability in the number of participants over time, with as many as 766 in 2002, and as few as 585 in 2004. On average, participants in this fishing mode take 23 fishing trips per year, and trips averaged less than a ½ day in duration but longer trips, up to 20-25 days, did occur.

This is primarily a cod fleet (48 percent of landings), although a number of these vessels target bluefin tuna (almost 14 percent of landings). In spite of the substantial numbers of participants, the amount of cod landed (1.3 million lb per year) remains less than one-third of the cod landings of the large-mesh gillnet fleet. In addition to cod and bluefin tuna (375,000 lb per year), scup, pollock, and striped bass are also landed, albeit in smaller amounts.

The New England handline and rod and reel fleet, along with having a large number of participants, reports landings at over 100 ports per year (up to 144 ports in 2003), but 60 percent of landings are concentrated at just 5 ports: Harwichport, MA (622,000 lb per year); Chatham, MA (412,000 lb per year); Barnstable, MA (221,000 lb per year); Gloucester, MA (214,000 lb per year); and Point Judith, RI (126,000 lb per year). Figure 12 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

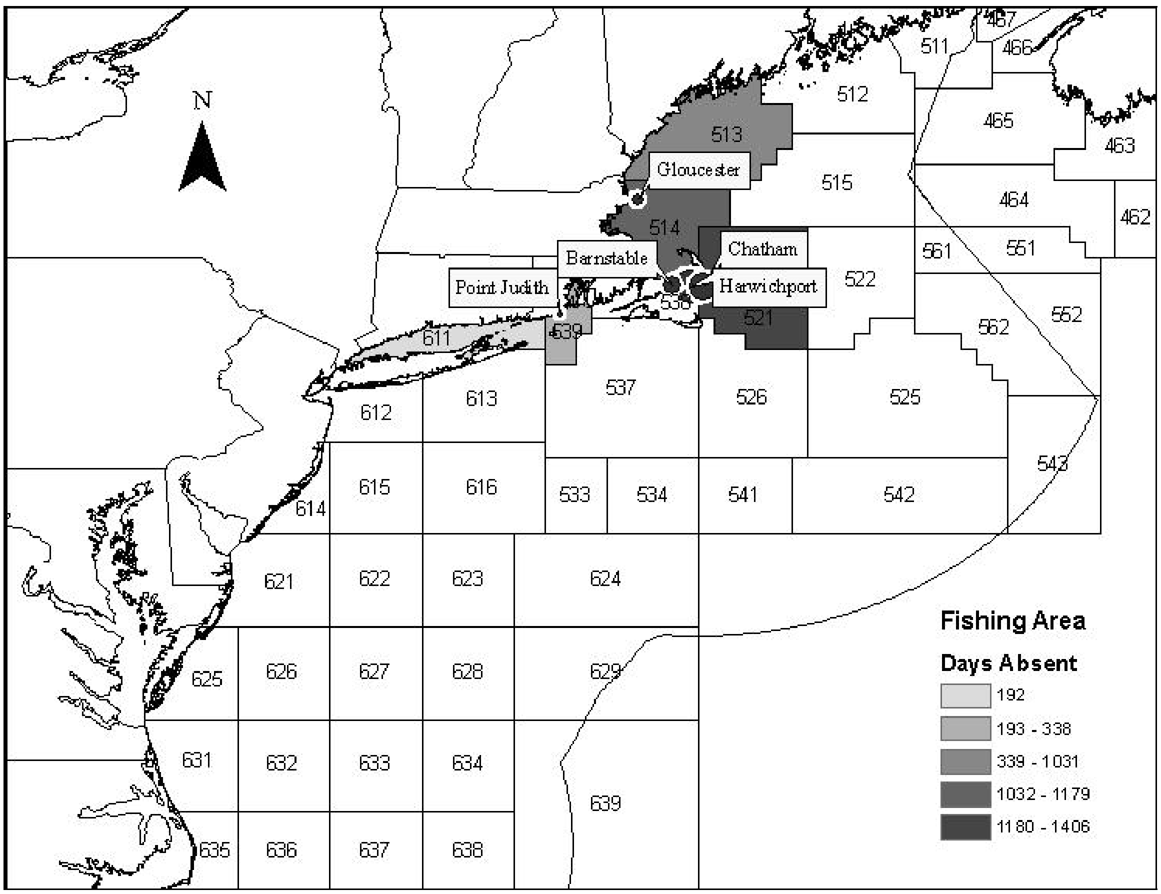

Figure 12. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England handline/rod and reel fishing mode.

3.5.2. Mid-Atlantic

A similarly large fleet, with over 500 participating vessels per year, the Mid-Atlantic handline and rod and reel fishing mode shares many functional characteristics with the New England mode, but targets completely different species. Each participating vessel, on average, made over 44 trips per year, landing at well over 100 ports (the number of ports has increased substantially in the last few years—in 2000, there were 82 reported ports of landing, but by 2003 this had increased to 209). Trips generally last less than ½ day, but trips over 20 days in duration have occurred each year.

As noted above, the similarities between the New England and Mid-Atlantic modes end when it comes to the species landed. Black sea bass dominates (over 1.0 million lb per year, 31 percent of total landings), but scup (almost 650,000 lb per year), bluefish (490,000 lb per year), mackerel (over 230,000 lb per year), and Atlantic mackerel (220,000 lb per year) are also important species to this fishing mode. Although over 115 species are landed per year by participants in this fishery, these five species represent almost 80 percent of total landings. One-fifth of all landings are made in Montauk, NY, but central New Jersey (Point Pleasant, Brielle, and Belmar) is also a primary area for this fishing mode, with almost one-third of all landings being fairly evenly divided among these three ports. Virginia Beach, VA, with 8 percent of landings, also ranks in the top five ports. Figure 13 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

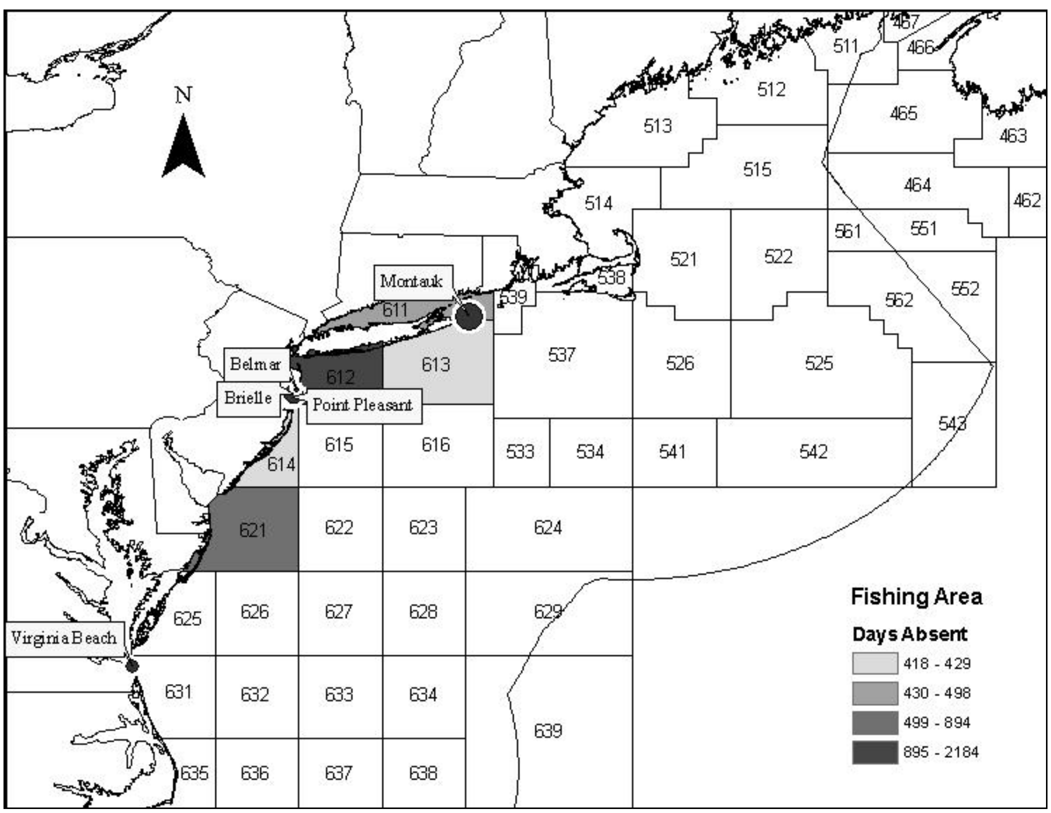

Figure 13. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic handline/rod and reel fishing mode.

3.6. Lobster Pot Fishery

Characterizing the New England and Mid-Atlantic lobster pot fishing modes is limited by the lack of data from many participants who are not required to submit FVTRs because they do not hold a Federal permit with a FVTR requirement.

3.6.1. New England

While FVTR information is not available for vessels that hold no Federal permits or no Federal permits other than for lobster, a substantial number of participants in the New England lobster pot fishing mode hold at least one Federal permit with a requirement to submit FVTRs. There are, on average, over 650 participants in the New England lobster pot fishing mode that submit FVTRs each year, and these participants take an average of 61 fishing trips each year. Most fishing trips are well under 1 day in duration, although trips lasting 20-30 days do occur each year.

American lobster is the primary species landed in this fishing mode, with an average of nearly 16 million lb landed each year by participants that submit FVTRs. This represents over 70 percent of the total landings by these participants. Jonah crab is also a significant component of this fishing mode, with an average of nearly 5 million lb landed annually. Together, lobster and Jonah crab comprise 95 percent of the total reported landings in this mode. Various crab species (rock, red, among others) also factor as landings, but in much smaller amounts.

Landings in this fishing mode are fairly spread out among over 150 ports in New England, and the top 5 ports (Sandwich, MA, Newport and Point Judith, RI, Newington, NH, and Gloucester, MA) together account for only 41 percent of the landings made by reporting participants. Sandwich, MA, averaged 2.5 million lb (11 percent of the total reported landings), while the other four each average 1.5-1.7 million lb (7-8 percent of total reported landings). Figure 14 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

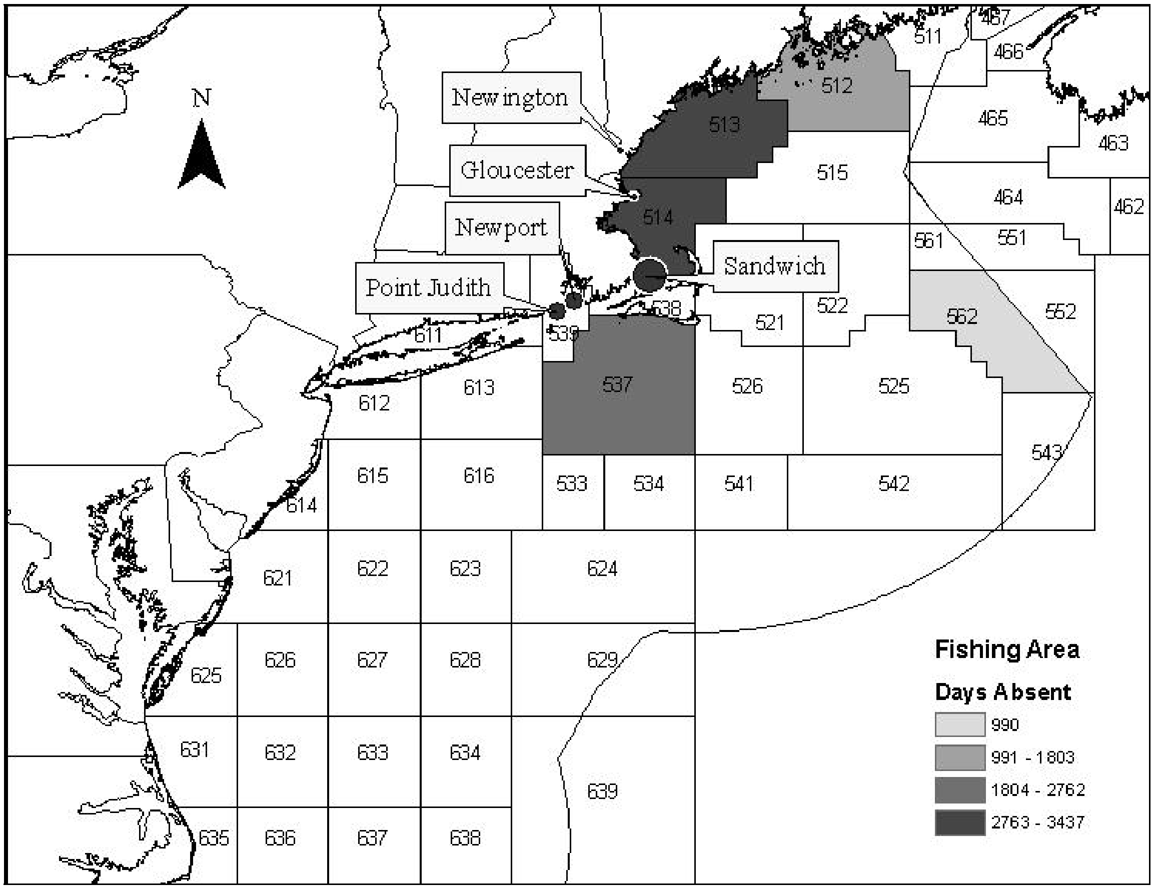

Figure 14. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England lobster pot fishing mode.

3.6.2. Mid-Atlantic

There are many fewer participants in the lobster pot fishing mode that report via FVTRs in the Mid-Atlantic than in New England, as the average number of reporting participants is just over 100 per year. These participants take fewer fishing trips, about 30, per year. Most trips last well under 1 day, and the longest trips tend to be between 10 and 16 days in duration.

As expected, American lobster is the primary species landed, although at 1 million lb per year, these landings represent a small fraction of the 16 million lb per year landed in New England. Lobsters comprise almost 76 percent of the annual landings, with Jonah crab (195,000 lb) and black sea bass (45,000 lb) adding another 18 percent of total landings. Montauk, NY (360,000 lb per year), Point Pleasant, NJ (248,000 lb per year), and Sea Isle City, NJ (166,000 lb per year), are the top ports for participants in this fishing mode that report via FVTR. Together these three ports take in over 58 percent of the total reported landings for this mode. Freeport, NY, and Belford, NJ, together account for another 11 percent of the reported landings each year. Figure 15 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

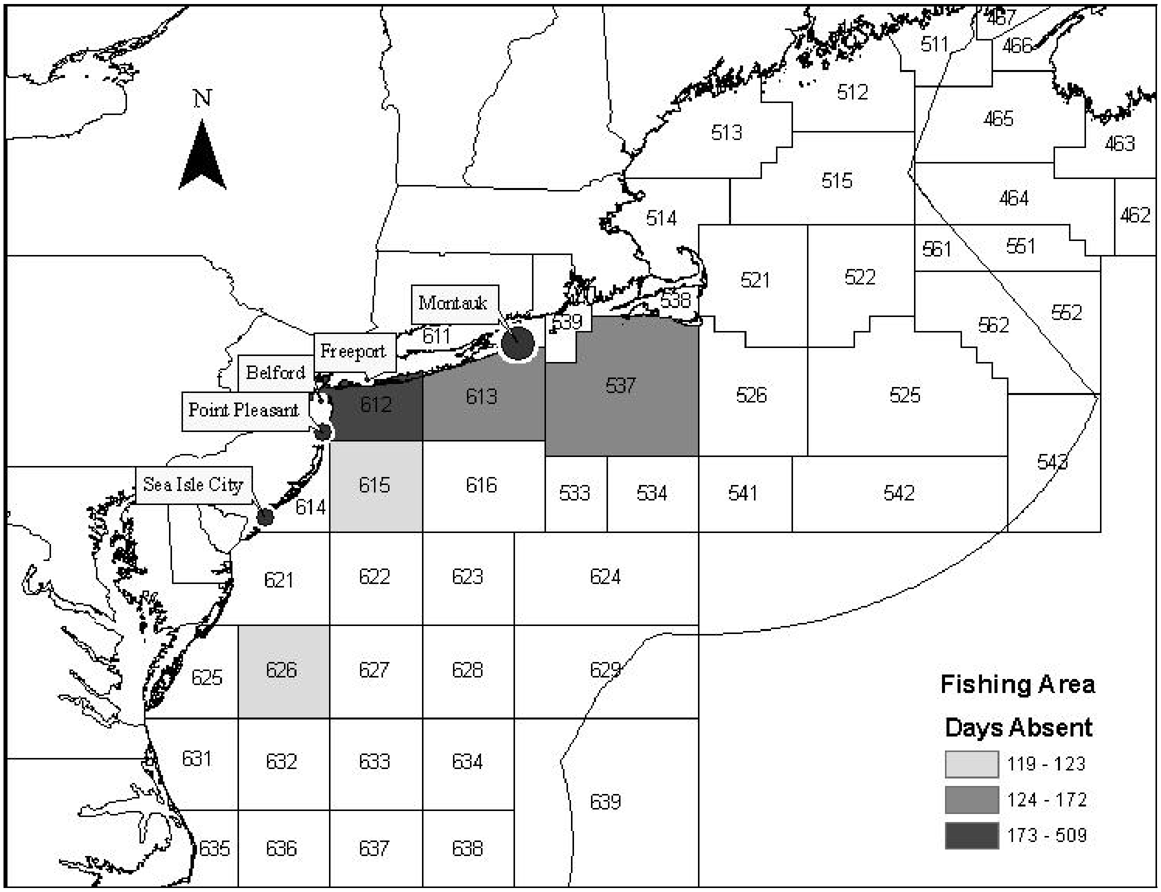

Figure 15. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic lobster pot fishing mode.

3.7. Bottom Longline Fishery

As explained in chapter 5, for the purposes of allocating fishery observer effort within the groundfish fisheries, some New England longline fishing trips are differentiated according to the type of trip (if the trip participates in a SAP). However, this information is not available on the FVTR, and so the following summaries do not specifically address the differences between these types of trips and other longline trips.

3.7.1. New England

The number of participants in the New England bottom longline fishing mode has decreased from 90 vessels in 2000 to 69 vessels in 2004, with an average of 77 participating vessels each year. These vessels take an average of 20 fishing trips each per year, each lasting an average of just under 1 day (the longest trip in the time series, over 21 days, occurred in 2003, and, by contrast, the longest trip in 2004 was 8.6 days in duration).

Spiny dogfish (almost 1.5 million lb per year) and cod (just over 1.3 million lb per year) are the primary species landed by participants in this fishing mode, together representing over 75 percent of the total mode landings, with haddock (almost 525,000 lb per year) representing another 14 percent. Most of the landings by the New England bottom longline fleet come to Chatham, MA (53 percent), but Harwichport, MA (22 percent) is also very important. Secondary ports include Gloucester, MA (8 percent), Portland, ME (4 percent), and Scituate, MA (3 percent). Figure 16 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

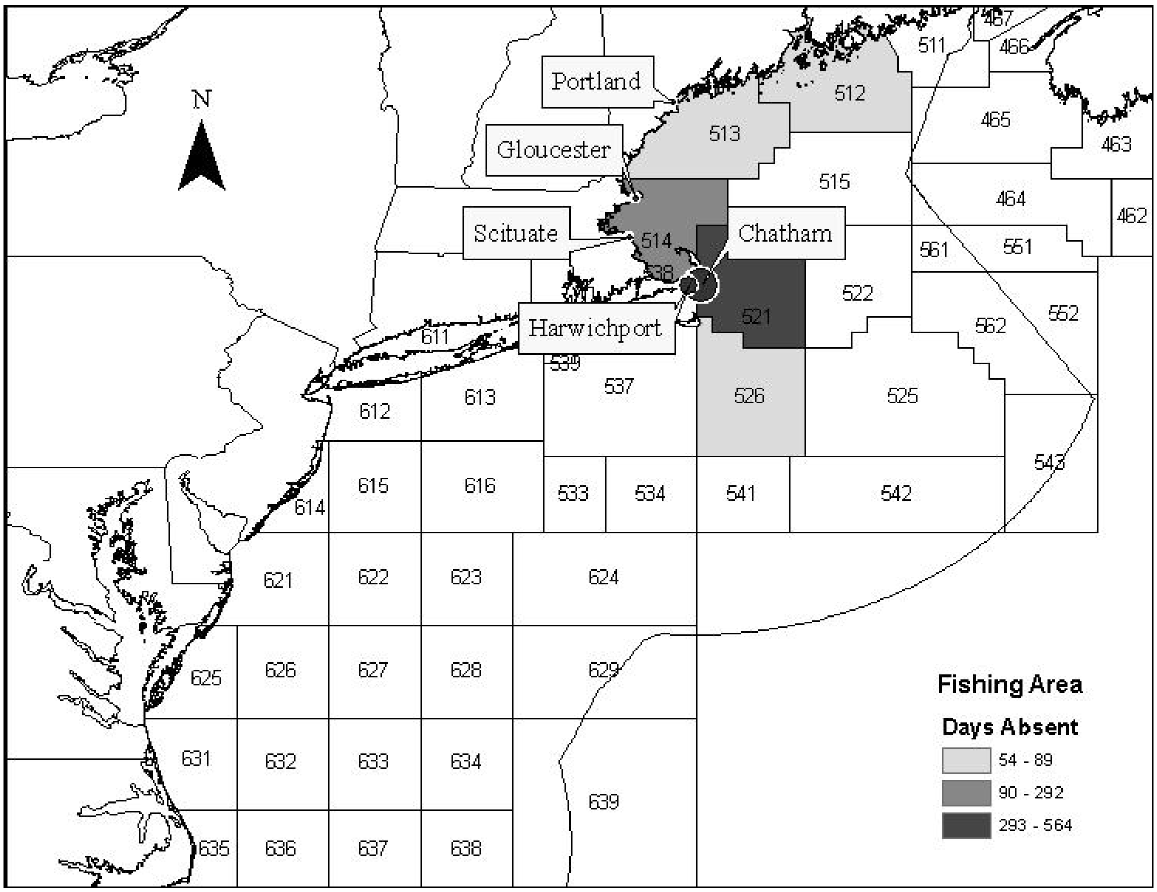

Figure 16. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England bottom longline fishing mode.

3.7.2. Mid-Atlantic

The Mid-Atlantic bottom longline fishery is a much smaller, much more focused fishing mode that primarily targets tilefish. On average, fewer than 16 vessels participate each year, making an average of just under 11 fishing trips per year. Fishing trips average just under 5.5 days in duration, but trips up to 15 days occur.

As noted, this is a much more focused fishing mode than many others, with 95 percent of landings being tilefish, of which at least 78 percent is golden tilefish. Similarly, nearly 85 percent of the landings are made on Long Island, NY, in Montauk

(68 percent), Hampton Bays (11 percent), and Shinnecock (4 percent), and the remaining landings (15 percent) come in to Long Beach/Barnegat Light, NJ. Figure 17 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

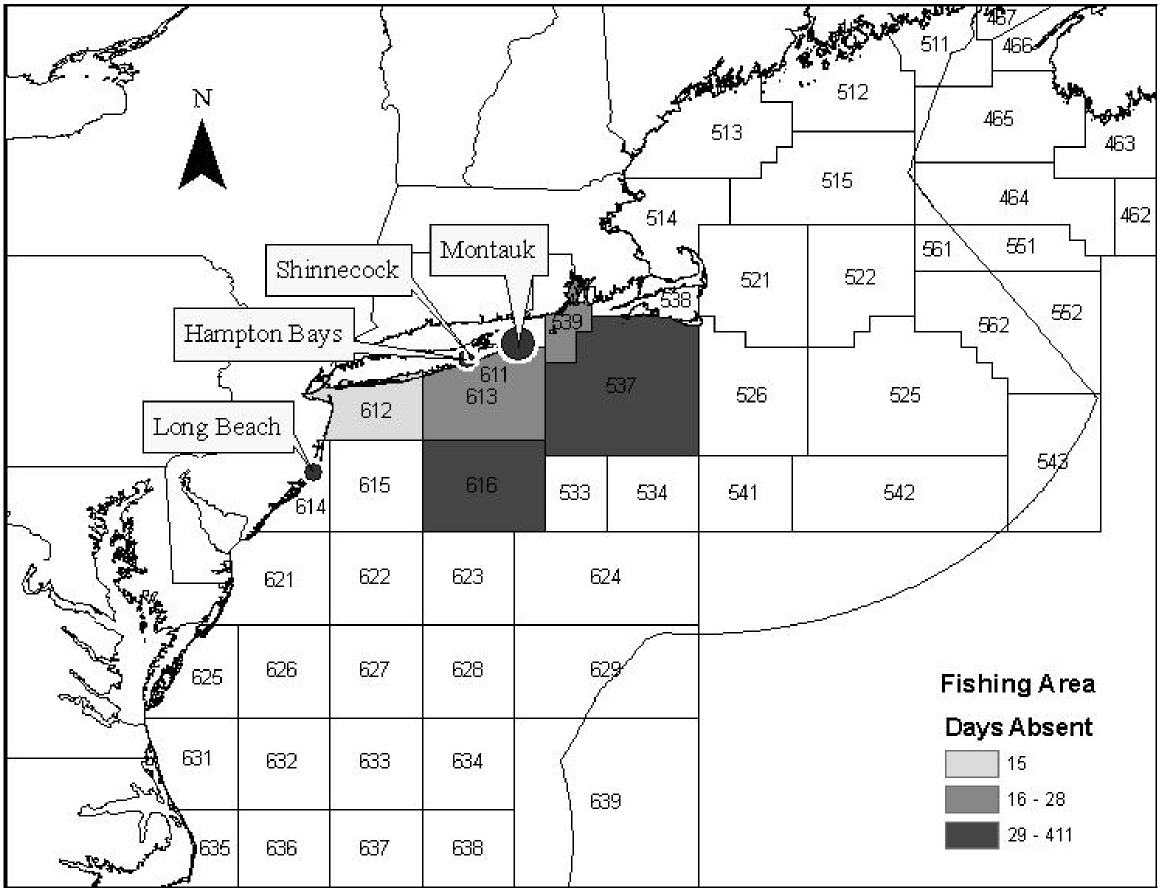

Figure 17. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic bottom longline fishing mode.

3.8. Mid-Water Single and Pair Trawl Fisheries

For the purposes of the development and application of the Northeast Region SBRM, paired and single midwater trawls are considered together in the stratification of observer data and the allocation of observer effort. However, this section discusses each type of trawl configuration separately and, within each type of configuration, the New England and Mid-Atlantic modes are separately addressed. This is done primarily for ease of analyzing the data from the FVTR database, and, as described below, there are many similarities between the two gear configurations that allow them to be treated together within the SBRM.

3.8.1. New England Midwater Pair Trawl

All of the midwater trawl fisheries are large volume fisheries with relatively few participants. The New England pair trawl mode averages less than 14 active participants each year, and each participants takes, on average, nearly 50 fishing trips per year. Most trips are relatively short, averaging just 1.5 days, but longer trips 7-15 days in duration do occur. The New England pair trawl fishing mode is an extremely targeted fishery, with no more than three species landed in any year from 2000-2004. Over 85 percent of the annual landings are Atlantic herring (nearly 121 million lb per year), and Atlantic mackerel (15 percent, or 21 million lb, per year) generally comprises the remainder. Occasional landings of spiny dogfish occur, but the amounts (11,000 lb per year) are negligible compared to the two primary species.

Gloucester, MA, is the top port for this fleet, receiving over 32 percent of the annual landings (45.7 million lb). Portland, ME, and New Bedford, MA, rank second and third, respectively, with 21.4 million lb (15 percent of the total) landed each year in Portland, and 19.8 million lb (14 percent) coming in each year to New Bedford. Portsmouth, NH, and Rockland, ME, complete the top five ports, with a total of 22.7 million lb (16 percent of the total) between them. Figure 18 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

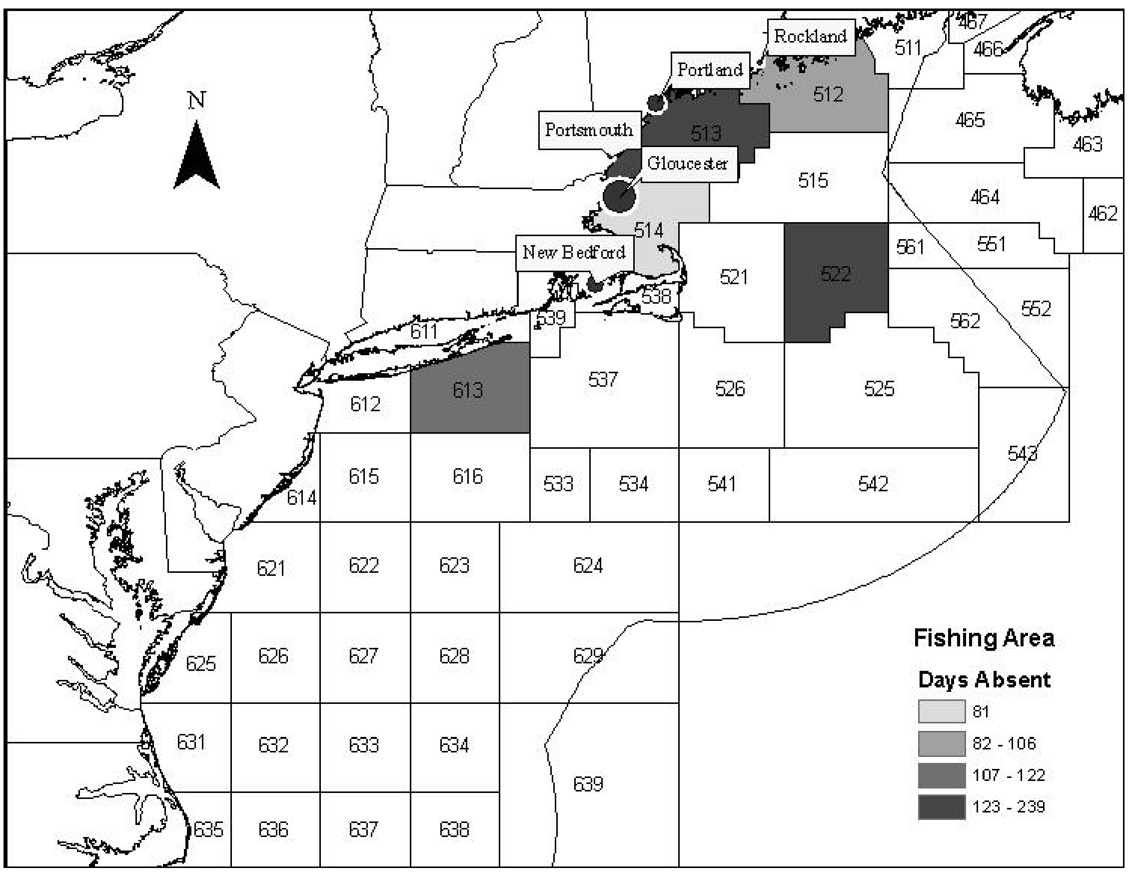

Figure 18. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England midwater pair trawl fishing mode.

3.8.2. New England Midwater Single Trawl

The New England midwater single trawl fishing mode is similar in size to the pair trawl, with an average of 17 participants per year. These vessels take an average of 23 trips each per year, less than half the number of trips taken by the New England pair trawls. The total annual landings of this fleet, at 68.2 million lb, is similarly about half that of the pair trawl fleet. Trip lengths are about the same, if slightly shorter on average, as the pair trawls, at 1.5 days in duration, although the longest trips average slightly longer for the single trawls than the pair trawls (13.4 days versus 10.5 days).

The species landed in this mode are largely the same as for New England pair trawls, with almost 84 percent of all landings being Atlantic herring and Atlantic mackerel comprising another 16 percent. The only other landings of note included almost 1.3 million lb of *Illex* squid in 2003, but this represents 96 percent of all *Illex* landed by this fleet in the time series, so this species is not a typical component of the landings. Although there are a variety of other species occasionally landed, the amounts (generally less than 10,000 lb per year) are negligible relative to herring and mackerel.

Portland, ME, is the primary port for the midwater single trawl fleet, with over 42 percent of the annual landings (nearly 29 million lb). Gloucester, MA, is second, with 16 percent of the landings (11 million lb per year). Point Judith, MA (9 million lb), and North Kingstown, RI (7 million lb), also receive substantial amounts of this fleet's annual landings. Bath, ME, accounted for 32 percent (25 million lb) of the fleet landings in 2000, but landings in Bath declined to 3.8 million (5 percent) in 2001 and, since 2001, Bath has not been in the top 10 ports annually. Figure 19 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

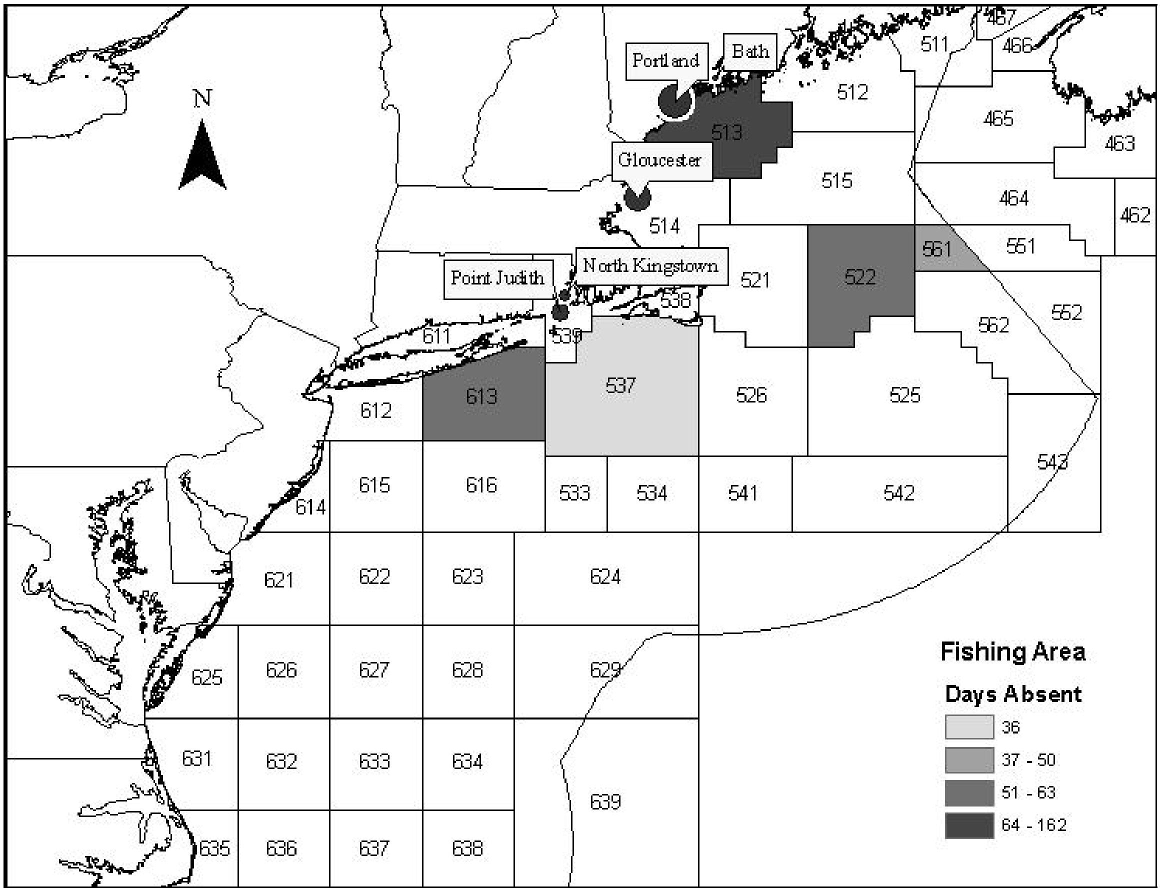

Figure 19. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England midwater single trawl fishing mode.

3.8.3. Mid-Atlantic Midwater Pair Trawl

The Mid-Atlantic midwater trawl modes, both paired and single trawl, are smaller than their New England counterparts. The Mid-Atlantic pair trawl mode has averaged just over six vessels per year for the last 3 years.[19] Trips averaged 2.5 days in duration, and each vessel took, on average, over 10 trips each year. In contrast to the New England midwater trawl fishing mode, for which Atlantic herring is the primary target species, in the Mid-Atlantic, Atlantic mackerel is the top species.

Nearly 95 percent of all landings by Mid-Atlantic midwater pair trawls is Atlantic mackerel, averaging over 22 million lb per year. Just over 1 million lb per year of Atlantic herring are landed by this fleet, and relatively insignificant amounts of chub mackerel, Atlantic croaker, and menhaden are also landed, although these last three species together account for less than 1 percent of total annual landings.

[19] There were no data for this sector in 2000 in the FVTR database, and only one trip was reported in 2001, so these years were excluded from the analysis.

Not only is Cape May, NJ, the top port for this fishing mode, it is the only port where the vessels participating in this fishery have landed their catch in the last 3 years. Figure 20 displays primary fishing areas utilized by participants in this fishing mode.

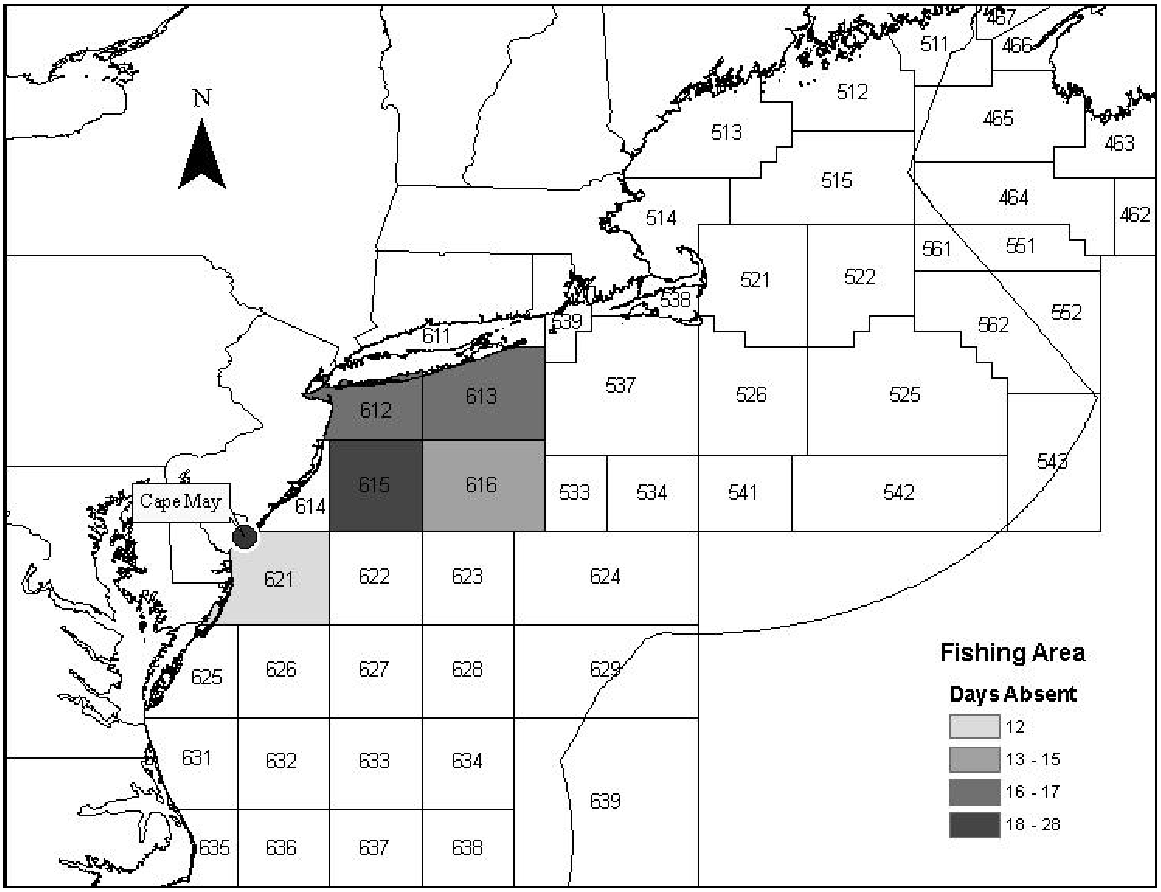

Figure 20. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic midwater pair trawl fishing mode.

3.8.4. Mid-Atlantic Midwater Single Trawl

The Mid-Atlantic midwater single trawl fishing fleet also has an average of six active vessels participate each year, and these vessels take, on average, approximately 10 trips per year, with the majority of trips lasting over 2 days. Longer trips, up to 20 days in duration, have occurred.

As with the pair trawl fleet, the primary species landed by the participants of the single trawl fishery are Atlantic mackerel (83 percent of the total landings) and Atlantic herring (11 percent of the total landings). However, the total landings by this sector represent less than half of the landings from the pair trawl fleet (10.7 million lb per year versus 23.4 million lb per year). In addition to Atlantic mackerel and Atlantic herring, blueback herring (250,000 lb per year), *Loligo* squid (124,000 lb per year), and bluefish (89,000 lb per year) are also landed. Together, these three species account for 4.3 percent of the total annual landings by this fishing mode.

While Cape May, NJ, is the top port for this fleet, with 98 percent of the annual landings, relatively small amounts of catch are landed in Greenport, NY, Hampton, VA, Newport News, VA, and Montauk, NY. Figure 21 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

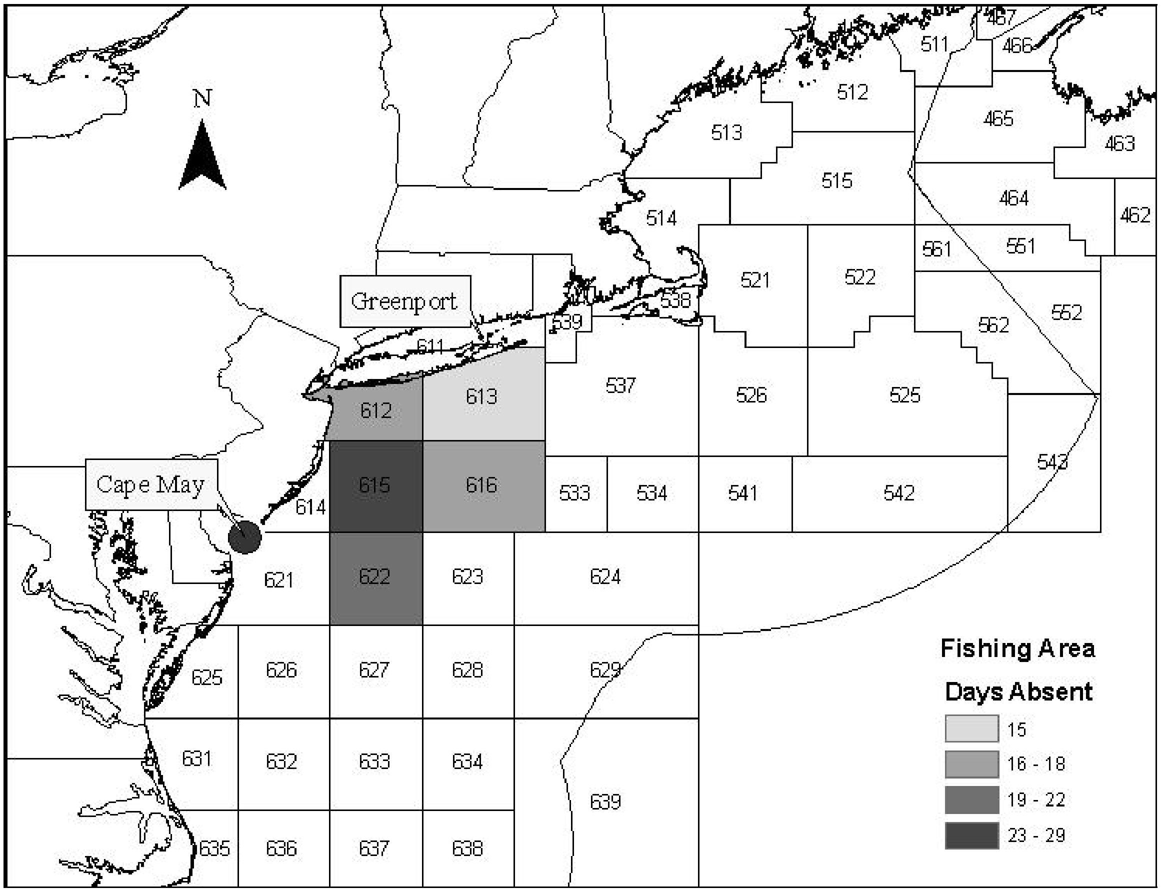

Figure 21. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic midwater single trawl fishing mode.

3.9. Otter Trawl Fishery

Within the overall bottom otter trawl fishery, there are two mesh size categories used to define the fishing modes for the purposes of the SBRM: Small mesh (less than 5.5 inches) and large mesh (5.5 inches and greater). For each mesh size category, the two focus areas (New England and Mid-Atlantic) will be addressed. As explained in chapter 5, for the purposes of allocating fishery observer effort within the groundfish fisheries, some New England large-mesh otter trawl fishing trips are differentiated according to the type of trip (if the trip is to the U.S/Canada management area or uses B-Regular DAS). However, this information is not available on the FVTR and so the following summaries do not specifically address the differences between these types of trips and other large-mesh otter trawl trips.

3.9.1. Small-Mesh Otter Trawls

3.9.1.1. New England

The New England small-mesh otter trawl fishing mode has 225 participants, on average, landing almost 58.5 million lb of fish each year. These vessels take, on average, almost 19 fishing trips per year, and the trips average just under 2 days in duration (although longer trips up to 20-30 days do occur).

Squid comprise the majority of catch for the participants of this fishing mode, with more than 17 million lb and 10 million lb of *Loligo* and *Illex* squid, respectively, landed on average each year. Together, these two species account for 47 percent of all landings in this mode. Silver hake is also very important, with over 14.6 million lb (25 percent of the total landings) landed each year. In addition to these three species, Atlantic mackerel (4 million lb) and Atlantic herring (3 million lb) account for another 12 percent of annual landings.

The majority of landings made by participants in this fishing mode come into either Point Judith or North Kingstown, RI. Together, these two Rhode Island ports receive almost 30 million lb (66.5 percent) of all small-mesh otter trawl landings in New England each year. New Bedford, MA (5 million lb annually), New London, CT (4 million lb annually), and Newport, RI (under 3 million lb annually), also constitute major ports for this fishing mode. Figure 22 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

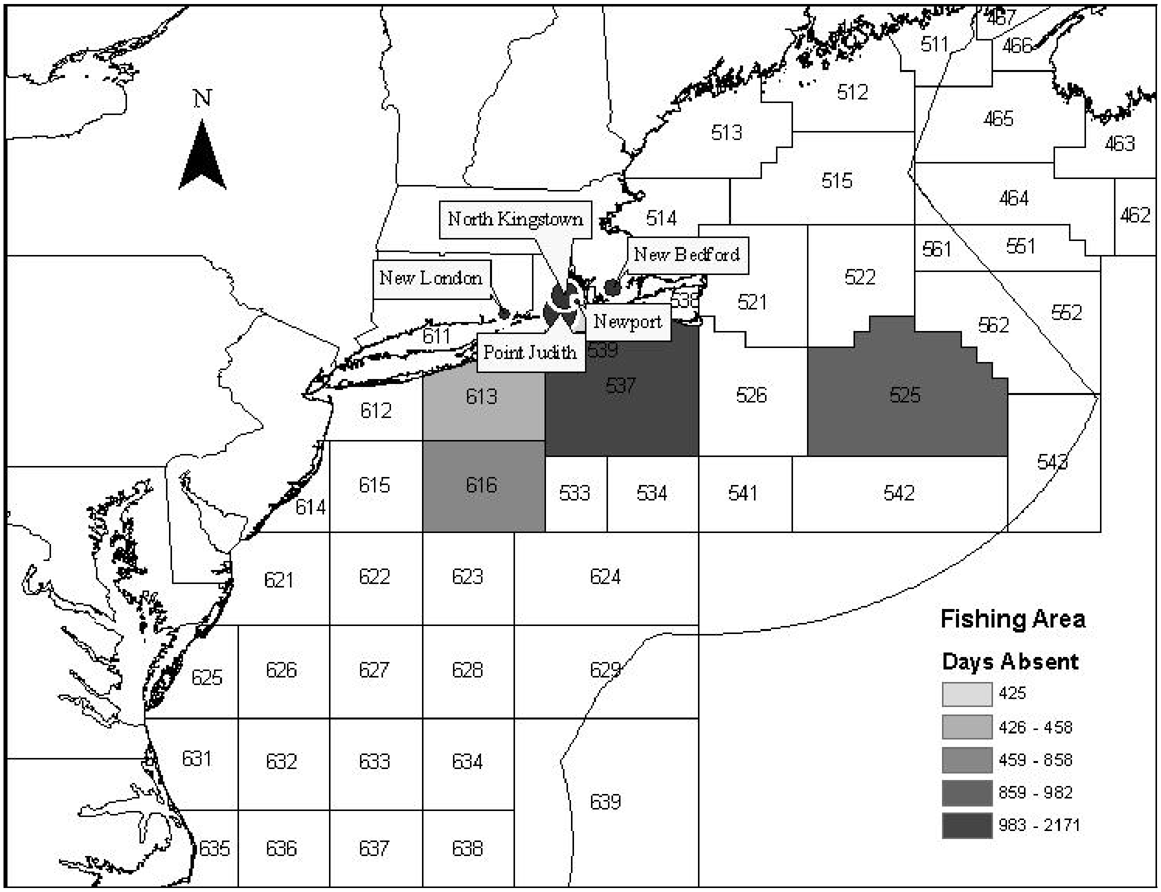

Figure 22. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England small-mesh otter trawl fishing mode.

3.9.1.2. Mid-Atlantic

There are many similarities between the New England and Mid-Atlantic modes of this fishery—not only in the species landed, but there is also an overlap in the areas fished (see Figure 22 and Figure 23). Participation in the Mid-Atlantic fishing mode averages over 170 vessels per year, slightly less than the number of New England participants. On average, each Mid-Atlantic vessel takes over 37 fishing trips per year, but unlike the New England mode, for which trips lasted almost 2 days on average, fishing trips taken by Mid-Atlantic small-mesh otter trawl vessels averaged less than 1 day in duration, although longer trips up to 20 days also occur. Mid-Atlantic small-mesh otter trawl vessels appear to take trips of about half the duration of New England vessels, but take twice as many trips. Thus, the overall fishing effort of each vessel appears, on average, to be about the same as for New England.

As in New England, squids comprise the majority (54.4 percent) of landings, with over 12 million lb of *Loligo* squid and almost 9 million lb of *Illex* squid landed each year. Silver hake also comprises a substantial amount of the annual catch, with almost 5 million lb. Atlantic mackerel (2 million lb) and Atlantic croaker (1.6 million lb) account for over 11 percent of annual landings.

Cape May, NJ, is the top port for this fishing mode, with over 16 million lb of landings (42 percent of total landings for this mode) each year. Montauk and Shinnecock, NY, together take in another 35 percent of annual landings, with Point Pleasant, NJ (2.3 million lb annually), and Hampton, VA (1.6 million lb annually) also accounting for another 10 percent of total landings. Figure 23 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

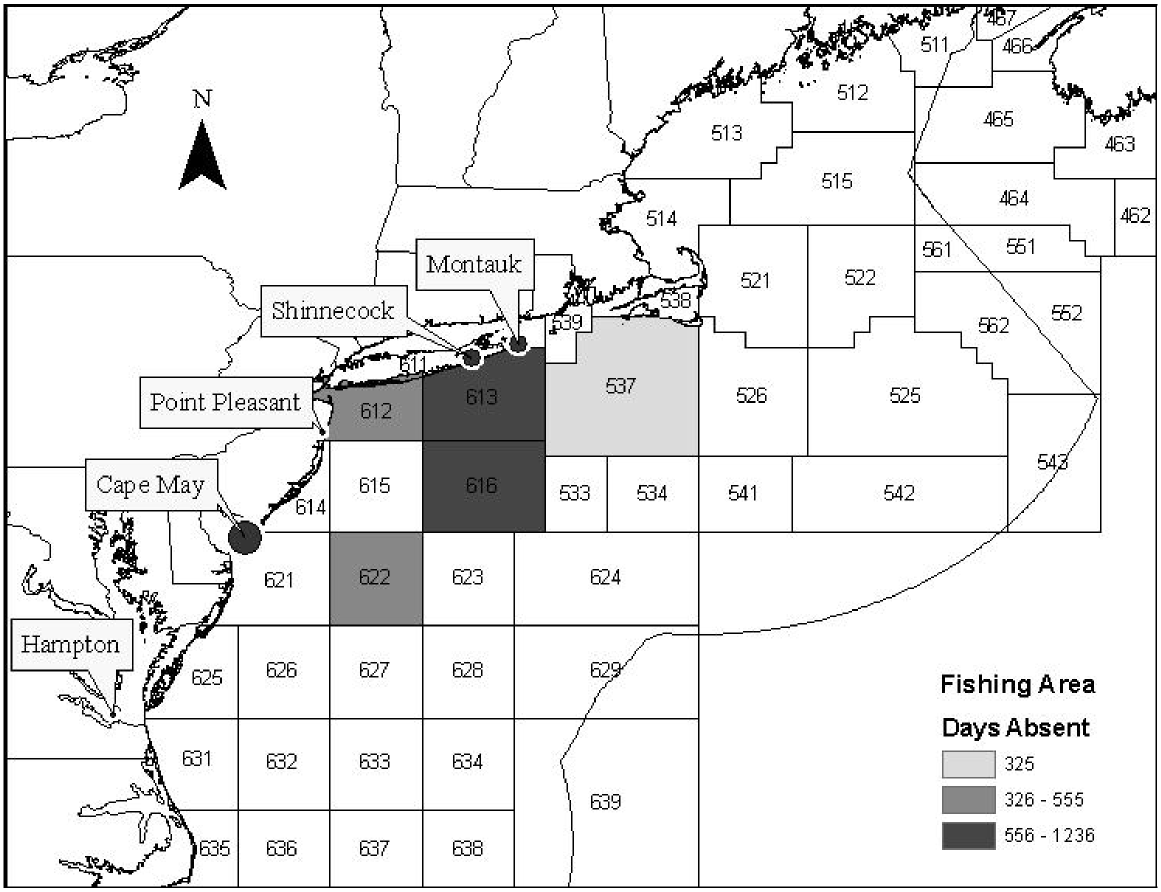

Figure 23. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic small-mesh otter trawl fishing mode.

3.9.2. Large-Mesh Otter Trawls

3.9.2.1. New England

The New England large-mesh otter trawl fishing mode is the third largest mode (behind the New England lobster pot and handline/rod and reel modes) of all Northeast Region fisheries, with an average of 533 active participating vessels. In total, the participants in this fishing mode land an average of 100.8 million lb of fish annually. Each of these participating vessels takes, on average, 32 fishing trips per year, although there is a lot of variability within the mode that correlates to vessel size, areas fished, and DAS available. Fishing trips tend to last almost 2 days each, on average, but there are many vessels that take trips lasting 1 day or less, and other vessels that take longer trips, lasting up to 20-30 days.

In spite of the large-mesh otter trawl mode's association with the groundfish fishery, the top species landed are skates (over 17 million lb per year; 16 percent of total landings for the fishing mode) and monkfish (15.5 million lb per year; 14.5 percent of total landings). Landings of Atlantic cod, yellowtail flounder, haddock, and winter flounder also average over 10 million lb per year. Together, these four groundfish species comprise 45 percent of the total landings of the fishing mode.

New Bedford, MA, is the top port for this fishing mode, with over 41 million lb of fish (41 percent of the total annual landings) coming in each year. Portland, ME, Point Judith, RI, and Gloucester, MA, are also important ports, each taking in approximately 12 percent of the total landings for this mode each year. Figure 24 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

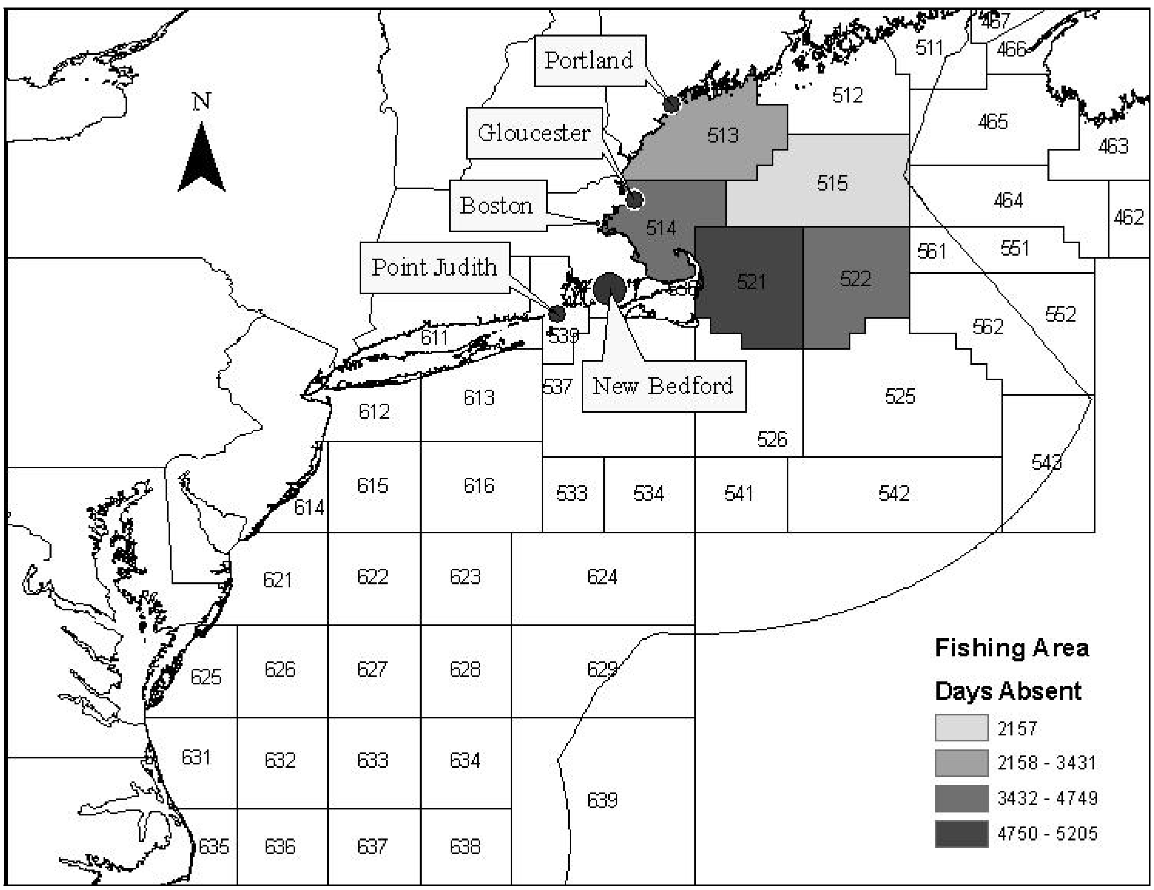

Figure 24. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England large-mesh otter trawl fishing mode.

3.9.2.2. Mid-Atlantic

With almost 225 vessels participating in this fishing mode each year, the Mid-Atlantic large-mesh otter trawl fishing mode is smaller than its New England counterpart as total landings average just over 11 million lb per year (just over 10 percent of the landings associated with the New England large-mesh otter trawl fleet). Mid-Atlantic vessels take, on average, 28 1-day fishing trips per year, although trips as long as 20 days have been taken in some years.

Summer flounder is the primary species landed, representing almost half—5.2 million lb—of the total annual landings. Winter flounder, skates, *Loligo* squid, and scup together account for another 27 percent of the total annual landings. Winter flounder landings average just under 1.1 million lb per year and skates average almost 900,000 lb annually, while *Loligo* squid and scup landings each average approximately 500,000 lb. Landings in this fishing mode are fairly evenly divided between a number of ports in New York, New Jersey, and Virginia. Shinnecock, NY, Hampton, VA, Point Pleasant, NJ, Montauk, NY, and Newport News, VA, comprise the top five ports each with over 1.1 million lb (10+ percent of the total) of landings each year. Figure 25 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

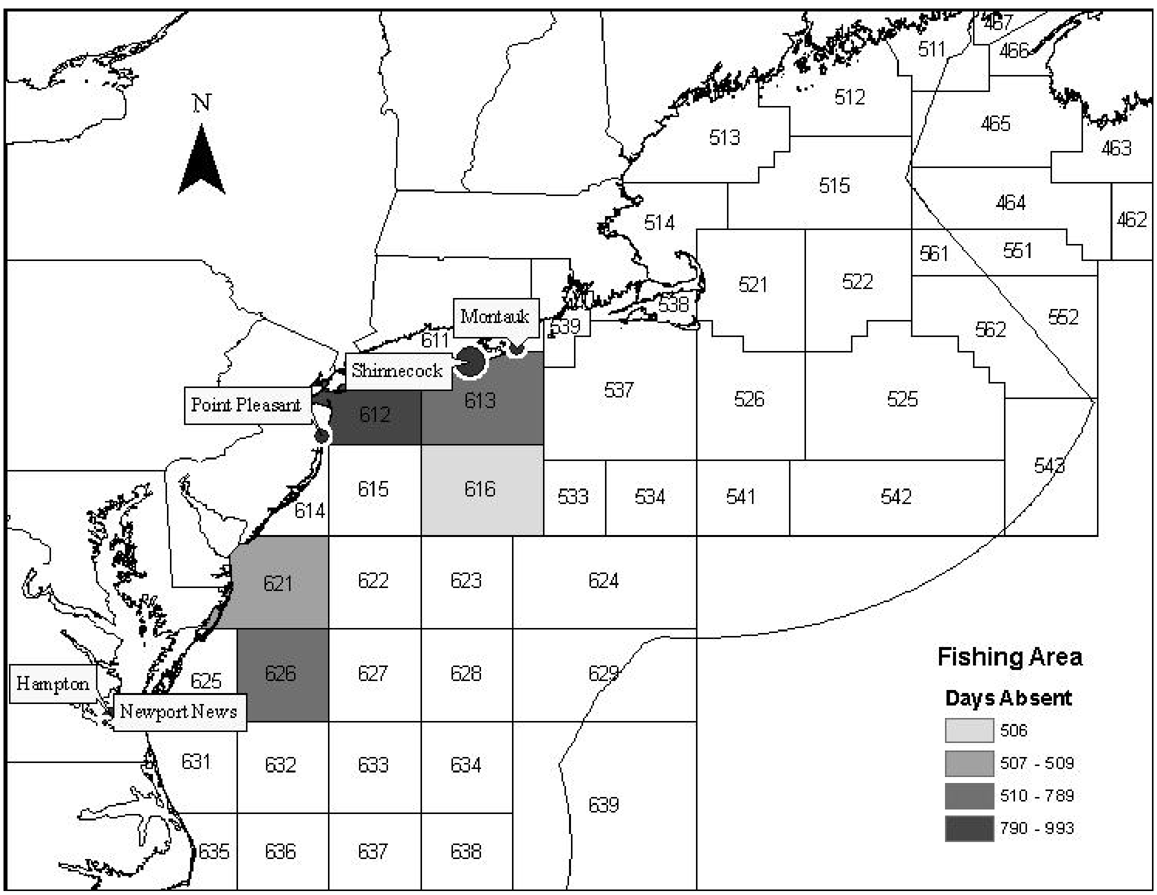

Figure 25. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic large-mesh otter trawl fishing mode.

3.10. Purse Seine Fishery

3.10.1. New England

The New England purse seine fishing mode primarily targets Atlantic herring. The number of active participants averages just over 9 vessels per year, and each vessel takes, on average, 37 fishing trips each year. These fishing trips tend to last less than 1 day in duration, although longer trips of up to 9 days occur.

Landings of Atlantic herring average 47.7 million lb per year, third in herring catch after the midwater pair and single trawl modes. The purse seine fishing mode is the most directed of all New England modes, with herring comprising over 99 percent of total annual landings by weight. Although the amounts are much smaller, bluefin tuna landings are important, with over 225,000 lb per year. Other species landed include negligible amounts of menhaden, bluefish, and Atlantic mackerel.

Most of the landings made by vessels participating in this fishing mode come to Maine ports, with Rockland (19.3 million lb per year), Stonington (13.2 million lb per year), and Prospect Harbor (6.7 million lb per year) accounting for nearly 82 percent of the total landings. On average, another 10 percent of the total annual landings are split relatively evenly between Vinalhaven and Portland, ME. Figure 26 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

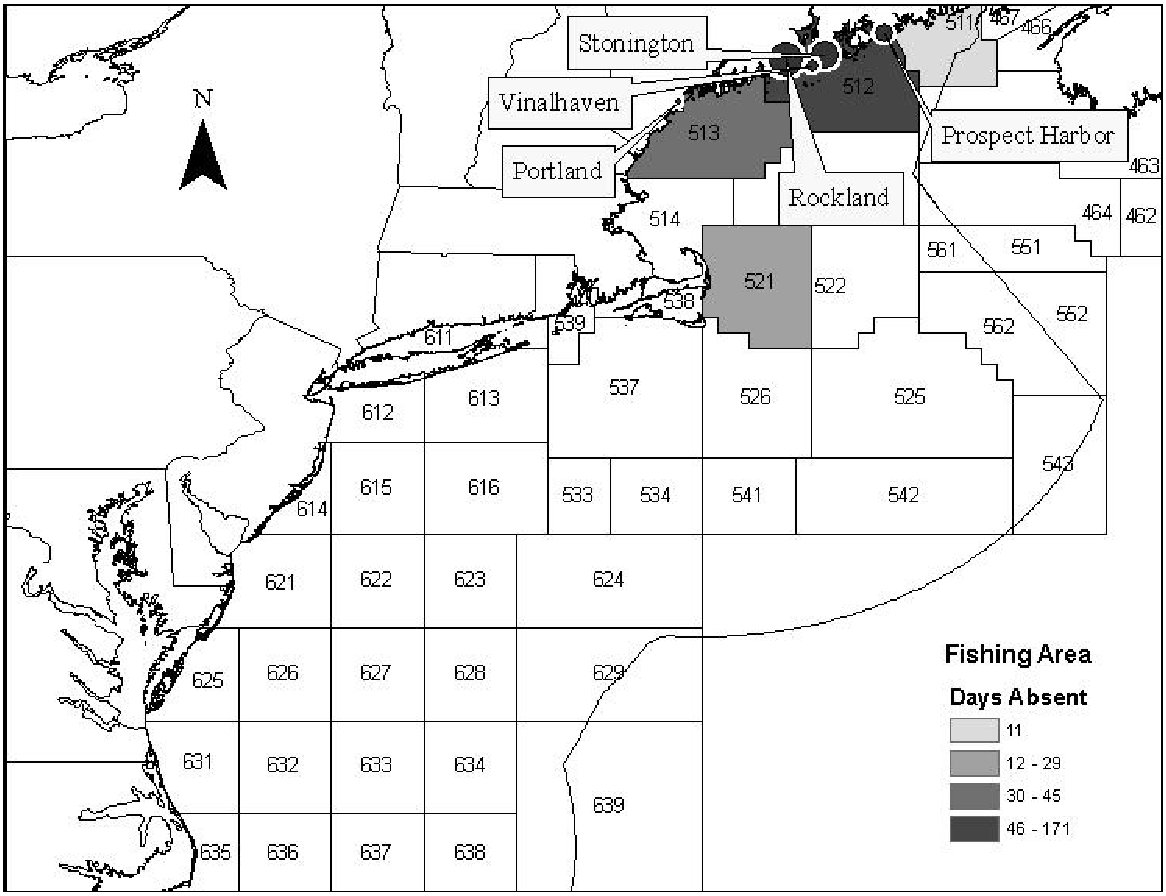

Figure 26. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England purse seine fishing mode.

3.10.2. Mid-Atlantic

As the New England purse seine fishing mode is the most targeted in New England, so is the Mid-Atlantic purse seine mode the most targeted in its region: Over 99.9 percent of all landings in this mode are menhaden. The four active participating vessels take, on average, 38 fishing trips each year, with most trips lasting less than a ½ day. Even the longest trips most years last less than 1 day, although there was a 5-day trip reported in 2004.

Menhaden landings in this fishery average almost 18.5 million lb annually. While other species (silversides, redfish, carp, etc.) are occasionally landed, the amounts tend to be limited to a few thousand lb at most in any year. Cape May, NJ, is the leading port of landing for this fishery, receiving over 11.3 million lb (61 percent of the total landings) each year. Point Pleasant, NJ, is also a primary port for these vessels, with landings averaging over 6.7 million lb (36 percent of the total). Together, these two ports account for 98 percent of the annual landings, but relatively small amounts are also landed in Belford, NJ, Greenport, NY, and Islip, NY. Figure 27 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

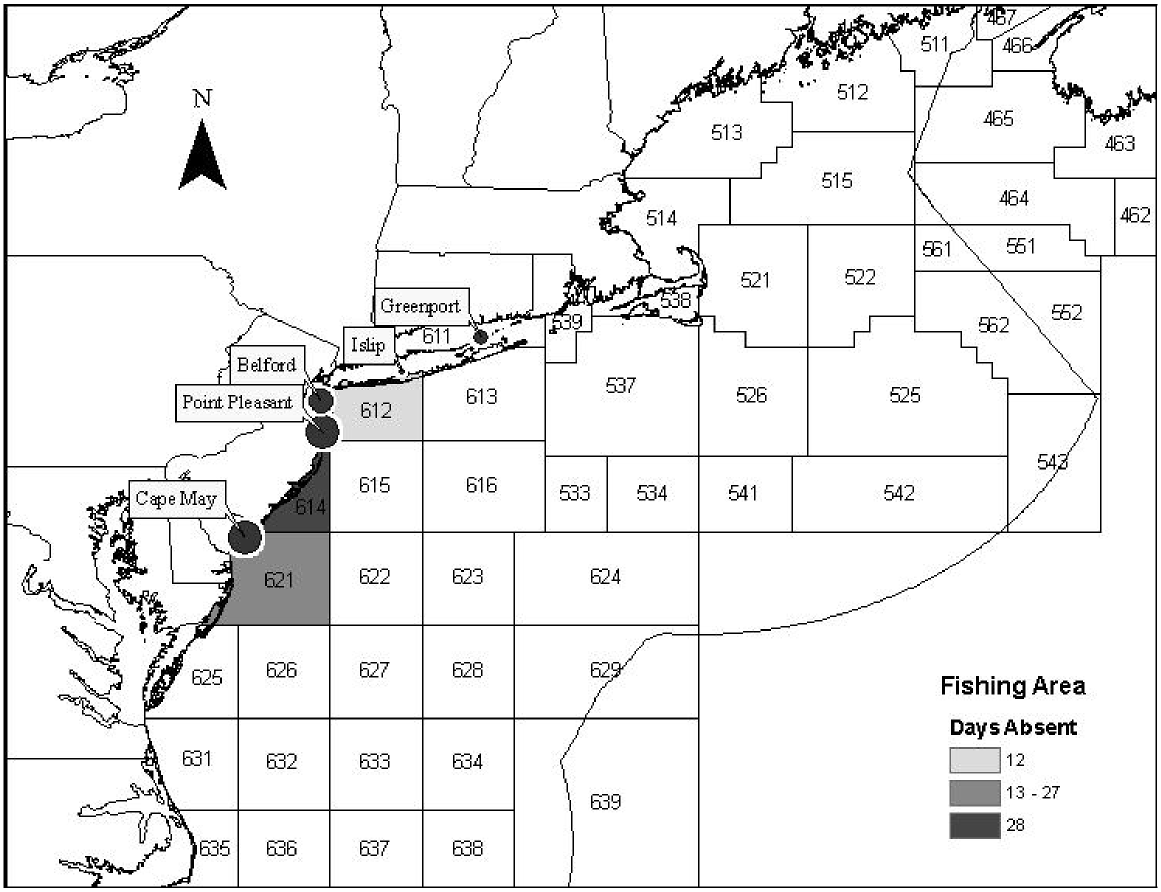

Figure 27. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic purse seine fishing mode.

3.11. Scallop Dredge Fishery

As explained in chapter 5, for the purposes of allocating fishery observer effort within the overall sea scallop dredge fishery, New England and Mid-Atlantic sea scallop dredge fishing trips are further differentiated according to the type of permit (limited access or general category) and the type of trip (open area or scallop access area). The following sections are not subdivided based on these attributes, but instead provide summaries consistent with the rest of this chapter. While the differences among these trips (general category vs. limited access and open area vs. access area) are important for allocating observer effort in a representative way across the larger scallop dredge fishery, unlike the gillnet and otter trawl mesh size categories, there are not substantial differences among these trips in the species targeted, areas fished, or ports landed.

3.11.1. New England

The New England scallop dredge fishing mode averages over 296 active participating vessels each year. Although the number of annual fishing trips varies with permit category and available DAS, on average these vessels each take over 16 fishing trips per year. While the average trip length for all participating vessels is just under 4 days per trip, much longer trips, up to 45 days, do occur. On average, the participants in this fishing mode land over 27 million lb of fish each year, of which over 25 million (almost 93 percent) are sea scallops. Other than monkfish (nearly 1.3 million lb per year), only relatively negligible amounts of sea cucumbers, sculpins, and yellowtail flounder are landed each year.

New Bedford, MA, is the top scallop port in New England, accounting for almost 84 percent of the total annual landings for this fishing mode. Stonington, CT (1.4 million lb per year), Fairhaven, MA (nearly 500,000 lb per year), Sandwich, MA (280,000 lb per year), and Point Judith, RI (230,000 lb per year) also rank in the top five scallop dredge ports in New England. Figure 28 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

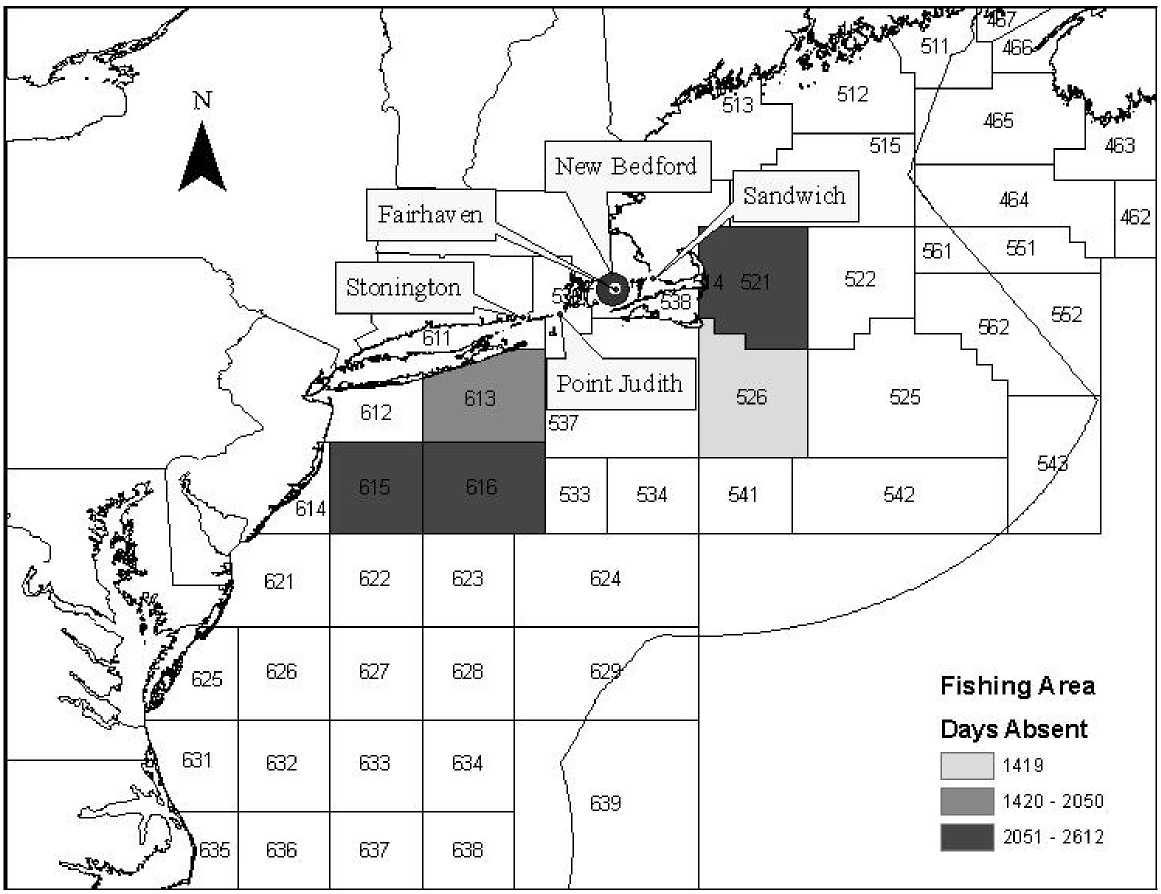

Figure 28. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England scallop dredge fishing mode.

3.11.2. Mid-Atlantic

Somewhat smaller than its New England counterpart in terms of number of participants and the amounts of sea scallops landed, the Mid-Atlantic sea scallop dredge fishing mode has averaged almost 184 active vessels from 2000 to 2004, but the number of participants has been increasing (from 116 in 2000 to 278 in 2004). On average, participating vessels take 17 fishing trips per year, although, as with the New England mode, the number of trips varies among vessels with permit category and available DAS. Trips average 5 day in duration, although longer trips 20-30 days in duration occur.

As with the New England mode, sea scallops are the primary target and the top species landed, comprising, on average, 97 percent of the total annual landings by the participating vessels. In addition to scallops, an average of 325,000 lb of monkfish is landed each year, along with small amounts of knobbed whelks and summer flounder (each less than 65,000 lb per year).

Mid-Atlantic scallop dredge vessels utilize several ports for landing their product. Newport News, VA, is the top port, with an average of 7.4 million lb of landings each year (34 percent of the total landings). Cape May, NJ, ranks second with 5.2 million lb of annual landings (24 percent of the total), and the City of Seaford, NY (3.1 million lb per year), Hampton, VA (2.4 million lb per year), and Long Beach, NJ (1.9 million lb per year), complete the top five ports for this fishing mode. Figure 29 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

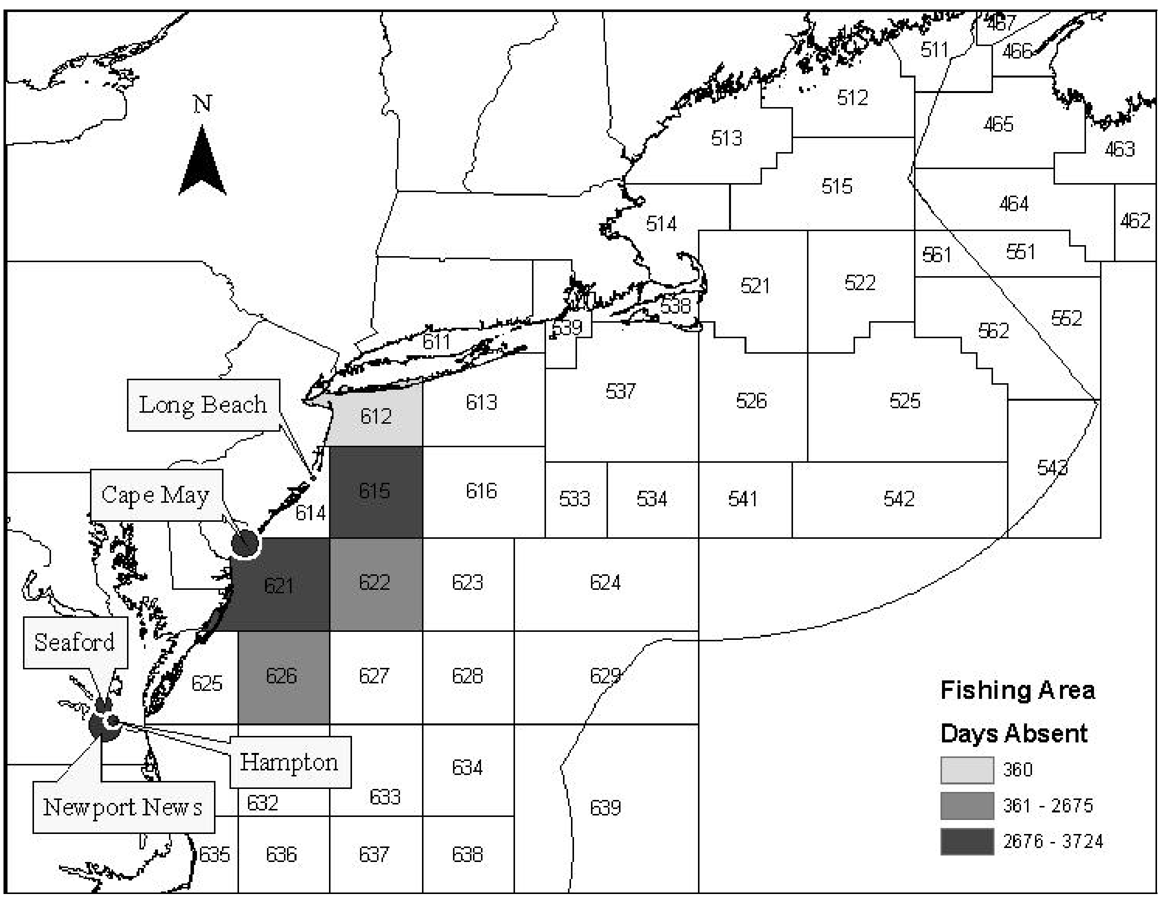

Figure 29. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic scallop dredge fishing mode.

3.12. Scallop Trawl Fishery

3.12.1. New England

Compared to the other sea scallop fishing modes in the Northeast, the New England sea scallop trawl mode is relatively small. There are only three participants, on average, each year, each making nine fishing trips. Fishing trips average 1-2 days in length, and the longest trips average 8 days in duration.

Sea scallops are the top species landed, but these landings average less than 40,000 lb per year (less than 0.1 percent of the sea scallops landed using scallop dredges). Small amounts of monkfish, winter flounder, summer flounder, and yellowtail flounder are also landed by the participants of this fishing mode, but landings of these fish average less than 2,000 each per year. As with the New England scallop dredge mode, New Bedford, MA, is the top port, with over 87 percent of total scallop trawl landings. Newport, RI, Stonington, ME, Point Judith, RI, and Stonington, CT, each account for small amounts of the total landings by this fishing mode. Figure 30 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

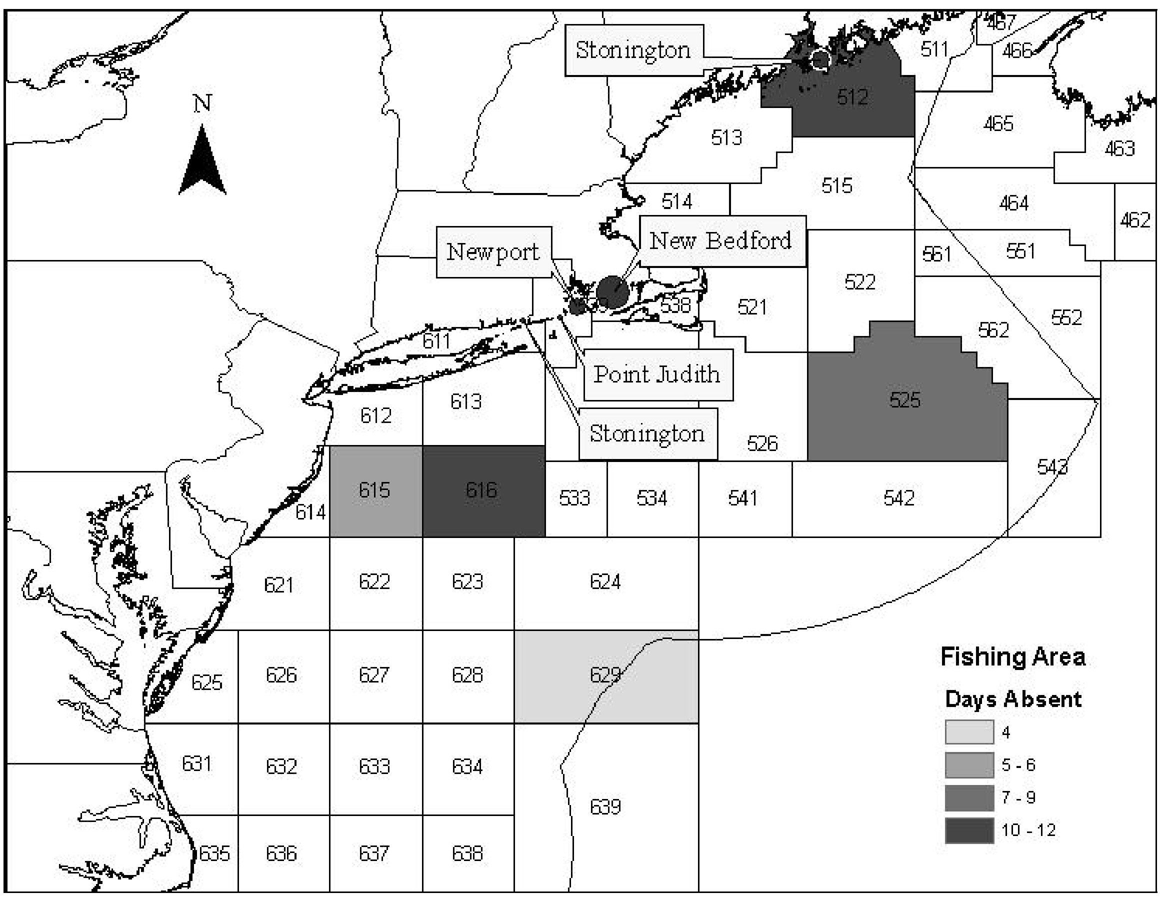

Figure 30. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England scallop trawl fishing mode.

3.12.2. Mid-Atlantic

Much larger than its New England counterpart, but still smaller than the scallop dredge modes, the Mid-Atlantic scallop trawl fishing mode averages over 40 participating vessels each year. On average, each of these participating vessels takes almost 16 fishing trips each year, and the number of trips has been increasing in recent years. Trips average 4-5 days in duration, although longer trips of 30+ days occur.

As with every other sea scallop fishing mode, scallops account for over 90 percent of the annual landings. In the Mid-Atlantic scallop trawl mode, total annual landings are close to 3.1 million lb, of which almost 2.8 million lb are sea scallops. Other species landed by the participants in this fishing mode include horseshoe crabs (95,000 lb per year), summer flounder (83,000 lb per year), knobbed whelk (53,000 lb per year), and monkfish (29,000 lb per year). Cape May, NJ, is the top port for this fishing mode, receiving on average almost 1.1 million lb of landings each year. Hampton and Newport News, VA, together take in nearly 1.7 million lb each year. Chincoteague, VA, receives only 140,000 lb on average each year. Cape Charles, VA, ranks as the fifth scallop trawl port in the Mid-Atlantic, with approximately 56,000 lb of landings each year. Figure 31 displays the top ports and primary fishing areas utilized by participants in this mode.

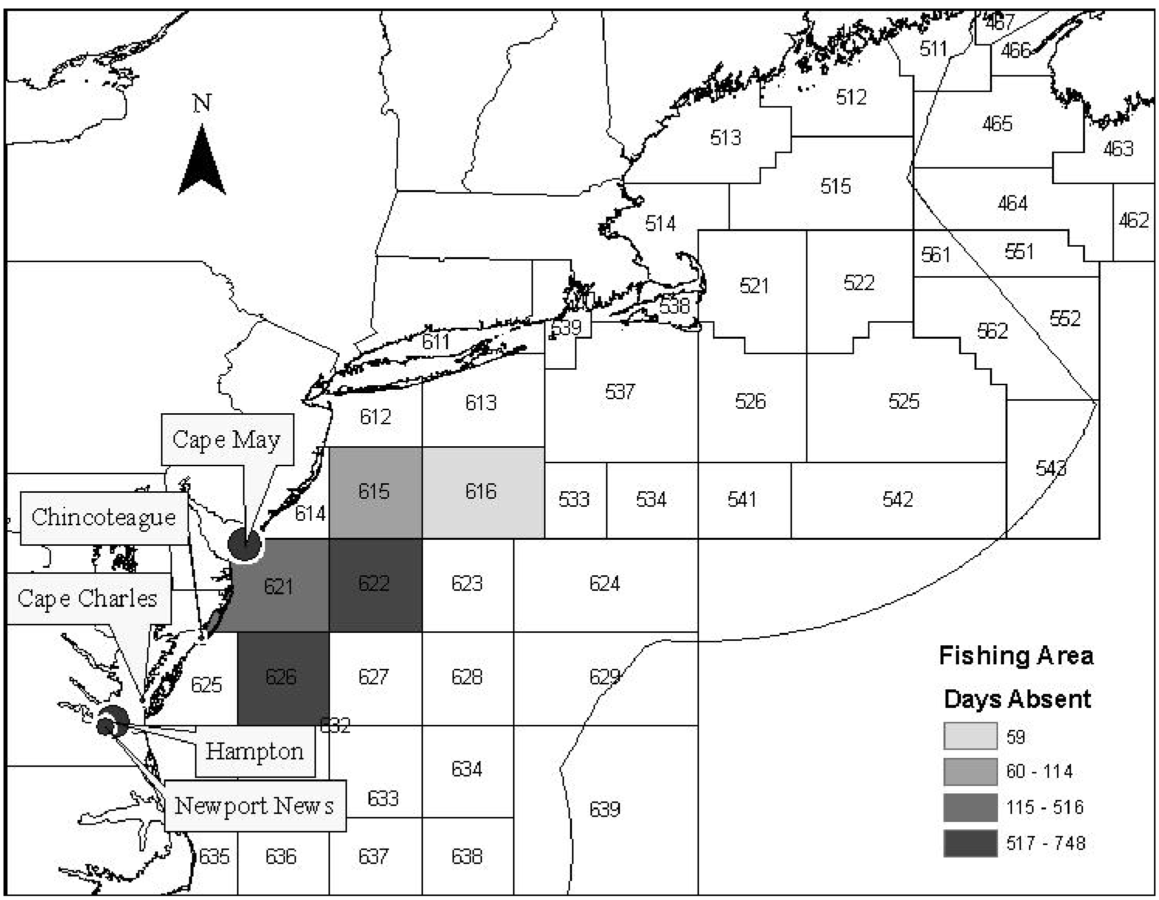

Figure 31. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic scallop trawl fishing mode.

3.13. Scottish Seine Fishery

Due to the small number of participants in the New England and Mid-Atlantic Scottish seine fishing modes, summary information characterizing fishing effort, landings, ports utilized, and areas fished cannot be reported in order to protect the confidentiality of the data provided by the participants.

3.14. Shrimp Trawl

3.14.1. New England

The New England shrimp trawl fishing mode includes, on average, approximately 175 participating vessels per year. These vessels take, on average, approximately 14 fishing trips each year, and most fishing trips last less than 1 day, although longer trips occur, up to 22 days in duration.

The primary target for this fishing mode is Northern (pandalid) shrimp, and almost 84 percent of the 3.3 million lb of fish landed, on average, each year in this fishing mode are pandalid shrimp. Unspecified shrimp species and mantis shrimp comprise another 9 percent of annual landings, so, together, shrimp account for 93 percent of the total landings in this fishing mode. The remainder is largely American plaice, silver hake, and other groundfish species, although these species each account for 1 percent or less of total annual landings.

The primary ports for this fishing mode are all located in Maine, as landings in the top five ports (Portland, South Bristol, Cundys Harbor, New Harbor, and Port Clyde) account for 60 percent of the total landings. Half of these (31 percent of total landings, over 1 million lb per year) come in to Portland, ME. Figure 32 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

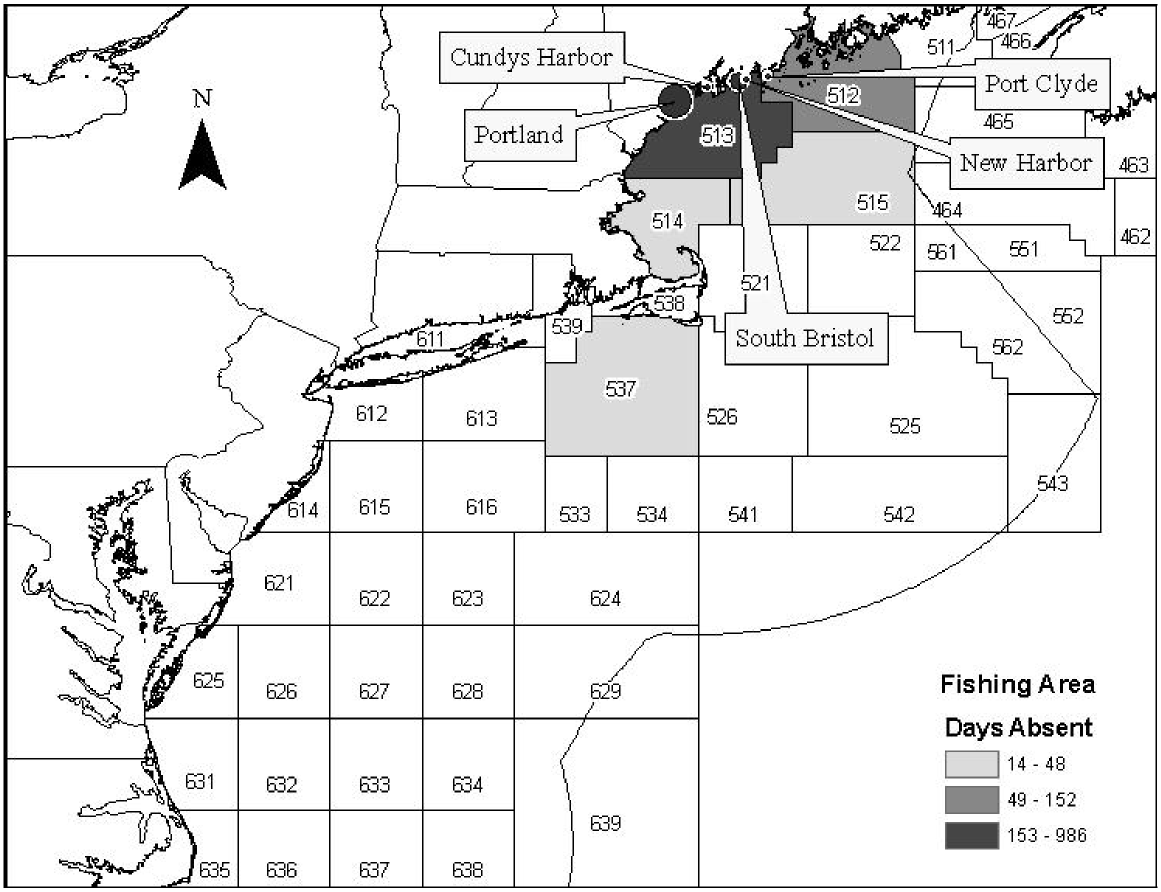

Figure 32. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the New England shrimp trawl fishing mode.

3.14.2. Mid-Atlantic

The Mid-Atlantic shrimp trawl fishing mode has fewer participants than the New England mode, with an average of 51 vessels participating over the years 2000-2004. These vessels take, on average, just under 11 fishing trips per vessel per year. Fishing trips last, on average, considerably longer than in the New England shrimp trawl mode, with most trips being 4-5 days in duration. The longest trips last 14-16 days.

As with the New England shrimp trawl fishing mode, the primary target for this mode is Northern (pandalid) shrimp, although less of the total landings (48 percent, on average) of this mode are comprised of shrimp than in New England. Shrimp landings average just under 1.3 million lb per year, and summer flounder (660,000 lb per year, on average) and sea scallops (290,000 lb per year, on average) are also important components of this fishing mode. Total landings for the Mid-Atlantic shrimp trawl mode average 2.6 million lb per year, and almost 85 percent of these landings are composed of these three species.

The primary ports for this fishing mode are almost all located in North Carolina, with Beaufort (662,000 lb per year, on average), Wanchese (323,000 lb per year, on average), Engelhard (305,000 lb per year, on average), and Oriental (279,000 lb per year, on average), North Carolina, together accounting for almost 60 percent of annual landings, on average. Chincoteague, VA, takes in another 7 percent of annual landings, completing the top five ports for the fishing mode. Figure 33 displays the top ports and primary fishing areas utilized by participants in this fishing mode.

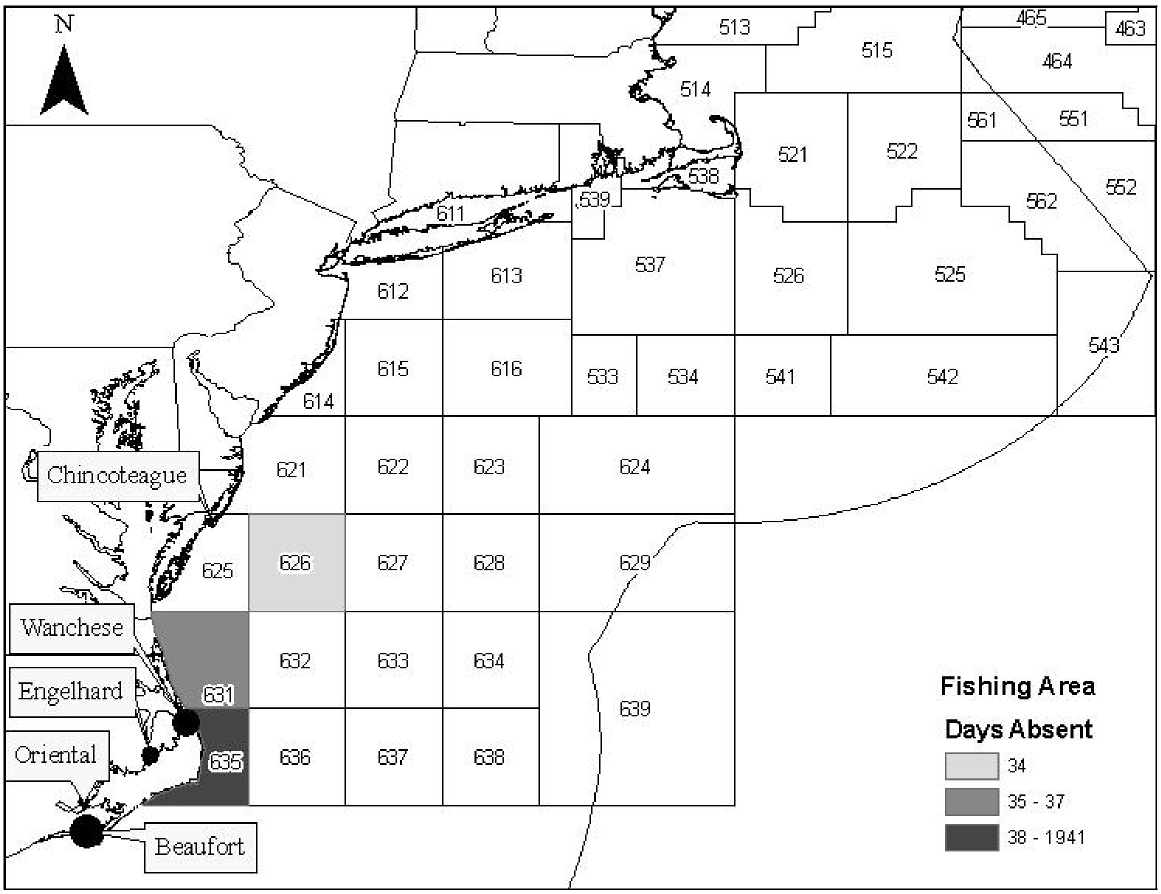

Figure 33. The primary ports of landings (dots are scaled proportional to the average percent of landings at each port), and the primary areas fished (reported as average days absent by statistical area) in the Mid-Atlantic shrimp trawl fishing mode.

Fishing Mode	Primary Regulating FMP(s) (includes only those Federal FMPs subject to the SBRM Amendment)	Average Number of Participating Vessels	Average Total Annual Landings (in million lb)	Top 3 Species Landed
MA/NE Clam Dredge	Surfclam and Ocean Quahog	87.0	6.82**	ocean quahog; surfclam
NE Crab Pot	Deep-Sea Red Crab	7.4	3.04	red crab; Jonah crab; other crabs
MA Crab Pot	(none)	8.2	0.08	blue crab; red crab; menhaden
NE Fish Pot	Summer Flounder, Scup, Black Sea Bass	41.8	0.56	hagfish; black sea bass; scup
MA Fish Pot	Summer Flounder, Scup, Black Sea Bass	61.8	0.90	black sea bass; tautog; whelks
NE Small-mesh Gillnet	Northeast Multispecies	25.6	0.10	pollock; cod; monkfish
MA Small-mesh Gillnet	Atlantic Bluefish	101.2	3.84	Atlantic croaker; bluefish; menhaden
NE Large-mesh Gillnet	Northeast Multispecies; Spiny Dogfish; Monkfish	168.0	12.75	cod; pollock; spiny dogfish
MA Large-mesh Gillnet	Spiny Dogfish; Atlantic Bluefish	83.4	1.49	smooth dogfish; bluefish; spiny dogfish
NE Extra-large-mesh Gillnet	Northeast Multispecies; Monkfish; Skate Complex	130.2	14.21	monkfish; skates; cod
MA Extra-large-mesh Gillnet	Monkfish; Skate Complex	100.2	6.20	monkfish; skates; striped bass
NE Handline/Rod & Reel	Northeast Multispecies; Summer Flounder, Scup, Black Sea Bass	679.2	2.69	cod; bluefin tuna; scup
MA Handline/Rod & Reel	Summer Flounder, Scup, Black Sea Bass; Atlantic Bluefish	513.0	2.88	black sea bass; scup; bluefish
NE Lobster Pot	(none)	657.0	22.16	lobster; Jonah crab; rock crab
MA Lobster Pot	(none)	103.4	1.32	lobster; Jonah crab; black sea bass
NE Bottom Longline	Spiny Dogfish; Northeast Multispecies	77.2	3.73	spiny dogfish; cod; haddock
MA Bottom Longline	Golden Tilefish	15.8	1.52	tilefish; cod; swordfish
NE Pair Trawl	Atlantic Herring; Mackerel, Squid, Butterfish	13.8	141.55	Atlantic herring; Atlantic mackerel; spiny dogfish
NE Midwater Trawl (single)	Atlantic Herring; Mackerel, Squid, Butterfish	17.0	68.19	Atlantic herring; Atlantic mackerel; *Illex* squid
MA Pair Trawl	Mackerel, Squid, Butterfish; Atlantic Herring	6.3	23.40	Atlantic mackerel; Atlantic herring; chub mackerel
MA Midwater Trawl (single)	Mackerel, Squid, Butterfish; Atlantic Herring	6.0	10.69	Atlantic mackerel; Atlantic herring; blueback herring
NE Small-mesh Otter Trawl	Mackerel, Squid, Butterfish; Northeast Multispecies	225.0	58.49	*Loligo* squid; silver hake; *Illex* squid
MA Small-mesh Otter Trawl	Mackerel, Squid, Butterfish; Northeast Multispecies	171.4	38.62	*Loligo* squid; *Illex* squid; silver hake
NE Large-mesh Otter Trawl	Northeast Multispecies; Monkfish; Skate Complex	533.2	100.85	skates; monkfish; cod
MA Large-mesh Otter Trawl	Summer Flounder, Scup, Black Sea Bass; Northeast Multispecies; Skate Complex	224.8	11.12	summer flounder; winter flounder; skates
NE Purse Seine	Atlantic Herring	9.2	48.09	Atlantic herring; bluefin tuna; menhaden
MA Purse Seine	(none)	4.4	18.48	menhaden; silversides; redfish
NE Scallop Dredge	Sea Scallop; Monkfish	296.2	27.12	sea scallops; monkfish; sea cucumbers
MA Scallop Dredge	Sea Scallop; Monkfish	183.8	21.69	sea scallops; monkfish; whelks
NE Scallop Trawl	Sea Scallop	3.0	0.04	sea scallops; monkfish; winter flounder
MA Scallop Trawl	Sea Scallop	42.2	3.10	sea scallops; horseshoe crabs; summer flounder
NE Scottish Seine	Northeast Multispecies	N/A	N/A	silver hake; cod; winter flounder
NE Shrimp Trawl	(none)	175.2	3.33	Pandalid shrimp; other shrimp; American plaice
MA Shrimp Trawl	(none)	51.4	2.63	Pandalid shrimp; summer flounder; sea scallops

Table 28. Summary information on the fishing modes addressed in chapter 3. Averages reflect data from 2000-2004, except as noted in the text. Top species are based on the cumulative landings from 2000-2004. (Clam dredge landings are given in millions of bushels.)**

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Chapter 4
Bycatch Reporting Mechanisms

4.1. Introduction

Around the country and around the world, various methods are used to collect information on catch and catch disposition in commercial and recreational fisheries. The variety of methods and tools in use and under development reflect the variety of fisheries on which catch and catch disposition information is collected. Developing a complete understanding of the catch in a fishery, and the implications that the catch and any associated discards may have on fishery resources, involves information collected from a variety of sources utilized in a comprehensive manner. This may include information reported by the fishing industry (e.g., dealer purchase reports and/or vessel trip reports), fishing-related information collected by independent sources (e.g., fishery observers and/or electronic monitoring), or information about fishery resources collected independent of fishing activities (e.g., resources surveys). This chapter identifies and describes several mechanisms that may be used to collect information on fishery resources and fishing activities to develop a complete understanding of fishing activities and their implications for fishery resources in the Northeast Region.

This chapter first provides a general overview of the variety of fishery information collection methods evaluated as part of the development of this amendment in order to establish a general understanding of the types of information collected and how these methods function. Following the general overview discussion of each method, this chapter evaluates the feasibility for utilizing each mechanism for collecting information on bycatch occurring in the variety of fishery modes employed in the Northeast Region (described in chapter 3). The various fishing modes represent different fishing gears and fishery operating characteristics, and are associated with different bycatch levels and rates. These factors must be taken into account when determining the most appropriate methods with which to collect catch and catch disposition information. This chapter provides a general overview of how the variety of information collection methods described here may be applied to the various Northeast Region fisheries in order to assess bycatch in the most appropriate manner.

4.2. Fishery Independent Surveys

4.2.1. Description

A fishery independent resource survey is a catch-all description for a variety of scientific fishery resource assessments conducted by NMFS and state fisheries agencies in the Northeast Region conducted onboard NOAA or state agency research and chartered vessels. The surveys are specifically designed to gather data on the abundance, distribution, size, and age composition of economically and ecologically important marine species of concern (NMFS 2004). A wide array of at-sea sampling techniques and several different types of fishing gear are used to collect data on finfish and shellfish species. The majority of fishery independent surveys are conducted using a stratified random sampling design and are conducted over the entire range of a particular species distribution at various times through the year (NMFS 2001). The time series of data for some surveys, such as the bottom trawl survey, date back to 1963 (Azarovitz 1981).

The fishery independent surveys conducted in the Northeast Region by NMFS are designed and conducted by the Ecosystems Survey Branch of the Northeast Fisheries Science Center (NEFSC). Table 29 lists the surveys conducted by the NEFSC, their frequency and season of occurrence, and the participating NOAA research vessels.

NOAA Research Surveys	Frequency-Season	NOAA Research Vessels
Bottom trawl	Annual – Spring/Fall	R/V Delaware II
Sea scallop dredge	Annual – Summer	R/V Albatross IV
Hydraulic clam dredge	Triennial	R/V Henry B. Bigelow (2006)
Gulf of Maine trawl	Annual – Summer	
Continental shelf trawl	Annual – Winter	
Marine mammal sighting	Variable – All surveys	
Fish egg and larvae	Several times per year	

Table 29. NOAA Fishery Independent Surveys in the Northeast Region.

Fishery independent surveys conducted by state fisheries agencies from North Carolina to Maine are typically coordinated through the ASMFC. A committee composed of scientists and staff from state marine fisheries agencies, the ASFMC, the NEFSC, and academia provide oversight and coordination of surveys in the Northeast Region. Some details of the resulting program, called the Northeast Area Monitoring and Assessment Program, are listed in Table 30 below (P. Kilduff, pers. comm., ASMFC).

For many of the fishery independent surveys, the primary purpose is to provide estimates of relative abundance for a specific finfish or shellfish species or species assemblage (NMFS 2001, 2004). The fishing methodology and gear utilized may differ substantially from those employed in a commercial fishing operation. Many of the sampling protocols employed include speciation and detailed biological data collection on all captured species.

Agency or Institution	Survey Name / Gear Type	Time Series
NC Division of Marine Fisheries	*Alosa* spp. seine Juvenile fish trawl Pamlico Sound trawl Pamlico Sound gillnet	1972 - present 1979 - present 1987 - present 2001 - present
VA Institute of Marine Science	Small mesh trawl Large mesh trawl	50+ years 2002 - present
DE Natural Resources and Environmental Control	Juvenile species trawl Adult fish species trawl	1980 - present 1966-1971, 1979-1984, 1990 - present
NJ Dept. of Fish and Wildlife	Ocean stock assessment trawl Delaware Bay trawl	1989 - present 1991 - present
NY State Dept. of Environmental Conservation	Small mesh trawl	1987 - present
CT Dept. of Environmental Protection	Long Island Sound trawl	1984 - present
RI Dept. of Fish and Wildlife	Marine fisheries trawl	1979 - present
MA Division of Marine Fisheries	Inshore bottom trawl	1978 - present
NH Dept. of Fish and Game	Estuarine juvenile finfish seine	1997 - present
Maine Dept. of Marine Resources	ME/NH inshore trawl	2000 - present

Table 30. State agency fishery independent surveys in the Northeast Region.

4.2.2. Evaluation and Applicability

Fishery independent surveys are not a means to directly collect bycatch and discard data. Though some detailed information is often collected on a subsample of the catch or for many species of interest, the fishing practices, gears, and the spatial and temporal areas of operation utilized in surveys are often different than those of commercial fisheries. Because of these independent characteristics, fishery survey data are not typically used as a substitute for missing information on commercial fishery bycatch frequency or occurrence within the same spatial or temporal areas. Further, these differences make it difficult to take the data gathered in the fishery survey and expand it to the commercial fishing effort level. In some instances where sufficient observer data are unavailable, research survey abundance data have been used to develop an indirect estimate of discards using regression and ratio analytic techniques (Mayo et al. 1992; NEFSC 2001; NEFSC 2003).

Fishery independent survey data may have some limited utility in providing insight on species occurrence or interaction that could be further investigated through fishery dependent monitoring programs. The systematic design of a fishery independent survey may function to provide catch data for rare or infrequently encountered species as well as detailed capture information on key species of concern. Information about rare or species of concern provided by a fishery survey could be used to prioritize fishery dependent monitoring within the same spatial or temporal areas to better understand potential interactions of these particular species as bycatch in commercial fishery operations.

4.3. Vessel Trip Reports/Logbooks

4.3.1. Description

The vessel owner or operator of any vessel issued a valid Federal permit for any commercial or charter/party fishery except American lobster must maintain on board the vessel, and submit to NMFS, an accurate FVTR for each fishing trip. FVTRs must be submitted regardless of species caught or area fished. This requirement is fully described at 50 CFR 648.7(b) and has been in place since 1994. A listing of the data collected by the FVTR is provided in Table 31.

Vessel, crew, operator	**Gear**	**Commercial Catch**
Vessel name	Gear type	Pounds kept (by species)
USCG documentation number	Quantity and size	Pounds discarded (by species)
or State registration number	Mesh/ring size	Sea turtle incidental take
Federal permit number		Skates by size category
Number of crew	**Location**	
Number of anglers (charter/party)	Chart area (statistical area)	**Charter/Party Catch**
Vessel operator's name	Average depth	Number kept (by species)
Signature of vessel operator	Latitude/longitude *or*	Number discarded (by species)
	Loran station and bearings	
Trip Information		**Sale/Landing**
Date/time sailed	**Effort**	Dealer permit number
Date/time landed	Number of hauls	Dealer name
Commercial *or* charter/party trip	Tow/soak time duration	Date sold
		Port and state landed

Table 31. Information collected on Northeast Region Fishing Vessel Trip Reports, by data type.

Because the FVTR is a standardized form designed to capture data from numerous fisheries, the number of logbooks that must be maintained and submitted by a vessel owner or operator that participate in more than one fishery and utilizes more than one fishing permit is minimized. A new FVTR must be completed if the vessel changes gear type, mesh size, or statistical area during a fishing trip. The presence of an onboard observer during a trip does not relieve the vessel of the requirement to submit an FVTR.

FVTRs must be received or postmarked by the 15th of the month following the month in which the trip ended. The Regional Administrator may authorize individuals to submit reports electronically, by using a VMS or other media.[20] Submitted FVTRs are checked for completeness and then entered into a database. Incomplete, illegible, or inaccurate FVTRs are returned to the submitter for correction. Vessel owner/operators with missing, incomplete, illegible, or inaccurate FVTRs may not be allowed to renew their Federal fishing permits until the problem(s) are corrected. Copies of FVTRs are required to be maintained onboard the vessel by the vessel owner/operator for one year and retained by the owner/operator for a total of three years.

All discards are required to be reported on Northeast Region FVTRs (NMFS 2004). Thus, given the mandatory reporting requirement applied to all federally permitted vessels (with the exception of vessels holding only a Northeast Region lobster permit), FVTR data represent a comprehensive source of information on total fishing effort, location, catch, and bycatch. In addition to the requirement to submit FVTRs, some FMPs require catch information to be reported also through an interactive voice response system.

4.3.2. Evaluation and Applicability

FVTRs provide an extensive set of data regarding fishing location, effort, catch, and bycatch. However, FVTR data are self-reported by the individual vessel operator and there are several challenges and limitations associated with the use of self-reported catch and discard data that have been well documented (NEFSC 1996; Walsh et al. 2002; NMFS 2004). The challenges and limitations include low compliance with mandatory reporting requirements, misidentification of species, errors in estimating the amount of catch in large volume fisheries (e.g., Atlantic mackerel and Atlantic herring), under-reporting (particularly of discards), and data entry errors on FVTR forms. It should be noted that FVTRs are not systematically inaccurate—a comparison of total groundfish landings from FVTR to dealer records for calendar years 2003 and 2004 shows close agreement between the two data sources (Rago et al. 2005). However, many fishermen have expressed concern about disclosing detailed information about primary fishing grounds for target species or providing information on discards in FVTRs for fear that the information may be used in a future management action that would negatively impact their operations.

With caution, the data provided in FVTRs can be utilized to provide the basis for stratum-specific expansion factors to raise the observed portion of the commercial fishing fleet's trips to the entire fleet. While FVTR data can be compared to other fishery dependent data sources such as dealer reports, vessel monitoring systems (VMS), and DAS to ensure the information provided is both complete and accurate, only observer data can be used to confirm the completeness and accuracy of FVTR bycatch and discard data. Additional information on the effective use of FVTRs as a bycatch and discard monitoring tool can be found in chapter 5.

[20] To date, no electronic systems have been authorized for use as an alternative to the FVTR.

New technologies such as electronic monitoring systems (described in section 4.10) could be used to verify FVTR logbook catch and discard data in hook and line fishery modes as is done with the comprehensive catch accounting system in British Columbia. It should be noted that a rigorous regulatory environment, requiring total retention of key species and documentation of all discards is in place to support British Columbia program. If a similar program were developed for the Northeast Region, a comprehensive regulatory structure, with considerable technological support and personnel, would need to be established.

4.4. Dealer Purchase Reports

4.4.1. Description

Since May 1, 2004, all federally permitted seafood dealers (excluding lobster only) have been required to submit electronic reports of all fish purchased on a weekly basis.[21] This requirement is fully described at 50 CFR 648.7. Dealer purchase reports are compiled and submitted to NMFS through one of two approved software packages specifically developed for this purpose or through a file upload process.

Dealer reports must include the following information for each purchase made from a fishing vessel: Dealer identification information; vessel identification information from which fish were purchased; a trip identifier; dates purchased; amount of species landed; price paid for each species; and disposition of the fish. Dealers reports are assumed to be the best source for comprehensive estimates of total landings and the resulting revenue generated. They can be used by the dealers for tax preparation purposes and as legal documentation of the purchase and sale of the landed catch.

4.4.2. Evaluation and Applicability

Federally permitted dealers are required to report all purchases of species governed by a Federal FMP. Dealers are not required to collect or report information on bycatch or discards. Dealer reports of landings may or may not specify the market category[22] which could, in turn, be used to categorize the general size of animals comprising the landed catch. Landings-related size information would not yield any

[21] May 1, 2004, was the effective date of a rule requiring all federally permitted seafood dealers in the Northeast except those handling lobster only to report fish purchases electronically via computer. Prior to this rule, all dealers were required to report all fish purchases on paper forms, submitted monthly, and dealers that purchases certain species were required to provide additional summary information on a weekly basis through an automated telephone call-in system. The May 1, 2004, rule consolidated the two reporting requirements, eliminated both the telephone call-in system and the paper reports, and implemented an on-line reporting program known as the Standard Atlantic Fisheries Information System (SAFIS).

[22] "Market category" is a term used to describe the various forms or sizes of fish products sold to dealers and for which different prices may be paid (for example, dealers will pay fishing vessels different prices per lb for "whale" cod, "market" cod, and "scrod" (small) cod).

specific application for quantifying bycatch or discards, even if discards of the same species landed were listed as discards on a FVTR. Dealer reports would not supply any information about species not brought to market. Therefore, dealer reports have limited applicability towards documenting discards.

Dealer reports are primarily used as a census of landings in a fishery. In turn, dealer data are important for expanding the catch and discard rates reported by at-sea observers to the entire fishing fleet. This information is used to optimize observer coverage and to developing estimates of total fishing effort and total discards (see Chapter 5 and Appendix A for more information).

4.5. At-Sea Observers

4.5.1. Description

At-sea fisheries observers are generally biologists trained to collect information onboard fishing vessels. Observers may be deployed for various reasons including monitoring interactions with protected species, measuring catch composition and disposition (including discards), validating or adjusting self-reported data, tracking in-season quotas (including bycatch quotas), or a variety of other reasons (NMFS 2004). In addition to the observer program that operates out of the NEFSC, several states employ observers either through a formal observer program or on an ad-hoc basis. In most cases, state observer programs are intended to provide information on fisheries not covered by the Federal observer program (such as the American lobster fishery).

4.5.1.1. Federal Observer Program

Bycatch in Northeast Region fisheries is monitored primarily through the Northeast Fisheries Observer Program (NEFOP). The Fisheries Observer Program is coordinated through the NEFSC and has been in operation since 1989. The quality of observer information is ensured through several aspects of the program: Observers participate in a comprehensive training program that includes proficiency and testing standards; a standardized set of on-board data collection protocols are utilized in training and are available at-sea in written reference documents; and finally, significant auditing and quality assurance of the data collected occurs before it is used in stock assessment and management decisions (NMFS 2006a).

To allow extrapolation of the sample data to the fleet as a whole for the purposes of total bycatch estimation, the Fisheries Observer Program employs a rigorous statistical sampling design. The procedure includes: Definition of a sampling frame across all relevant fisheries; and identification of sampling strata based on observable properties. A detailed discussion of the precision and accuracy of observer bycatch estimates is provided in chapter 5. Information on the data flow related to quality assurance and control for the Northeast Fisheries Observer Program can be found in Appendix D.

Observers are trained to collect a variety of information, including the amount of all catch and bycatch, the disposition of the catch (i.e., kept or discarded), biological samples (i.e., for age and size distribution studies), effort data (e.g., number of tows, haul duration, vessel horsepower), gear characteristics, and economic information (NMFS 2006a). Observers record everything caught in the net (both living and non-living) and identify all organisms caught (including finfish, crustaceans, shellfish, corals, sponges, etc.) to the lowest taxonomic level possible (NMFS 2006a).

Current regulations require any vessel issued a Federal permit to carry an observer aboard a particular fishing trip, if requested to do so. Vessel owners or operators who refuse to carry an observer or that leave dock prior to the observer embarking are referred to the NMFS Office of Law Enforcement and may be prosecuted. Upon embarking, an observer will ensure the vessel has a current U.S. Coast Guard safety decal. Should the vessel not have an inspection decal or other unreasonable safety issues arise, the unsafe vessels will be observed at a later time. The Fisheries Observer Program continues to work with non-compliant vessels to ensure compliance with safety and requirements (Amy Van Atten, pers. comm., NMFS).

The Fisheries Observer Program allocates observer coverage (“sea days”) to monitor bycatch (fish, invertebrates, and protected species) in the commercial fisheries in the Northeast. Available funding and the average cost of an observer sea day determine the number of potential sea days in the program for a given period of time. With the exception of some observer coverage funded through industry set-asides in the sea scallop fleet, the costs of observers in the Northeast fisheries are entirely borne by the Federal Government, using funds appropriated to NMFS by Congress. While NMFS requests funding for the Fisheries Observer Program that it has determined necessary to meet the needs of the fishery and to comply with statutory mandates, the actual levels of future funding cannot be entirely predicted, and are uncertain until Congress approves the budget. Some of these annual funds are ‘earmarked’ to ensure that the required levels of sea days are available to satisfy mandated levels of coverage required for some fishery management plans or for fisheries that occur specific areas (e.g., 5 percent coverage in the Northeast multispecies fisheries). The remaining funds and subsequent sea days are divided amongst the remaining fisheries in the northeast. Within this remaining pool of sea days, it is necessary to maximize the utility of the available days to ensure that resulting bycatch estimates are accurate and precise for each fishery mode. The detailed methods currently used to optimize available observer coverage throughout certain Northeast Region commercial fisheries is described in chapter 5 and Appendix A.

4.5.1.2. State Observer Programs

State fisheries agencies often administer at-sea observer programs for fisheries that occur within their jurisdiction. State observer programs generally occur in fisheries that target species that are not federally managed or target federally managed species in state waters. All of the states within the Northeast Region have conducted some level of at-sea observations. Excluding lobster observation programs, North Carolina, Maryland, Rhode Island, and Massachusetts have formal programs for one or more areas and/or target species.

Standards for state observer programs are established by the Atlantic Coastal Cooperative Statistics Program (ACCSP) and NMFS. Therefore, much of the information previously described in section 4.5.1.1 also applies to the state administered observer programs.

4.5.2. Evaluation and Applicability

Observer-gathered discard information is generally considered the most accurate and objective in recording bycatch and discard information. Observer programs often collect detailed biological information on both catch and discards for all aspects of commercial catch; Fish, invertebrates, marine mammals, birds, and protected species. Observers produce quantitative assessments of bycatch and discards. As such, it is often the primary source of bycatch and discard reporting and is the foundation for bycatch and discard estimation. Observer data are utilized extensively in both stock assessment and management actions.

Observer data are preferred over other data sources including FVTR data for a few reasons. Unlike fishermen, who may be performing or managing many fishing-related tasks at once so that reporting bycatch and discards becomes a lower priority than culling retainable catches or navigating their vessel, observers are solely focused on data collection while deployed at sea. In addition, observers are highly trained in their independent functions of data collection and are unlikely to be distracted by other priorities or influenced to misreport information. However, there are different sampling protocols for fishery resources and for marine mammals, and an observer assigned to a vessel primarily as a marine mammal observer may not conduct complete sampling of vessel catch and discards.

Managing an observer program requires dealing with numerous practical and fiscal constraints. Observers must be carefully trained, work under sometimes hazardous conditions, and deal with a variety of circumstances that can arise while at sea on a fishing vessel. Logistical issues, such as having an adequate number of observers available to cover a wide geographic area, numerous ports, and a variety of fisheries; and getting the observers aboard vessels within relatively short windows of time before they intend to sail further add to the complexity and costs of observer programs. Finally, safety issues must be considered in deploying observers. Observers are not deployed aboard vessels that present unsafe or unhealthy conditions. Vessels that may otherwise be safe may not have space or appropriate accommodations to carry observers. Even on a vessel that is determined to be safe and appropriate to accommodate an observer, weather, sea conditions, and the very nature of the commercial fishing business present some risk. As a result, recruitment and retention of observers is challenging.

While observer programs are one of the best ways to collect bycatch and discard information, they are also one of the most expensive means of doing so, due to the costs of rigorous training, recruitment of observers, salaries and benefits (including premium pay while at sea and on-call pay while waiting for a vessel to depart), contractor profit, travel costs, gear and equipment, and insurance (NMFS 2004). Indirect costs include salaries and benefits of NMFS employees that oversee the observer program, sampling design and analytical support, data entry, and database design and maintenance.

State observer programs may be used to provide the same types of discard and bycatch information provided by the Federal observer program. In many instances, the fisheries observed may not involve vessels with Federal fishing permits or may occur on vessels operating exclusively within the jurisdictional waters of a particular state. The data available from state programs may have value in providing information on non-FMP species or about locations not often sampled by the Federal program. Data collected by state programs are coordinated by the ACCSP and available to federal stock assessment scientists through data sharing agreements.

4.6. Port Sampling (Commercial)

4.6.1. Description

Port agents are NMFS staff located in the major fishing ports in the Northeast Region. Port agents are responsible for collecting biological samples of landed catch to characterize commercial landings following standardized sampling protocols. Biological sampling data are linked with FVTR data to identify the statistical area the landed fish were harvested. Length and age samples are used to translate landed weight into numbers of fish landed at age. Landings-at-age data are then grouped with discard-at-age data to develop a total catch-at-age matrix used in analytical stock assessment models.

4.6.2. Evaluation and Applicability

Biological sampling conducted by port agents contributes to the assessment of total catch of species in the Northeast and provides important biological information on FMP species for use in stock assessment and management actions. Port agents do not collect specific information on bycatch or discards. They may receive anecdotal information occasionally during sampling or conversations with fishermen. The length and age data collected by port agents, along with other fishery dependent data sources, are a key component in estimating size and age of catch and, to some extent, are applicable to discard estimates by providing a size distribution for comparison against observer data.

Port agents also facilitate outreach with the fishing industry and dealers regarding reporting issues, new regulations, data quality concerns, and compliance with regulations. Port agents also work with industry to properly identify species through the use of outreach materials such as the skate and protected resources identification guides. Port agents assist in answering industry questions pertaining to data entry on FVTRs and dealer weight-out reports. As outreach representatives of the agency, port agents help to increase the accuracy and reliability of the fishery-dependent data sources.

4.7. Recreational Fishery Sampling

4.7.1. Background

For many fish stocks, catch and discards associated with recreational angling are an increasingly important component of overall fishing mortality. NMFS (2007) estimates that in 2005 over 12 million anglers made more than 83 million fishing trips nationwide and caught more than 423 million fish, 59 percent of which were released. The total weight of recreational catch equates to about 9 percent of the total U.S. commercial harvest (in the states participating in MRFSS), but since anglers tend to target relatively few species, the proportion of total catch attributed to recreational fishing on a stock-by-stock basis may be substantially higher. In Atlantic bluefish, for example, the total annual allocation and catch for recreational fishing exceeds the commercial allocation and catch. Accordingly, fishery managers need data on recreational fishing to ensure management actions are informed by estimates of the total impact of the recreational component.

Recreational angling presents NMFS with especially difficult data collection challenges. Angling may occur throughout the EEZ and coastal zone, including estuaries. Effort is broadly dispersed; anglers may work from bridges, piers, public and private beaches, other coastal properties, private docks and boats, and charter and head/party boats.[23] Also, recreational catch may not be sold, so aggregation points, such as dealers for commercial fisheries, are not available as data collection nodes. Other problems exist, such as the lack of a universal registry of anglers, making it difficult to capture data to support estimates of recreational fishing participation, effort, and catch per unit of effort, through which an overall estimate of recreational fishing impacts can be derived.

To begin collecting data on recreational fishing activities, in 1979 NMFS initiated MRFSS. Since then, the MRFSS has been expanded, refined, and supplemented by other surveys and methods, which are described in the sections that follow.

4.7.2. Description

The MRFSS is the only federally coordinated source of fishery independent data available on bycatch for recreational fisheries in the marine waters of the United States, including estuarine areas. Data collected through the MRFSS are used to produce estimates of recreational participation, fishing effort, catch, and discards/bycatch of finfish. Data on recreational shellfishing are not collected.

[23]The terms “head boat” and “party boat” refer to same thing: boats that take large groups of anglers on a fishing trip. Generally, the anglers purchase individual tickets to fish, and the vessels may carry up to 100 anglers. The duration of head boat trips is usually 4 to 12 hours. “Charter boat” refers to vessels that are hired—often for a full day—by a pre-formed group of 4 to 8 anglers (NRC 2006). Charter boats are often associated with large pelagic fisheries, but will often seek other species if the principal target is unavailable or if bag limits are met before the charter expires.

MRFSS data are collected by two independent, but complementary, surveys:

- Access-Point Intercept Survey – designed to collect data on catch per unit effort through interviews with individual anglers; and
- Coastal Household Telephone Survey (CHTS) – designed to collect data used to estimate the total number of marine recreational trips taken by coastal residents.

Intercept surveys are simply pre-formatted interviews of anglers, conducted at fishing access sites such as docks, marinas, and along the shore. Catch data are obtained from anglers intercepted by trained interviewers stationed at fishing access sites or patrolling the shoreline. Interviewers identify, count, weigh, and measure fish that are available for inspection. Fish not brought ashore (i.e., discarded bycatch) are categorized through the interview as used for bait, filleted, discarded dead, or released alive. In addition to the access-point intercept, surveyors will often ride aboard head/party boats to conduct the interviews with anglers and to collect data on angler practices and fish that are caught and discarded. All the intercept interviews—ashore and aboard party boats—are used to develop estimates of catch per unit effort, which in this case is the recreational fishing trip. Intercept data are not used as the basis for estimating recreational fishing effort.

The CHTS obtains information on recreational fishing effort (Table 32). The effort information obtained via the telephone surveys can be used to scale estimates of overall recreational fishing effort with the catch-level information collected through the interview program. In combination, these two sources of information can be used to derive estimates of overall recreational fishing impacts, including discard estimates.

Intercept Survey	Telephone Household Survey
• Number, weights, and lengths of fish caught (by species)	• Presence of marine recreational anglers in household
• State and county of residence	• Number of anglers per household
• Avidity level (trips per year)	• Fishing trips in 2-month period
• Mode of fishing	• Mode of each trip
• Primary fishing area	• Location (county) of each trip

Table 32. Data collected by the complementary MRFSS methods.

Under the CHTS and Access-Point Intercept Survey, marine recreational fishing data on effort, participation, catch, and discards are collected for 2-month periods (“waves”) by subregion, state, fishing mode, and primary fishing area. In the Northeast Region, surveys are conducted in five waves, March through December, except in Maine and New Hampshire. In these two states, survey of the party/head boat fleet occurs March through October, and shore-based intercept (of shore-based anglers and those completing trips in private or charter boats) is conducted for three 2-month waves, May through October. Total survey effort during a 1-year period usually involves more than 76,000 intercept interviews and over 265,000 telephone interviews (Witzig et al. 2006).

In 2003, the ACCSP launched a coastwide For-Hire Survey[24] (FHS), which was designed to collect catch and effort data from directory-based interviews with operators of charter and head/party boats. It also includes a "validation data" component that, through dockside observations of vessel activity, is used to validate the interviews and to correct any reporting errors. Catch per unit effort for the FHS relies on the access point intercept interviews noted above.

Unlike CHTS, which relies on random digit dialing to contact households in coastal counties, the FHS uses a telephone directory of known charter and party boat fishery participants. Sampling occurs weekly as vessel operators are contacted and asked about fishing effort in the prior week. The validation surveys are conducted through the same intercept survey method described above, but are targeted to correspond with vessels slated to be interviewed under the FHS at the week's end.

Another source of recreational fishing data is the fishing vessel trip report (FVTR). Charter and party boats in the Northeast Region are required to submit FVTRs per 50 CFR 648.7(b). Though not part of the MRFSS, the FVTRs are important sources of recreational fishing data in the region and may be used to supplement MRFSS data in the determination of impacts from recreational fisheries in the region.

Finally, over the years, several states have instituted activity- or fishery-specific recreational fishing surveys. Examples include state-level MRFSS collections, angler reporting by catch-card, and vessel counts at certain marinas and harbor entrance channels. Such programs are well established on the Pacific, Gulf, and southeast coasts. In the Northeast Region, however, state-level programs are few and not focused on species under management of the Fishery Management Councils. The FHS began as a state program in Maine in 1995, before its methods were adopted coastwide. A catch-card program in North Carolina and Maryland requires reporting on bluefin tuna and marlin catches, and an FHS-type telephone survey, including access-point validation intercepts, is used to collect data on effort and catch of large pelagic species aboard charter boats and private boats with permits for highly-migratory species. None of the state-level programs are relevant to the fisheries considered in this document.

4.7.2.1. MRFSS Access-Point Intercept Survey Methods[25]

The intercept survey consists of interviews to gather catch and demographic data from marine recreational anglers who have just completed fishing in one of 3 fishing modes: Head/charter boat; private/rental boat; or shore based (e.g., man-made structures, beaches, and banks). As noted above, the intercept survey continuously samples angler catches during the five 2-month sampling periods from March through December, except in Maine and New Hampshire. Intercept sampling is stratified by state, mode, and 2-month wave with a minimum of 30 intercepts in each stratum, two of which (in each

[24] In some NMFS documents, the FHS is considered a component of the MRFSS. In others, it is presented as a supplement to the MRFSS. Such distinctions are merely semantic and have no relevance to the quality of the data and the degree to which the programs are integrated.
[25] Sections 4.7.2.1, MRFSS Intercept Survey, and 4.7.2.2, MRFSS Telephone Survey, are taken largely from Witzig et al. (2006).

stratum) must be with residents of coastal counties. Beyond this minimum, samples are allocated in proportion to average estimates of fishing pressure from the three previous survey years. Approximately 20,000 intercepts per year are allocated in the Northeast Region under MRFSS (NMFS 2005SOW).

At the core of the access-point intercept sampling plan is the Master Site Register (MSR), a complete coastwide list of access sites for marine recreational fishing. It was originally developed in 1979 and has been continuously updated. Sites are chosen for interviewing assignments by randomly selecting from among the MSR sites, as they are weighted by estimates of expected fishing activity. The intent of the weighting procedure is to sample in a manner such that each angler trip has an equal probability of inclusion in the sample.

If, after the seventh week of a wave, the interviewers have not contacted the required two coastal county residents for each stratum through MSR assignments, then, with NMFS approval, an interviewer may “rove.” Roving assignments allow interviewers to select sites known to be active (rather than selected randomly). Other restrictions on the number interviews per site and the distance between sites are relaxed until the target number of interviews with coastal county residents are collected (NMFS 2005SOW).

The method used for assigning samplers to conduct interviews and collect data aboard a head/party boat is analogous to the MSR intercept assignment process. A directory of head/party boats is maintained and each entry is assigned a “pressure” reflective of the number of trips the vessel is expected to make in a week. Pressure is determined through field observations by MRFSS staff and contractors, and the directory is updated regularly. Vessels annotated with a greater pressure value are likely to have samplers aboard more frequently than those vessels with a relatively low pressure. As with shore-based intercept sampling, the method for assigning samplers to ride aboard head/party boats helps to ensure each vessel trip has an equal probability of being sampled and minimize sampling bias and increase precision (Robert Andrews, pers. comm., NMFS).

Intercept sampling is distributed among weekdays, weekends, and holidays in such a manner as to assure that about 60 percent of the interviews are collected on weekends and holidays on the Atlantic coast. Anglers are intercepted, screened, and interviewed at assigned access sites upon completion of their fishing trips. A small number of interviews (less than 5 percent) are conducted with beach/bank shore mode anglers who have not completed their trip. At heavy use sites, every n^{th} angler is intercepted and interviewed. For example, every second or third angler might be interviewed if the site is too busy to interview all anglers.

Each interview consists of:

- An introduction to the survey and information on the Privacy Act of 1974;
- An oral interview concerning the fishing trip just completed;
- A thorough examination of the respondent's catch; and

- Measurement of lengths and weights from all of (or if necessary, a random sample) the fish of each species in the respondent's catch.

Interview procedures vary slightly among fishing modes:

- When assigned to head/charter boats, the interviewer occasionally rides on head boats to interview anglers and to examine their catches.
- Private/rental boat anglers are interviewed at boat ramps and hoists while they are recovering their boats or at dockside while they are cleaning their boats.
- Anglers fishing from natural shorelines often are widely distributed along beaches and banks with multiple access points, hence samplers often have to rove from angler to angler within the defined boundaries of the site to obtain interviews.
- Man-made structures often have a single egress point at which samplers can easily intercept departing anglers.

Interviewing procedures have been developed to allow separate recording of information on the following:

- Catch which is unavailable for identification;
- Available catch which can not be easily subdivided among anglers; and
- Catch obtained during multiple-day boat trips.

For fish not available for the interviewers examination, information is only recorded for individual anglers. For the fish available for inspection, grouped catch is allowed.

The procedure for interviewing anglers while aboard a head/party boat is roughly the same, except that parts of the interview may occur even before any fish are caught while the boat is heading out to sea (NMFS 2005SOW). Samplers do not attempt to interview all of the passengers, but randomly select passenger to be interviewed. As fish are brought aboard, the sampler will attempt to collect data on all catch (retained and discarded). Retained catch is weighed and measured (fork length). Discarded catch is measured, but is not weighed due to the concern of causing the fish further injury. The location fished may be obtained from the boat's captain after the trip. Otherwise, the vessel's crew are not interviewed.

4.7.2.2. MRFSS Telephone Survey Methods

The telephone survey is carried out in 2-week periods of interviewing starting the last week of each 2-month wave of fishing activity and continuing in the first week of the following month. For example, for the March/April wave, households are called during the last week of April and the first week of May. Respondents are asked to recall on a trip-by-trip basis all marine recreational fishing trips made within their state during the 60 days prior to the interview.

A summary of the methods used in the telephone survey are as follows:

- The telephone survey is only used to gather information on fishing effort, not on catch rate or species composition.
- The telephone interview sample quota for each wave varies with the amount of fishing activity expected. The allocation is based on historic MRFSS data on fishing effort.
- Interview allocations for each county are proportional to the square root of the number of households within the county. This ensures a minimal level of sampling in coastal counties with small populations.
- The sampling units in the telephone survey are households with telephones in coastal counties. Households are contacted using a procedure called "random digit dialing." In this procedure, each telephone number (including unlisted numbers) within the county has an equal probability of selection.
- The household effort data obtained in each county is weighted by the number of households in the county for calculation of a state level estimate of the mean household fishing effort. In statistical terms, a stratified sampling estimator is used.
- This weighting procedure was started in 1993 and applied to all historical estimates. In earlier years, an improper weighting scheme (based on the number of households in the state) was used. States with large coastal population centers (e.g., Boston, Baltimore) were the most affected by the change.
- All households are eligible for contact each wave, regardless of whether they were contacted in a previous wave.
- Telephone interviews are conducted between 10:00 a.m. and 9:30 p.m. (respondent's local time) on weekdays and weekends.
- Up to 10 attempts are made to reach each household. Repeated attempts are made to complete the questionnaire with all eligible anglers residing in each contacted household.
- As necessary, interviews are conducted in Spanish.
- Information on marine recreational fishing activity is obtained from each angler in the household or from a responsible adult when appropriate.
- A procedure called "hot deck" imputation[26] is used to adjust for nonrespondent anglers and households prior to estimation.

4.7.2.3. For-Hire Survey

The FHS is designed to collect data on fishing effort and catch per unit effort aboard charter and party boats. Effort data are collected through pre-formatted telephone interviews with vessel operators. A directory of active for-hire vessels is the source from

[26]The "hot deck" imputation method "replaces missing values in the data for a given household or angler with values randomly selected from complete, current observations obtained for households or anglers with similar characteristics. Hot-deck imputation leads to a complete data set that preserves the original variability of the sampled data better than 'mean' imputation. It is also usually preferred over 'cold-deck' imputation which replaces missing values in current data with values randomly selected from historical observations." (Ditton *et al*. 2001)

which the sample frame is drawn. The directory is updated opportunistically and through information collected in the telephone surveys.

Sampling is stratified by state, mode (charter or party), week, and sampling wave. The sampling waves are the same as with MRFSS. The FHS survey is conducted for 5 waves, March through December, on the Atlantic coast, except in New Hampshire and Maine, where it runs for three/four waves, May/March through October. In each week of the survey, called a "sampling week," approximately 10 percent of the for-hire fleet is selected to be queried. In areas where a 10 percent sample would result in fewer than three samples per stratum, additional samples are drawn. The vessels selected for the FHS are contacted by mail the week prior to the sampling week. A letter explains the program and the data that are needed, and the vessel operator is given a copy of the basic reporting form.

Vessel operators are contacted the week following their sampling week and interviewed in accordance with the FHS questionnaire and established protocols. The questions focus on the number of trips taken, the length of the trips, distance from shore, the number of anglers, and fishing method (trolling, jigging, etc.). The interviewer asks what species were targeted on the trip but does not ask the respondent to quantify or otherwise describe the catch and discards. Ditton *et al*. (2001) reports that, on average, 83 percent of the for-hire vessels in the survey are successfully contacted and about 80 percent respond to the survey. The FHS provides vessel operators with the alternative of self reporting by submitting the completed reporting form to a toll-free fax number or through a PIN-protected secure website. About 5 percent of respondents use these alternative reporting modes.

The FHS includes dockside validation of self-reported trip data. During the designated sampling week, interviewers visit the marina/dock where the target for-hire vessel is moored. The interviewer notes the time and date and records the vessel status (moored, underway, hauled out, etc.) Ideally, interviewers will visit the dock several times during the sampling week. The presence/absence/activity data are compared to and used to correct errors in the self-reported FHS data. CPUE data are collected through access intercept surveys, conducted ashore at access points or afloat aboard party boats as described above.

4.7.2.4. FVTRs from Party and Charter Boats

Throughout the Northeast Region, party and charter boats are subject to the requirements at 50 CFR 648.7(b) for preparing and submitting FVTRs, just as are commercial vessels. An FVTR must be completed for each fishing trip. A new page must be started for each statistical area in which the vessel fishes. The FVTR logbook must be submitted by the 15th of the month following the month in which the trip ended. Charter and party boats are required to report the number of anglers fishing and the number (rather than the weight) and species of all fish kept and discarded.

A description and an evaluation of FVTRs are included in this document under section 4.3. The section is applicable to charter/party FVTRs with one exception. In commercial fisheries, the dealer report, documenting the species and pounds landed, provides an independent form of verification of the commercial FVTR. Catch from recreational fishing, however, may not be sold. Consequently, no dealer report is generated, and the party/charter FVTR cannot be verified in the same manner. Otherwise, the uses and limitations of the charter/party FVTR are the same as those addressed in section 4.3.

4.7.3. Evaluation and Applicability

In the Northeast Region, the species for which recreational angling is a significant source of fishing mortality include summer flounder, winter flounder, scup, bluefish, Atlantic cod, and striped bass. For each of these stocks, FVTRs, MRFSS, and FHS data are primary sources of bycatch and discard information, used to document bycatch of these species, along with all others, in recreational fisheries. Data include landing and discard distributions by catch and size class by stock area and mode. Catch and discard per trip estimates are used in conjunction with effort data obtained by both surveys to estimate total recreational catch and bycatch for use in stock assessments.

Data on fish caught by recreational anglers are categorized as follows:

- Type A – Fish brought back to the dock and identified by MRFSS interviewers.
- Type B1 – Fish that are released dead, used for bait, or filleted and identified only by the angler.
- Type B2 – Fish that are released alive and identified by the angler.

Types A and B1 are considered directly in the determination of total mortality from recreational fishing. Though type B2 data are reports of fish released alive, certainly some of the fish do not survive. Live-release mortality rates for the stocks listed above range from 8 to 50 percent. The estimations are based on empirical evidence, observations in commercial hand-gear fisheries, comparisons to similar species, and, in some cases, directed studies. Summer flounder, for example, were thought to die 25 percent of the time after release by a recreational angler, but studies in the 1990s determined the mortality rate to be approximately 10 percent. Taken together, types A, B1, and a percentage of B2 catch, form the basis for estimations of total mortality resulting from recreational fishing (Mark Terceiro, pers. comm., NMFS).

Fish age data are not collected under MRFSS or the FHS. Age is derived from length-frequency data collected on landed fish (Type A) through intercepts. Length-frequency data on discards (Types B1 and B2) are collected by intercept samplers when they ride aboard party/head boats. Other sources of data for estimation of length-frequency of discards include intercept-observed sub-legal fish, at-sea sampling by state agencies, and self-reporting programs in Virginia, Maryland, New York, Connecticut, and Massachusetts. Catch-at-age, derived in this manner, is a component in the determination of stock size and total fishing mortality (Mark Terceiro, pers. comm., NMFS).

The overall effectiveness of the MRFSS has been evaluated many times (Witzig et al. 2006). Detailed information on the reviews that have been conducted since the inception of the MRFSS is available on the NMFS Office of Science and Technology web site.[27] This site also outlines the current precision and accuracy of the MRFSS program data.

In September 2004, NMFS contracted with the National Research Council (NRC) of the National Academy of Sciences to conduct a critical review of the agency's recreational fishing surveys. The report of the review was delivered to NMFS in April 2006.[28] The report acknowledged the profound difficulty of collecting accurate and precise data on recreational fishing, listed a number of programmatic criticisms including possible sources of imprecision and bias, and included significant recommendations for redesigning the MRFSS.

General findings of the NRC include that:

- Much in recreational fisheries, from participation levels to management goals, has changed since the design and implementation of the MRFSS and the survey has not kept pace with the changes;
- Funding and staff support is inadequate, and additional resources are needed to overhaul and maintain MRFSS;
- The CHTS and access-intercept programs have serious design and implementation flaws and use inadequate analytical methods;
- For the purposes of data collection, the for-hire sector has more in common with commercial fishing than with private angling; and
- Concerns about the use of MRFSS to support fishery management decisions are well-justified.

To address issues cited in the report, the NRC recommended changes to the MRFSS and FHS that would improve the effectiveness of sampling procedures, enhance their applicability as relates to fishery management measures, and heighten the usefulness of the MRFSS social and economic analysis provided by the survey data. The NRC's many recommendations for improvement of the MRFSS and FHS also apply to the state-level recreational surveys designed to supplement the MRFSS data collection and analysis.

Specific to bycatch and discards, the NRC recommended several measures to enhance data quality, including mandatory logbooks in the for-hire sector (charter boats), greater use of onboard observers, and delineation of catch by target effort, catch effort, or directed effort, among other things. More information regarding the NRC assessment and NMFS's efforts to improve recreational fishing data collection is provided in chapter 5.

[27] For website, see www.st.nmfs.noaa.gov.
[28] Unless otherwise noted, all of the information in this subsection is drawn from NRC 2006.

4.8. Industry-Based Surveys

4.8.1. Description

Industry-based surveys are marine resource assessment surveys conducted onboard commercial fishing vessels that are typically under the control of academic institutions, state fishery agencies, or other marine scientists or investigators (NMFS 2006d). Often, collaborations between some of the aforementioned groups and NMFS may be involved with a specific industry-based survey. Industry-based surveys often have pre-defined sampling schemes and protocols that are more narrowly focused than fishery independent surveys described in section 4.2 of this chapter. Industry-based surveys may utilize the empirical knowledge of participating vessel operators and fishermen to conduct surveys in areas where specific species are known to occur in either unusually high abundance or in areas outside the scope of the traditional NMFS surveys (Earl Meredith, pers. comm., NMFS). In addition, industry-based surveys often use gear designed to optimize the catch of the specific species being targeted by the survey.

The primary purpose of some industry-based surveys is to supplement estimates of relative abundance for a specific finfish or shellfish species or species assemblage obtained in NMFS surveys or to provide abundance data for areas and/or species poorly sampled by NOAA surveys (Table 33). These data may be utilized in conjunction with other data sources in performing stock assessments. The fishing methodology and gear utilized in industry-based surveys may be more similar to standard commercial fishing operations than fishery independent surveys, but may still differ substantially from typical fishing operations. Not all of the sampling protocols employed include detailed data collection on all captured species (Earl Meredith, pers. comm., NMFS).

Industry-Based Survey	Principal Investigator
ME/NH inshore trawl	ME Dept. of Marine Resources
Atlantic cod trawl	MA Division of Marine Fisheries
Yellowtail flounder trawl	RI Dept. of Environmental Management
Surf clam inventory	NJ Dept. of Environmental Protection
Sea scallop abundance	Coonamesset Farm
Sea scallop video	University of Massachusetts
Scup in non-trawlable areas	University of Rhode Island/Charles Borden
Mid-Atlantic supplemental finfish	National Fisheries Institute

Table 33. Industry-based surveys in the Northeast Region.

4.8.2. Evaluation and Applicability

Industry based surveys may provide an alternate source of information on species distribution and the frequency of occurrence in fishing gear. However, because of their focused design, compressed seasonality, and specialized fishing gears, industry-based surveys are poorly suited to replace or supplement current data sources for bycatch information. The data generated through industry-based surveys cannot be directly expanded to the commercial fishery, nor does it often present a complete picture of all species encountered, because gears used, areas and seasons fished, and sampling schemes may differ substantially from commercial fishing operations or other fishery-dependent data collections. The time series of industry-based survey data may be susceptible to lapses or compression pending research priorities and funding availability.

4.9. Study Fleets

4.9.1. Description

In collaboration with the New England groundfish fishing fleets, NMFS has established a pilot project to develop and implement state-of-the-art electronic data reporting devices for use aboard groundfish fishing vessels in the Northeast (NMFS 2006d). The goal of the project has been to design and field test electronic reporting hardware for collecting, recording, and transferring more accurate and timely fishery-based data than is practicable to obtain through the FVTR.

Three distinct pilot fleets comprising different vessel size categories are included in the pilot project. The first fleet is large southern New England trawlers from New Bedford, MA, to Narragansett, RI. The second fleet is small hook vessels based out of Cape Cod, MA. The third fleet is medium-sized trawlers and gill-netters from Cape Ann, MA, to Mid-Coast Maine (NMFS 2006d). NMFS, three regionally based fisheries associations, and a government support contractor assist in the management of the Study Fleet Program.

Specialized equipment is necessary for data transmittal; currently the equipment is paid for by NMFS. Vessels participate on a voluntary basis and are currently compensated for their participation in the project (Earl Meredith, pers. comm., NMFS).

Data collected include an automated global positioning satellite (GPS) link for detailed catch location information. The remainder of the data collected are self-reported and are similar in nature to the FVTR data described in chapter 4.3. The reporting system can automatically capture water conductivity (used to determine salinity), temperature, and depth information for use in profiling species abundance by depth or temperature. Once study fleet data are transmitted, the sender may perform a one-time correction to the submission via a web site interface. The data are then usable with little additional modification for analysis/management. The study fleet data provide a middle-level resolution between detailed tow/haul level observer and broad trip/area FVTR data and can be made available at or near real-time (Earl Meredith, pers. comm., NMFS).

4.9.2. Evaluation and Applicability

The Northeast Region Study Fleet provides all of the self-reported data elements supplied in an FVTR, but the data are transmitted electronically and are provided on a tow-by-tow basis rather than at the trip level. The study fleet can provide more detailed location data than is available on a FVTR including location information for each tow/set of the fishing gear. However, because the number of participants in the study fleet is relatively small, the amount of data available is also relatively small.

The same caveats and limitations apply to study fleet data and FVTRs (section 4.3.2). The electronic recording and transmittal of the study fleet data may minimize the transcription entry errors associated with FVTRs, but may introduce new errors. The most functional current study fleet is a small subset of the groundfish trawl fishery mode. Because it is not necessarily a statistically valid representation of the groundfish fleet, expanding the self-reported tow-by-tow bycatch and discard data to the entire fleet may not be representative of overall fishing practices. Attempts to deploy the study fleet technology into other fishery modes have yet to move beyond the proof-of-concept phase. Development of the reporting software continues in the hook and line and gillnet groundfish and *Illex* squid fishery modes.

The study fleet project has the capability to provide more detailed location and more precise effort data, such as tow distance, than is available from FVTRs. The improved location data may be beneficial in performing more precise expansions of observer-based bycatch estimates, particularly if the program is retooled to be a representative sample of the fleet or is expanded to encompass entire small fleet fisheries such as red crab or tilefish. The ability to use fleet reported data for “hot spot” bycatch management is not feasible at this time. The personnel, infrastructure, and current regulations are insufficient to affect this type of management. The near real-time reporting capabilities of the study fleet could be useful in directing additional fishery dependent data collection efforts to specific areas to further investigate unusual bycatch events reported by the study fleet.

The study fleet project is currently undergoing a detailed evaluation and assessment. At present, the project has demonstrated that the hardware and software developed can be used to effectively collect and transmit tow by tow catch and discard information for the groundfish trawl fishery mode. However, the goals for the next phase of the project have yet to be determined. The Research Steering Committee will have input as to the future design and data products of the study fleet.

4.10. Digital Video Cameras

4.10.1. Description

4.10.1.1. Electronic Monitoring Systems

The use of fixed placement, high resolution, and tamper resistant video cameras on-board fishing vessels that record digital video data to large capacity computer hard drives has been a relatively recent development in fisheries around the world (Ames 2005; McElderry 2003; McElderry et al. 2003; Tamee Mawani, pers. comm., DFO Pacific Region; Bob Stanley, pers. comm., AFMA). These systems are often referred to as electronic monitoring systems.

Electronic monitoring can be utilized to augment or replace onboard human observers in some data collection tasks. The majority of applications using electronic monitoring have been developed to monitor gear interactions with protected species and birds, to detect presence or absence of specific fish species occurring as bycatch, or to validate vessel landing and logbook information (e.g., as monitoring in full retention programs). Forays into bycatch quantification have yielded mixed results with success largely dependent on the type of gear being monitored and the electronic monitoring video quality (Mark Buckley, pers. comm., Digital Observers, Inc.). The technology supporting electronic monitoring has advanced significantly in a short time and issues of image quality that were once prevalent are virtually nonexistent when the cameras are properly placed. Electronic monitoring applications have been deployed successfully in fixed gear fisheries (i.e., longline, pot/trap, mechanical jig) and in trawl fisheries with relatively homogeneous catch composition.

Within the Northeast Region, a proof of concept project has been completed using electronic monitoring onboard small longline vessels operating off Cape Cod (McElderry et al. 2005). This project produced very similar data results as would be collected by an onboard observer in identifying and quantifying bycatch species, namely Atlantic cod occurring in sets targeting haddock (McElderry et al. 2005). A full beta testing program using electronic monitoring onboard longline vessels is scheduled for 2006. Two proof of concept projects are scheduled to occur in 2006 as well—one in the herring mid-water trawl fishery to monitor at-sea discards and one in the day gillnet fleet to identify and quantify bycatch.

4.10.1.2. Image Processing Systems

Also known as "digital observers," this is an enhanced version of electronic monitoring systems described above. Digital video data are captured by fixed placement video equipment. The resulting video data are run through custom image recognition software that process the picture through a series of algorithms to identify fish species, provide length data and in some cases where a length/weight relationship has been established, weight data (Davis 2002). Video data are typically reviewed by technicians to visually confirm software identification findings and system performance.

4.10.2. Evaluation and Applicability

4.10.2.1. Electronic Monitoring Systems

Some initial successes using electronic monitoring have been demonstrated in several specific, limited programs world wide (McElderry et al. 2005). In these programs, electronic monitoring technologies have been capable of providing visual catch data to answer specific questions about what is being caught, discarded, or interacting with fishing gear. Because of these successes, electronic monitoring is considered to have considerable potential for fishery applications and has been hailed by some as a replacement for onboard human observers. This may be true to a certain extent in fisheries where little previous at-sea data collection of any type has occurred. Considering the current limits of the technology and recent experience utilizing the technology, electronic monitoring is currently capable of acquiring only simple presence and absence data rather than the highly detailed data collected by at-sea observers such as those utilized in the Northeast Region.

Current successful electronic monitoring programs use video as a means to monitor retention or validate logbook data for retention and discards. In these programs, electronic monitoring uses visual data in an attempt to confirm logbook reports, and is only a part of the total monitoring program and does not do anything beyond confirming presence or absence of catch and discards. Such retention or logbook monitoring programs are supported by extensive regulatory environments that include some type of limited access privilege program and significant administrative support. These programs require extensive post-trip comparisons of video data to logbook and landings records. No such analogous program or regulatory environment currently exists in any Northeast Region fishery mode.

In the Northeast Region fishery modes, the at-sea observer programs are very complex in their sampling schemes and in regards to the data collected. Electronic monitoring technology is currently not capable of performing most of the detailed data collection tasks performed by human observers. Simple presence/absence characterization of catch would not lend itself to data expansion in any meaningful way in the models used in the Northeast Region unless additional parameters such as weight or length can be associated with the visual data. To obtain such data, vessel crews would have handle catch and discards in a tightly prescribed manner at designated locations to ensure image capture. In contrast, electronic monitoring may be useful in documenting marine mammal or protected species interactions with commercial fishing operations in the absence of an at-sea observer, because in these cases, simple presence/absence data are usually sufficient. Deployment of electronic monitoring into fisheries with little to no at-sea observer coverage as a supplement to overall coverage levels would not yield data with much utility unless the deployments were tailored around answering very simple presence/absence questions.

The technology supporting the onboard video units has under gone significant development in recent years. So too has the number of programs testing the technology in applications worldwide. The potential for future uses of electronic monitoring remains high as continued refinement occurs. Many features of electronic monitoring are desirable. Electronic monitoring units can be deployed on small vessels that could not reasonably accommodate an onboard observer and may have a lower daily operational cost to industry when compared to onboard observers. There are some important electronic monitoring issues relating to the Freedom of Information Act (FOIA), privacy, data use, and chain of custody have not been widely discussed or resolved. In addition, significant program administrative support and costs are associated with large-scale electronic monitoring programs. Significant costs are involved with retrieving, reviewing, analyzing, and storing the electronic image data (Kinsolving 2006). Decisions would also need to be made regarding minimum performance standards and who would bear the costs of implementing an electronic monitoring program.

4.10.2.2. Image Processing Systems

This technology is still in pilot study development and has yet to demonstrate that it can replace human observers in field applications. Significant challenges have occurred during field testing in capturing quality images under sufficient lighting on an adequate background for the imaging software to perform at an acceptable standard for species identification (Mark Buckley, pers. comm., Digital Observer, Inc.). Additional challenges have occurred in configuring systems to provide length and weight data. Often, fish handling practices may require modification to ensure that optimal image captures occur. Discards must occur at a designated area and may also require special handling and lighting for image capture for the systems to function properly. Further testing of this technology needs to be performed to determine its potential utility for specific fishery applications.

4.11. Alternate Platforms

4.11.1. Description

Alternate platform programs are observer programs utilizing skiffs (i.e., other small marine vessels) to deploy human observers in proximity to operations of near-shore fixed gear operations to collect information on gear interactions with marine mammals or other protected species. Observations may not always occur in close enough proximity to the fishing operation to identify animals to the species level. Collection of biological data is often restricted to animals that have been killed as a result of gear interactions.

A program in Alaska utilized skiffs to monitor sea bird and marine mammal interactions with shore-based salmon gill nets (NMFS 2006b). In the Northeast Region, an alternate platform observation program is in use to monitor bycatch, primarily sea turtles, in the Chesapeake Bay pound net fishery (Ryan Silva, pers. comm., NMFS) and to monitor dolphin and turtle interactions with coastal gillnet fisheries in North Carolina and Virginia.

4.11.2. Evaluation and Applicability

Use of alternate platforms may allow observation of vessels that are too small to accommodate an onboard observer. Observers may be able to cover several vessels or gear locations in a short period of time. Observers may be able to set their own sampling agenda as they would not be dependent on a particular vessel hauling gear at a particular time, provided the vessels to be observed are in close proximity (NMFS 2006b). Use of alternate platforms requires the operation of the alternate vessel, either by the observer or by a vessel operator. Safety issues may arise with the operation of small vessels.

The type of data collected is not detailed; typically only presence/absence information and species identification are performed. Identification may be limited by factors affecting visibility of the catch, such as the distance between the observer and the fishing vessel, time of day, sea state, etc. Current alternative platform programs are focused on marine mammal and protected species interactions and do not currently collect any information on other species (e.g., fish).

4.12. Stranding Networks

4.12.1. Description

Stranding is a term used to describe an event when marine organisms become stuck in shallow waters or on land. The most common occurrences involve ‘beached’ whales or sea turtles. Stranded animals may be alive or dead. Formal networks of experts have been formed in coastal states to monitor and respond to the occurrence of and collect data on stranding events.

The Marine Mammal Health and Stranding Response Program was formalized by the 1992 amendment to the MMPA. The program has the following components: Stranding networks; responses/investigations of mortality events; biomonitoring; tissue/serum banking; and analytical quality assurance (NMFS 2006e). A similar program, the Sea Turtle Stranding and Salvage Network, coordinates responses to sea turtle stranding and mortality events (NMFS 2006e). NMFS has been designated as the lead agency to coordinate stranding network related activities for both programs.

Within both networks, initial information on strandings are provided by the public, mariners, educational institutions, and other interested parties by contacting universities, state fish and wildlife agencies, or NMFS. Both stranding programs utilize an extensive group of qualified individuals from Florida to Maine to fully investigate any stranding that occurs. Investigators are well trained in species identification, common injuries, and often rehabilitation. Data on both marine mammal and turtle strandings are maintained by NMFS databases.

4.12.2. Evaluation and Applicability

Stranding networks have only limited value in providing bycatch-related data. The data collected by stranding networks is useful to ascertain if human interaction was involved with the stranding or mortality event. In most instances, stranded animals are found on shore and interaction with fishing gear may have occurred well before or some distance from the stranding location.

During a stranding investigation, every effort is made to determine if human interaction of any sort was a contributing factor to the stranding or mortality event. In some instances, this may be very clear as the animal may be entangled in man made debris, have wounds or scarring from propellers, entangled in fishing gear, or have fishing lures imbedded in their mouth or esophagus. In other cases, only a necropsy can determine if human impacts contributed to the incident. To determine if human interaction was related to the event, a determination must be made that an interaction with commercial or recreational fishing gear has occurred. Even if it becomes clear that fishing gear was involved, determining the specific type of gear is unlikely due to the similarities of many gear types, particularly the components of fishing gear most likely to be evidence of a fishery interaction (such as a line that could be from a crab pot, lobster pot, or even a gillnet). When it is possible to make a determination regarding the type of fishing gear with which the animal has interacted, this information may be most useful in providing insights about which general gear types may need further consideration regarding the likelihood of interacting with, injuring, or killing marine mammals and protected species.

4.13. Vessel Monitoring Systems

4.13.1. Description

Vessel monitoring systems are electronic transceivers placed onboard commercial fishing vessels that transmit electronically location information captured from either the vessel's GPS receivers or by triangulating position from VHF radio transponders or mobile phone short message service (Trumble et al. 2004). Vessel location can be monitored remotely in either real time or retrospectively and the speed of the vessel can be derived by plotting the locations identified and the time at which the vessel occupied those locations. The activity of the vessel can be discerned by the speed at which the vessel is traveling—generally, slower speeds indicate fishing and higher speeds indicate transiting ("steaming").

GPS satellite-based VMS provides NMFS in the Northeast Region with accurate locations of fishing vessels that are either required to or voluntarily use VMS. Real-time location information can be used to monitor compliance with closed areas, special access programs, and validate FVTR data. Obtaining location information, known as polling, typically occurs on a specified schedule (frequency) according to the regulations of the fishery in which the vessel is participating. NMFS may poll VMS vessels at any time.

Most VMS units are capable of sending and receiving text messages or e-mail. Vessel operators may use the text message functionality of VMS to supply self-reported, real-time catch information, including the amount of fish kept and discarded. Several special access programs in the Northeast Region require reporting of this type (see below). DAS use can also be monitored by VMS. When a vessel crosses the demarcation line, DAS will begin to be utilized at whatever rate is specified for the fishery and/or area in which the vessel is participating.

VMS may also be used to provide notification of a vessel's return to port to facilitate dockside inspection of vessel landings by NMFS law enforcement or other officials. VMS is currently required in several Northeast Region fisheries or fishery programs (Table 34). As of May 17, 2007, there were 1,573 vessels using VMS in the Northeast Region. Several Council actions under development may increase the number of participants.

Permit Category	Number
Full-time and part-time sea scallop	305
General category 1A sea scallop	622
Northeast multispecies (under a DAS)	552
Combination Northeast multispecies-sea scallop	45
Atlantic herring category 1 (> 500 mt annually)	20
Miscellaneous (new units, not yet assigned)	28

Table 34. Number of VMS users, by permit category (as of May 17, 2007).

Many of the fisheries listed in Table 34 have requirements to report bycatch via VMS. Atlantic sea scallop vessels are required to use VMS and are required to report catch of groundfish when operating in Sea Scallop Access Areas. Framework 42 to the Northeast Multispecies FMP requires all limited access DAS vessels participating in the Northeast multispecies fishery to use VMS. Monkfish fishing vessels are required to use VMS only when participating in special management programs.

4.13.2. Evaluation and Applicability

The applicability of VMS as a bycatch monitoring and reporting system is two fold. First, the systems provide the real-time position of each vessel tracked. The position data are used, for example, to ensure compliance with closed areas and monitor participation in special fishery access programs, many of which have specific bycatch quotas. Closed and special access areas may be designed to protect habitat, limit fishing mortality on spawning aggregations of fish, or to limit potential interactions with marine mammals, protected species, or other species of concern.

Second, vessels in some fisheries are required to supply self-reported discard data via VMS. In addition, vessels may use VMS to declare into specific fishery programs (e.g., the U.S./Canada management area, SAPs established under Amendment 13 to the Northeast Multispecies FMP, sea scallop access areas, and the monkfish offshore fishing area). By declaring into a specific fishery, program, or intent to fish in a particular mode, the amount of bycatch or the ability to discard legal-sized catch may be restricted. The submitted data are used in conjunction with observer data to monitor target and bycatch quotas, primarily in special access programs throughout the region.

VMS supplied data are validated using positional information, FVTRs, dealer reports, and observer data, and vice-versa. VMS may also help identify potential bias in regards to fishing location, effort, or trip length that may arise between observed and unobserved vessels.

It has been suggested that self-reported bycatch data and positional information supplied by VMS could be used for real-time bycatch avoidance (e.g., ‘hot-spot’ management) by providing the spatial and temporal characteristics of fishing activity as predictors for bycatch occurrence. At present, the Federal system is not structured to be responsive enough to enact dynamic management measures based on “hot spots,” such as avoiding bycatch in a small area. Significant regulatory changes and additional personnel, as well as changes in the administrative rulemaking process would be necessary to bring that type of management to fruition. Any bycatch “hot spot” management program would probably succeed far better if developed on a voluntary basis by the fishing industry.

4.14. Trawl Monitoring Devices

4.14.1. Description

Several marine electronic systems are available to monitor the performance of mobile fishing trawl gear (Trumble et al. 2004). These systems use wire or acoustic links to send information from sensors mounted on the trawl net to a receiver onboard the vessel. These devices can be used to measure the actual time and distance that the net is in contact with the bottom, when codends are filling or are full, and net opening height (i.e., net performance). Both commercial fishers and fishery researchers have made use of these technologies to better monitor their respective trawl nets as they operate.

4.14.2. Evaluation and Applicability

If tamper-resistant monitoring units were developed and made available for widespread use, they could be used as enforcement tools to ensure pelagic nets were not fished in contact with the bottom. At present, this type of monitoring is achieved through performance standards based on catch composition (e.g., if a percentage of benthic or demersal species are found in midwater trawl catch). Sensors could provide bottom contact information when used in conjunction with vessel location information, such as VMS, which could be useful in monitoring habitat impacts. In addition, these types of devices if employed in all trawl fisheries, could help reduce discards that result from "topping off" the catch when vessel holds are almost full.

4.15. Future Developments and New Technologies

The speed of development for electronics and technologies capable of operating in a marine environment to collect various data inputs is ever expanding. New technologies should be viewed with some degree of caution. Often regarded as the panacea for solving the monitoring or data needs of the day, new technologies should be developed and applied in fisheries with clearly developed goals for the end product of data generated. Rigorous development of new programs, testing, and performance standards must be developed as new technologies and data collecting methods are researched. Only through well planned proof-of-concept testing followed by beta-level field testing can new technologies be adequately assessed for suitability in any given fishery mode. In addition, thorough analysis of the costs and benefits must be considered relative to all parties involved; industry, government, and tax payers. Programs should focus on producing usable data that answer a specific question or set of questions, not just proving that the technology will work. Ideally, these types of tests and considerations will occur prior to full regulatory implementation of new technologies or replacement of current data collection sources are phased out.

Chapter 5
Sampling Design and Estimation of Precision and Accuracy

5.1. Introduction

This chapter presents the results of analyses conducted in support of the SBRM developed for Northeast Region fisheries. These analyses include: (1) A comprehensive summarization of 2004 data collected by the NEFOP; (2) an estimation of discard precision for fish and protected species using three different estimation methods and two different discard ratio estimators; (3) an evaluation of these different methods; and (4) an estimation of the observer sea days that would be required to achieve a desired level of precision. Other analyses related to the SBRM can account for the overlapping nature of multiple species caught by a fishery, develop species-specific imputation methods, and expand the optimization tool currently used to allocate sea day coverage to account for all monitoring objectives. These secondary analyses are briefly described in this document and can be undertaken in the future, but are not the primary focus for this analysis.

The methods used generally follow those recommended by the National Working Group on Bycatch (NWGB) (NMFS 2004) and further developed by Rago et al. (2005, Appendix A) and Fogarty and Gabriel (2005) for the Northeast multispecies fishery. These methods reflect a design-based rather than a model-based approach, and directly link the data collection monitoring program with the evaluation analyses. In Rago et al. (2005), 3 fishing modes and 12 species were examined; in this document, it was necessary to examine 45 fishing modes and 60 species/species groups to encompass all relevant federally managed species in the Northeast Region.

The NEFOP data are a key element of the Northeast Region SBRM. The SBRM should be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the efficacy of the allocation of observer sea days to monitor discards associated with multiple fisheries targeting a large number of resource species while operating under 13 different FMPs. The SBRM Amendment is not intended to be the definitive document on all possible bycatch estimation methods, nor is it a compendium of discard rates and totals. Instead, the SBRM is intended to support the application of multiple bycatch estimation methods used in specific stock assessments. The SBRM provides a general structure for defining fisheries into homogeneous groups and allocating appropriate levels of observer coverage based on prior information and the expected improvement in overall performance of the program. The general analytical structure helps identify gaps in existing observer coverage, similarities among fishing modes that allow for realistic imputation, and the tradeoffs associated with potential coverage levels for different target and discard species. The observer sea day allocation process, while guided by a concept of optimization, explicitly recognizes that many different factors affect the realized allocation of observer days to specific fisheries.

Moreover, the optimization model allows for continuous improvement in observer allocation as new information on the results of the previous year's data are obtained.

None of the analyses associated with the SBRM are based on the potential mortality associated with unobserved encounters with fishing gear. The omission of these mortality sources does not confirm or deny their potential importance. Rather, it explicitly recognizes that such events cannot be observed even when an observer is present on a given trip and, therefore, there is no basis for extrapolation to unobserved sampling trips.

5.2. Precision and Accuracy

It is important to understand that precision and accuracy are not the same thing and that they represent related, but different, aspects of a data collection program. Accuracy is defined as the closeness of a measured or estimated value to its actual value (for example, an estimate that there were 300 million people living in the United States during October 2006 can be considered reasonably accurate, but the actual number would have varied slightly with daily births, deaths, and immigration). Precision is defined as the degree of agreement of repeated measurements of the same quantity or object.

Precision is a measure of how closely repeated samples will agree to one another (i.e., the variability of the samples), and accuracy is an indication of how closely the estimate derived from the samples will agree with the true value. The precision of a sampling program can be measured because the data collected can be compared with one another using several basic statistical methods (to calculate the variance, standard error, standard deviation, etc.). However, the accuracy of the data rarely can be measured because the true value of the population feature being estimated is not known (which is why it is being estimated). As an example, consider a fish survey designed to generate an estimate of the total biomass of a fish species. The survey takes repeated samples (via tows of an otter trawl) of the population and those samples are used to estimate the total population. Because we can compare the samples (reported as kg/tow) to one another, we can calculate the variability and, hence, get a measure of the precision of the observations. However, because the actual biomass of the population cannot be known, we cannot compare the estimate to the true value. Therefore, there is no quantifiable measure of accuracy.

Data collected through a sampling program generally may be: Accurate but imprecise (substantial variability in the observations, but the observations coalesce to provide an estimate close to the true value); accurate and precise (low variability in the observations, which provide an estimate close to the true value); precise but inaccurate (low variability in the observations, but the estimate is not close to the true value); or neither precise nor accurate (high variability in the observations and an estimate that is not close to the true value). In a sampling program such as the at-sea observer program, the precision of the observations can be measured and controlled by calculating measures of variability and, if necessary, increasing the number of observations. While accuracy cannot be directly measured, it can be accounted for by reducing potential sources of bias in the data collection program. Bias is defined as a *systematic* difference between the expected value of a statistical estimate and the quantity it estimates. Thus, the case where the data were precise but inaccurate would most likely result from some source of bias in the data collection program. Absent bias, precision will lead to accuracy; thus, bias and accuracy are used interchangeably, but bias is generally associated with the design of sampling program. Eliminating potential sources of bias improves the accuracy of the results.

There are generally two primary potential sources of bias in a sampling program such as the at-sea observer program: Non-representative sampling; and the statistical properties of the consistency of the estimators (Rago et al. 2005). Non-representative sampling means that the targets of the sampling program (i.e., the vessels and trips on which an observer is present) are distinct and different from the overall population for which an estimate is desired. For example, if observers were placed only on small vessels fishing just offshore using a single gear type, these trips would not be representative of the variety of vessels, fishing gears, trip lengths, and fishing locations that comprise the wider fleet. The following section addresses the many ways in which the NEFOP strives to ensure that the observer program samples (observes) the Northeast Region fishing fleets in a representative manner. Later sections of this chapter address the statistical properties of the estimators, and provide evidence that there is very little bias associated with the data collected by the at-sea observers.

5.3. SBRM Design Considerations

5.3.1. Initial Design

5.3.1.1. Sampling Unit, Response Variables, and Precision Goals

Among the most important decisions in the preparation of the SBRM are associated with defining the sampling unit, determining the quantity to be measured for each sampling unit (in statistical terms this is known at the response variable), and establishing the desired level of precision for this value. The sampling unit is an object on which a measurement is taken (Cochran 1963; Mendenhall et al. 1971). The sampling unit for the SBRM is the vessel trip. For the purpose of the SBRM, the response variable for each trip is the total bycatch for a single species or a group of species. A bycatch ratio can be derived by dividing the total bycatch by some measure of fishing effort. If all trips have similar attributes (e.g., vessel power, fishing gear used, trip duration, etc.), then the average amount of bycatch per trip may be an acceptable ratio. Otherwise, the bycatch rate can be expressed as the ratio of total discards to vessel days absent from port, vessel days fished (i.e., the portion of the trip spent actually fishing), or the total kept weight of all species. Total kept weight of all species is, in this sense, a proxy for effective fishing power. For finfish and shellfish, the numerator of the bycatch ratio is defined as the total weight of the discards of the species or species group. The denominator of the bycatch ratio is either the total weight of all species kept (landed) or a measure of fishing effort. Owing to difficulties in interpreting quantitative measures of fishing effort found in the FVTRs, fishing effort is approximated by days absent.[29] For sea turtles, marine mammals, and sea birds, the numerator in the bycatch ratio is the total number of individuals discarded. Bycatch rates for these species are expressed as numbers per unit of fishing effort or numbers per species kept pounds.

The NWGB advocated evaluating bycatch programs on the basis of aggregated species, but this will not guarantee that programs will be adequate for individual species (NMFS 2004). To address this issue, the analyses conducted in support of the SBRM estimate not only bycatch ratios and the associated precision (relative standard error) for species complexes relevant to the FMPs (e.g., large-mesh multispecies, skates, etc.), but also bycatch ratios and precision for each individual species. Stock areas will not be considered in the analyses, although retrospective data on observed discards would be available at this scale. Conceptually, the problem of stock area is similar to that of estimating age-specific discard rates. The full variability of the estimates is the product of the uncertainty of the species-specific discard estimates and the sampling distribution of the age-length key, an issue of fine-scale detail that is beyond the scope of the broad SBRM. Parenthetically, the sampling design underlying the SBRM supports robust post-stratification, sufficient estimation of stock-area, and age-specific estimates of discards.

Although the Magnuson-Steven Act does not include marine mammals and sea birds in the definition of bycatch to be addressed by an SBRM, marine mammals and sea birds are included in these analyses to illustrate the comprehensive nature of the NEFOP and the SBRM. The aggregate species approach will illustrate the overall effectiveness of the SBRM. The individual species approach will show the tradeoffs for varying levels of precision. With respect to the precision targets, the NWGB determined that a 20-30 percent coefficient of variation (CV)[30] for the bycatch estimate is a useful goal:

> Protected species: For marine mammals and other protected species, including sea birds and sea turtles, the recommended precision goal is a 20-30 percent CV for estimates of bycatch for each species/stock taken by the a fishery.
>
> Fishery Resources: For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30 percent CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch can not be divided into discards and retained catch then the goal is a 20-30 percent CV for estimates of total catch (NMFS 2004).

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[29] The discard-to-kept ratio is abbreviated as d/k, and the discard-to-days-absent ratio is abbreviated as d/da.

[30] A "CV" is a coefficient of variation and is a standard measure of precision, calculated as the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the bycatch estimate itself. The higher the CV, the larger the standard error is relative to the estimate. A lower CV reflects a smaller standard error relative to the estimate. A 0-percent CV means there is no variance in the sampling distribution. Alternatively, CVs of 100 percent or higher indicate that there is considerable variance in the estimate. Chapter 5 describes several ways in which the variances of the data and the estimates can be minimized, including stratifying the sampling frame and optimizing sampling effort.

As the NWGB pointed out, “Ideally, standards of precision would be based on the benefits and costs of increasing precision” (NMFS 2004) and noted that under some circumstances, attaining the precision goal alone would not be an efficient use of public resources. In the evaluation of precision of discard estimates, a CV of 30 percent was selected to derive the number of sea days that would be necessary to sufficiently monitor the bycatch of species groups within a fleet sector. Selection of the higher value is predicated upon stratification of species and fisheries at a finer level than the NWGB recommended. In this document, the term CV is defined as the ratio of the standard error of the estimate divided by the estimate. The estimate can be total discard or mean discard rate. Use of the term CV is equivalent to the term proportional standard error; for the sake of consistency with the NWGB (NMFS 2004), we use CV throughout this document. The NWGB recommended overall precision goals for a “fishery,” but in the Northeast Region, a fishery may comprise several gear types; e.g., the groundfish fishery is composed of otter trawls, gillnets, and longlines. Thus, in order to define a fishery, gear type and mesh size are used as two key components in defining fishing modes within an overall fishery.

5.3.1.2. Definition of Strata—Fishery Identification

To monitor the diverse fisheries off the Northeast coast of the U.S. with at-sea observers, it is necessary to stratify the trips into fleet sectors with similar characteristics. For the Northeast Region SBRM, fleet sectors (fishing modes) are defined as strata within the overall survey design.

Commercial fishing trips are partitioned into fleet sectors using six classification variables: Calendar quarter; geographical region; fishing gear type; mesh size; access area; and trip category. Some fleet sectors were further stratified due to FMP requirements. These classification variables are selected because they are generally known before a trip occurs. Using these criteria, it is possible to generate a list of candidate vessels for each stratum, which simultaneously enables a random selection process and reduces the number of repeat trips on vessels. This is a critical aspect for both strata definition and sample selection. One cannot base a sampling design on the outcome of a sample observation. For example, in this exercise, it is not possible to select a sampling design that specifically improves the precision of cod discards, since that objective is dependent on the realization of the actual sample. However, it is possible to select samples that will improve the probability of obtaining improved discard estimates by estimating the expected proportion of trips that catch species groups of interest. These are important considerations to ensure that the observer allocations reflect a representative sample of active fishing vessels.

Calendar quarter was considered the most appropriate temporal unit to capture seasonal variations in fishing activity and bycatch rates over the full range of fisheries. Although some management regulations operate at a finer scale, once collected, quarterly data can be further subdivided if finer resolution is needed. Additionally, fishing trips are classified into two broad geographical regions, New England and Mid-Atlantic, based upon the port of departure: Ports located from Maine to Connecticut were grouped together to form the New England region and ports located in states from New York to

North Carolina comprise the Mid-Atlantic region. While data from both FVTRs and NEFOP are summarized by port landed, allocation of sea day coverage is necessarily based upon port of departure since an observer must physically board the vessel before it departs. A review of the observer and FVTR databases for 2004 revealed few instances (less than 2 percent of trips) where a change of port of landing from port of departure resulted in a change in region (i.e., New England to Mid-Atlantic or vice versa). The basis for classifying trips is the region/port of departure since areas fished are not always predetermined. The majority (over 93 percent) of 2004 observer trips both originated and fished in the same region, and exhibited the same general pattern observed in the FVTR data (see Table 35 and Table 36); however, the proportion of trips that do not do so can be accounted for in the sea day allocation.

	Area Fished	
Region/port of departure	New England	Mid-Atlantic
New England	72.4 percent	6.3 percent
Mid-Atlantic	0.2 percent	21.1 percent

Table 35. Percentage of 2004 observer trips that departed and fished in the New England and Mid-Atlantic regions.

	Area Fished	
Region/port of departure	New England	Mid-Atlantic
New England	60.1 percent	3.8 percent
Mid-Atlantic	0.8 percent	35.3 percent

Table 36. Percentage of 2004 FVTR records that departed and fished in the New England and Mid-Atlantic regions.

In these analyses, 14 general gear types were considered: Longline, otter trawl; scallop trawl; shrimp trawl; gillnets; scallop dredge; mid-water trawl (paired and single); fish pots/traps; purse seine; hand line; Scottish seine; clam dredge; crab pots; and lobster pots. Although the northern shrimp and the lobster fisheries are managed under the Atlantic Coastal Fisheries Cooperative Management Act (rather than the Magnuson-Stevens Act), these fisheries have bycatch of species managed by the New England and Mid-Atlantic Councils and, therefore, these gear types are included in the analysis to the extent possible.

Mesh size groups were used to further classify the otter trawl and gillnet gear types. For otter trawls, two mesh groups were used: Small mesh (less than 5.5 inches) and large mesh (5.5 inches and greater). For gillnets, three mesh groups were used: Small mesh (less than 5.5 inches); large mesh (from 5.5 to 7.99 inches); and extra-large mesh (8 inches and greater). Fishing trips that used either scallop trawls or scallop dredges were further classified into two access areas (open or closed) and well as two trip categories (general category or limited access). Trips using other gear types were not further classified beyond gear type and mesh size. Due to the mixture of species caught during a trip, it is not sufficient to classify trips with regard to target species because discard of target and non-target species may occur.

A total of 60 individual species or species groups are examined in these analyses. These species/species groups comprise the 13 FMPs of the New England and Mid-Atlantic Councils, an all species combined group, and five protected species groups. The fisheries encompassing these 60 species/species groups required 45 different fleet sectors to account for all regional, gear type, mesh size, and quota-monitoring status combinations (Table 38).

5.3.2. Data Sources

The sampling unit used in these analyses is the fishing trip. Trip characteristics are recorded in both the NEFOP and FVTR datasets. Together, these databases are used to define the size of the sample and the size of the strata. Data from each source are retrieved and prepared separately before they are combined.

5.3.2.1. FVTR Data

Beginning in June 1994, the Northeast Region's data collection system was changed from a voluntary to a mandatory reporting system for fishermen and seafood dealers holding federal permits (with the exception of those vessels that hold only Federal lobster permits) issued under regulations implementing FMPs developed by the New England and/or the Mid-Atlantic Council. The mandatory reporting system consists of two primary components: (1) Dealer reporting and (2) vessel trip reporting. Each component contains information needed for fishery management and stock assessment analyses. The dealer reports contain total landings by market category, while the vessel trip reports contain information on area fished, kept and discarded portions of the catch, fishing effort, and the gear type and mesh size used. Ideally, these data collection systems would record equivalent total landings. In practice, a variety of problems, especially incomplete or delayed reporting of FVTR, generally results in a slight underestimation of landings. The FVTR data have been routinely used in management analyses and peer reviewed stock assessments. Details on example applications of the FVTR to stock assessments may be found in a large number of reports of the Stock Assessment Review Committee (SARC).[31]

In these analyses, the 2004 FVTR (commercial) data are used to: (1) Define the sampling frame of the commercial fishing trips; (2) expand bycatch rates to total discards; and (3) evaluate the accuracy of the observer data with respect to area fished, kept pounds, and trip length. The FVTR data are the only synoptic data source for vessel activity, area fished, and fishing effort for commercial fisheries. The VMS data and the DAS data systems cover only portions of the fisheries and, therefore, their use is limited for this type of analysis.

[31] Reports prepared since 2000 may be found at http://www.nefsc.noaa.gove/nefsc.saw. Earlier reports are available by email (contact: saw_reports@noaa.gov).

The FVTR data can be used as a basis for defining the sampling frame, since all federally permitted vessels are required to file a FVTR for each fishing trip. These self-reported data constitute the basis of the fishing activity of the commercial fleets. FVTR trip data are collapsed into fleets as defined above. For each fleet sector, the number of trips, the average number of days absent per trip, and the kept weight of species are calculated.

The limitations of self-reported catch data, such as the data obtained through the FVTR, are well established (e.g., Walsh et al. 2002; NMFS 2004). Limitations of the initial FVTR datasets were described by the SARC in 1996 (NEFSC 1996). Since then, many of these limitations have been addressed. In particular, subsequent peer-reviews through numerous SARCs and a review by the National Research Council (1998) have identified the strengths, weaknesses, and appropriate uses of the FVTR data from the Northeast. Measures currently used to ensure the validity of the FVTR database include routine auditing procedures, standardized data entry protocols, and compliance reviews (Greg Power, pers. comm., NMFS).

In the analysis described below, the FVTR data are converted to round (live) weight using Commercial Fisheries Database System (CFDBS) conversion factors for each species. Days absent and total species kept on a trip are also calculated. The FVTR trips are collapsed into strata as defined above. For each fleet sector, the number of trips is calculated. Note that trips by vessels participating in the US-Canada access area, B DAS program, and other quota-monitored programs could not be identified in the FVTR data. These trips have been grouped by the other stratification variables and have not been partitioned separately.

The validity of using the FVTR data as a basis for developing a sampling frame is supported by comparisons with total landings data from dealer records. All federally permitted seafood dealers are required to report 100 percent of their purchases. These data are generally considered to represent a near complete census of total landings. A comparison of species landings from FVTR and dealer records for calendar year 2004 reveals some discrepancies, by species group, between these two sources (see Table 37). Overall, there is a 2.3 percent difference between landings reported in the dealer and FVTR databases; however, this low percentage difference is driven in part by a -10 percent difference for herring. If herring landings are removed from the total, the difference between the total kept weight in the two databases is 4.7 percent.

Species Group	FVTR Landings (mt, live)	Dealer Landings (mt, live)	Difference (mt, live)	Percent Difference
Atlantic Bluefish	2,357	3,423	1,067	31.2 %
Atlantic Herring	94,223	85,456	-8,766	-10.3 %
Atlantic Salmon	-	-	N/A	N/A
Deep-Sea Red crab	1,733	2,041	307	15.1 %
Mackerel/Squid/Butterfish	97,400	97,083	-317	-0.3 %
Monkfish	14,643	21,185	6,543	30.9 %
Large-mesh multispecies	35,101	41,414	6,313	15.2 %
Small-mesh multispecies	8,883	9,277	394	4.2 %
Sea Scallop	242,550	243,736	1,187	0.5 %
Skate complex (7 species)	13,054	16,073	3,020	18.8 %
Spiny Dogfish	600	983	382	38.9 %
Summer Flounder/Scup/Black Sea Bass	11,732	13,887	2,155	15.5 %
Tilefish	1,229	1,216	-13	-1.0 %
Total	523,505	535,774	12,269	2.29%
Total minus Atlantic Herring	429,282	450,318	21,036	4.67%

Table 37. The differences, in lb, in reported landings for 2004 between the FVTR and dealer databases (surfclam and ocean quahogs are not included in this table due to a different dealer reporting system for these species).

The apparent large percentage difference in the two databases for monkfish landings may be a result of misreporting monkfish product in the FVTR. If the incorrect product grade is reported (i.e., whole monkfish (“monk) are reported instead of monkfish tails (“monkt”)), then an underestimation of monkfish landings in the FVTR may result because the reported weight of monkfish tails would not be appropriately scaled up to the live weight equivalent. Large percentage differences for bluefish and spiny dogfish may be due to an inability to partition out the mandatory reporting landings (reflective of the FVTR data) from the state landings data, but this issue is unique to 2004 when mandatory electronic reporting for dealers was first implemented. Additionally, total landings of bluefish and spiny dogfish represent a small fraction of the total landings of all species and, overall, these differences are considered negligible. Ideally, it would be preferable to use total kept species weight and days absent from dealer data to expand bycatch rates and in the variance calculations of total discards; however, the FVTR data are currently the only source for information on gear type and mesh size—two key aspects of fishing operations used in stratifying trips and discard data. Thus, although they are considered to represent the complete landings, the dealer data do not present a complete picture of fishing activities.

Measures of fishing effort may be in terms of numbers of fishing trips, numbers of days absent, or numbers of days fished. Days fished is the finest level of effort, representing the time the gear is actually deployed in the water (e.g., trawl duration, soak time for fixed gears, etc.), while days absent represents a coarser level of effort, generally measuring the time a vessel is away from port. The lowest resolution of effort is the trip, which may encompass varying levels of days fished, days absent, and fishing power. The above comparisons of dealer and FVTR-based landings estimates suggest that some of the expansion factors for estimating total discards, and the weighting factors for d/k ratios will be underestimated slightly.

5.3.2.2. NEFOP Data

The NEFOP is a multi-purpose program that collects a broad range of data on all species that are encountered during a fishing trip, as well as data on gear characteristics, economic information, and biological samples. The NEFOP employs trained, sea-going observers to collect these data that also includes the weight, by species, and the disposition (retained and discarded), of the entire catch. Standard sampling protocols have been established and are utilized throughout the various fisheries.[32] For most gear types, observers use a complete sampling protocol that includes obtaining species weights for both kept and discarded portions of all species in the catch on every haul. In addition to the complete sampling protocol, there is a limited sampling protocol that is used on a portion of gillnet trips where specific information for marine mammals is collected. In a 'limited' sampling scenario, only kept species weights are obtained (no discard weights) since the observer must watch the gillnet gear during haul-back to observe if marine mammals roll out of the gear before the gear returns to the deck. Because there are two sampling protocols used for data collection, two datasets were formed using the 2004 NEFOP data: One dataset for fish observed on trips for which the complete sampling protocol was used; and another for turtles, marine mammals, and birds observed on trips for which either the complete or limited sampling protocols were utilized.

For the fish dataset, only observed hauls in which all discarded species were recorded are used. In the majority of trips, all hauls are observed. However, for some gear types, particularly the scallop dredge—where fishing activity occurs continuously and a single observer can not observe all hauls—it was necessary to expand discard species weights by the ratio of the number of total hauls to the number of observed hauls to account for all hauls in the trip. The expanded discard weight was used in the subsequent discard-to-days-absent analysis (but not in the discard-to-kept analysis) because days absent is a trip level variable representing the entire trip, not just the observed portion of the trip. Fishing trips utilized for training observers were excluded from the fish dataset but were utilized for the protected species set because it was assumed that training trips were capturing protected species information even though all

[32] On-vessel sampling of large-volume fisheries can be difficult. Subsampling protocols were developed for the purse seine and mid-water pair trawl fisheries during 2004; thus the results for species groups from these fleets should be considered preliminary. Sampling protocols have since been established for these large volume fisheries; the standardized sampling protocols for all fisheries with observer coverage are provided in the Northeast Fisheries Observer Program Manual.

discarded fish information might not be collected. For the protected species dataset, all on-watch hauls are included in the dataset, regardless if discarded fish species were recorded. Since all hauls are used in this dataset, it was not necessary to adjust the discard weight to account for non-observed hauls.

Fishing trips observed under one of the regulatory quota-monitoring programs were included, by gear type, in the protected species dataset but were partitioned into separate strata for the fish dataset because the total allowable catch limits associated with these access area programs may result in different fishing patterns than non-quota-based trips. There were limitations associated with developing estimates of total discards for these strata because these trips are not identified in the FVTR data. Species hail weight can be reported in round or dressed weights;[33] if kept hail weights are reported as dressed, then the hail weight is converted to round weight using CFDBS conversion factors for the species. All discard hail weights are assumed to be round weight. Turtles, marine mammals, and sea birds are recorded as numbers of individuals, rather than by weight. The NEFOP trip data are collapsed into strata as defined above. For each fleet sector, the number of observed trips, number of observed hauls, average trip length (days), kept weight of all species in the trip, the discard weight of each species, and the discard weight of all species (combined) are calculated.

A summary of the number of 2004 observed trips and sea days and 2004 commercial FVTR trips and sea days by fleet sector and calendar quarter is presented in Table 38 and Table 39. There was a broad range of at-sea observer coverage by fishing gear type in 2004; 11 of the 14 gear types had observer coverage. The lobster pot, crab pot, and clam dredge gear types were not covered in 2004. Regionally sparse coverage occurred for longline, shrimp trawl, fish pots, and handline. Some gear types, such as Scottish seines and purse seines, have very low industry activity and/or strong seasonal activity patterns. For the fleets examined in the analyses, there were a total of 126,498 fishing trips in the FVTR database and, of these, a total of 3,587 trips were observed, resulting in approximately a 3 percent overall coverage rate. Finer scale coverage rates vary among fleet and quarter. The highest observer coverage rate (45 percent), occurred in the Mid-Atlantic closed-area scallop dredge fleet. It should be noted that percent coverage is only one measure for monitoring adequacy, and that precision of discard rates, along with overall discard magnitude relative to population size, are the preferred measures for monitoring the adequacy of observer coverage levels.

5.3.2.3. Recreational Fishing Data

5.3.2.3.1. The NRC Report

As noted in section 4.7.3, a committee of the NRC began a review of NMFS's recreational fishing data collection programs in 2004 and submitted a report of findings and recommendations in April 2006. Two parts of the NRC report are particularly

[33] Hail weight is the amount of landings estimated by the fishing vessel on the FVTR; round weight is the weight of the whole, live fish; dressed weight is the weight of the fish carcass after the head, viscera, and fins are removed.

relevant to the issues of bias in data collection and estimations of bycatch and discards in recreational fishing. This section introduces the findings and issues identified by the NRC as related to sampling and statistical estimation. For more detail on these issues, please refer directly to the report.[34]

The NRC report notes that a goal of the MRFSS is to minimize the bias and to maximize the precision of the estimators used to analyze recreational fishing activity. The difficulty is that data are not (cannot be) collected from all recreational anglers, and representative samples must be selected that allow for unbiased estimation of the catch. Unfortunately, due to the dispersed nature of recreational fishing (spatially, temporally, and in terms of angler practices)—and in light of limited resources—it is exceptionally difficult to design a survey that will adequately sample or represent all possible fishery modes at all times. Some of the modes and the challenges of sampling them are described below:

- Shore-based fishing: The full extent of publicly accessible shoreline from which fishing occurs is impossible to monitor completely. Some anglers fish from private-property and are inaccessible to interviewers.
- Boat ramps and docks: In many areas, public boat ramps are too numerous to be monitored adequately. Again, access to docks and ramps on private property is restricted and unobserved.
- Night fishing: Generally, samplers/interviewers do not work at night. Night fishing is common in some areas and is likely not to be sampled.

For each of these modes, if the catch per unit effort of the inaccessible fishing activity is not the same as it is at accessible sites, then bias is introduced to the data.

Another source of bias may be the MRFSS' use of the MSR for intercept assignments. The MSR catalogs the fishing access sites along the coast, weighted relative to expected angler activity at the sites. NRC found that the updating of the MSR and the methods for weighting the sites were not performed consistently across regions. Also, the practice of weighting the MSR sites, while likely to improve the chances of successful angler intercepts, does not account for potential site-to-site variation of CPUE, and, thus, may introduce bias to the estimators. To address these problems, the NRC recommended that the access intercept program be redesigned. It should not depend on the assumption of an unvarying CPUE. It should provide for sampling at small and private access sites, for night fishing, and other poorly sampled modes. The NRC found that the methods of the CHTS may introduce sampling errors. In 1979, no accommodation was necessary to account for the use of cellular phones. Today, residents in coastal counties may use cell phones with non-coastal area codes and vice versa. Removing cellular phone numbers from the sampling frame is not an acceptable solution, because many people are using cellular phones exclusively and they would be excluded from the survey.

[34] Unless otherwise noted, all of the information in this subsection is drawn from NRC 2006.

In surveys such as the MRFSS, a basic rule of thumb is that precision can be improved by increasing the sample size. The CHTS has very low success rate at identifying households the residents of which participated in marine recreational fishing in the previous 2 months. Increased call efficiency would improve the sample size and could be realized if random digit dialing were replaced by directory-based dialing. The latter would require a universal registry of all marine anglers, but, currently, there is no requirement for anglers to register to fish in the EEZ. In the Northeast Region, only Virginia currently has a comprehensive registration requirement for anglers.

The main NRC recommendation that would address the shortcomings of the CHTS is that all saltwater anglers should be required to register, either through a Federal or state program. There should be no exceptions for age, gear, or locality. A requirement to have all anglers registered would reduce the telephone survey sampling frame from all coastal county residents to only marine recreational fishing registrants. Sampling from the set of more likely participants would greatly improve survey efficiency, and, with the same resources, many additional samples could be drawn and the precision of the survey would be improved. Registration would also address the CHTS problems associated with the widespread use of cell phones.

The fate of fish caught and released by recreational anglers is recorded by MRFSS; however, the survival rate of the discarded fish is not known. The NRC found that “the survey fails to provide a valid and reliable method of adequately accounting for fish caught and not brought to the dock.” These unaccounted fish would include fish released alive or dead, used as bait, or given away before reaching the dock. The NRC noted that the lack of such a method may introduce error to estimates of catch and discards. Also, incorrect fish species identification of catch and discards is another source of potential error cited by the NRC.

The statistical estimation methods used for analyzing recreational catch were also evaluated by the NRC. The NRC found that many program assumptions related to sampling design, only a few of which are noted above, are untested and the direction and amount of bias are undetermined. Therefore, the cumulative effect of bias on the final estimates cannot be assessed. The NRC also found that the survey does not take advantage of the latest methods and current knowledge of finite population sampling theory. The NRC report states, “The current estimates are particularly deficient when applied to small areas because they do not use information in adjoining areas or time periods, nor do they consider relationships between species that occur together.” The NRC determined that the resulting data are likely of lower precision than would be possible if this information were used. To address these matters, the NRC recommends that NMFS convene a group of statisticians to examine program assumptions and evaluate inherent biases. Also, the NRC recommends that the group design new analyses based on recent developments in sampling theory.

The full NRC committee report on the MRFSS is available for download from the National Academies Press web site.[35] NMFS’s efforts to overhaul the recreational data

[35] http://books.nap.edu/catalog.php?record_id=11616

collection programs are described in documents posted in Office of Science and Technology's website.[36]

5.3.2.3.2. Recreational Fishing Data Improvement and the Magnuson-Stevens Reauthorization Act

Upon receipt of the NRC's findings, NMFS initiated a national effort to respond quickly to the report's many recommendations and improve the agency's recreational fishing data collection programs. A senior-level steering committee guides the execution of a plan that includes 60 programmatic changes needed to overhaul the MRFSS, FHS, and other recreational fishing data collection programs. Chief among the many improvements is an effort to collect angler registration information from all of the states.

In December 2006, Congress passed the Magnuson-Stevens Reauthorization Act, which, among many other things, included provisions requiring the Secretary of Commerce to "establish and implement a regionally based registry program for recreational fishermen in each of the eight fishery management regions" (§ 201). As noted above, the establishment of an angler directory will greatly enhance the effectiveness of the CHTS by improving call efficiency and markedly increasing the number of successful interviews. Thus, effort estimations are likely to be supported by substantially more interviews/samples than in the past.

In addition to calling on NMFS to require angler registration, the Magnuson-Stevens Reauthorization Act mandates an overall improvement to the MRFSS, taking into consideration the recommendations of the NRC. By January 12, 2009, NMFS, after consultation with representatives of the recreational fishing industry, expert statisticians, and others, must "establish a program to improve the quality and accuracy of information generated" by the MRFSS. The Magnuson-Stevens Reauthorization Act provision specifies the methodologies the program shall employ, including an "adequate number" of angler intercepts, use of angler directories as a basis for surveys, collection of FVTRs from for-hire vessels, development and application of a weather corrective factor for catch and effort estimates, and establishment of an expert review/advisory committee to scrutinize the data and methods by which it was collected.

The MRFSS and FHS are important sources of data on discards by recreational anglers. Consistent with the agency-wide effort that is underway to improve recreational fishing data collection programs, the alternatives considered under this SBRM Amendment would effect no direct changes to existing recreational fishing survey programs. Instead, the preferred alternatives would fully incorporate the improved recreational survey programs that result from the nationwide upgrade effort.

[36] http://www.st.nmfs.gov/RecSurveyUpgrade/RecSurveyUpgrade.html

5.3.3. Additional Considerations

5.3.3.1. Unlikely Cells

In the matrix of fishing modes by species/species group, there are some combinations of species and gear modes that are considered infeasible or highly unlikely to occur (e.g., scallops in longline gear, surfclam in gillnet gear, etc.). With the assistance of the Councils' Plan Development Teams, Monitoring Committees, and Fishery Management Action Teams, some of these combinations have been identified as "unlikely" based on review of the previous 16 years of observer data, general knowledge of gear, fish distribution, and abundance patterns. Unlikely combinations of species and fishing modes are indicated in the matrix as gray-shaded cells (see Table 40). For some protected species, there was insufficient information with which to determine whether or not a combination was unlikely, so most combinations were assumed to be possible (see Table 41). When evaluating needed coverage levels, the unlikely cells would be removed from consideration to provide a more meaningful estimate. It is important to note that as fishing patterns, species abundance, and/or distributions change, these gray-shaded cells may be adjusted to reflect these changes.

The occurrence of trips with zero discards is summarized in Table 40 and Table 41 for fish and protected species, respectively. Generally, the unlikely gray-shaded cells correspond to trips where 100 percent of the trips had zero discards for the species. In August 2006, members of the two Councils' Science and Statistical Committees (SSCs) met to review the analytical work being done in support of this amendment. One aspect in particular that the SSC members addressed was the use of the unlikely cell process to help refine the cumulative observer coverage levels needed. The SSC members suggested that the process used to identify unlikely cells should serve as a first step in a more comprehensive "importance filter" process. The importance filter developed at the suggestion of the SSC members is described in chapter 6.

5.3.3.2. Missing Cells: Imputation and Pilot Coverage

The absence of at-sea observer coverage for some gear types/fishing modes during one or more quarters causes problems in two ways. First, if those quarters are ignored, the basis for comparing the average bycatch ratio will vary by fishery, species, and species group. In this situation, the inferences about the overall efficacy of an observer program are restricted to the set of quarters with observer data. Second, if the quarters are included, it is necessary to make some assumption about the mean and variance of the discard rate for these cells. This process is known as imputation, and it relies on information from the known part of the survey to attribute information to the unknown cells (quarters). Imputation of missing cells is routinely used in survey estimation, but it can be controversial because of the expert judgment required. Use of imputed values to compute an overall estimate of the CV of a bycatch rate will lead to a conditional estimate. "Conditional" in this context implies that the estimate depends on the set of rules/decisions used for imputation.

As part of the feedback process for improving the sampling design, it is necessary to use imputed values as a basis for allocating future at-sea observer coverage. Imputation procedures have been developed for Northeast multispecies (Rago et al. 2005) using a multi-tier imputation procedure for three gear types. Due to the diverse species and large geographic range of the comprehensive SBRM, a detailed imputation procedure is needed to account for the seasonal variability of all managed species over the full geographic range of the FMPs. Implementation of this amendment would continue to expand the imputation described in Rago et al. (2005) to provide appropriate means and variances by stratum for various species and species complexes and gear types.

Until the work to fully expand the formal imputation process is complete, a simple imputation approach was used in which data from adjoining strata were used. In this simple imputation, only the temporal stratification—calendar quarter—was relaxed (to half year) recognizing that seasonal variation can occur for some species (Table 38 and Table 39). In the case of shrimp trawl, given that the northern shrimp fishery is a seasonal fishery comprising only half the year, the quarterly data were applied annually. Data from adjoining cells were pooled to impute estimates for cells with zero or one trip. However, simple imputation could not be applied to fleets where observer coverage was low or missing throughout the year (i.e., there were too few data to support the simple imputation approach). In these cases, imputed values were not used, and the fleet was designated as a fleet in need of pilot observer coverage. If some data were available, then some estimates were derived; however, the sea days needed to achieve a 30 percent CV were estimated based on pilot coverage levels.

Pilot observer coverage is defined as a minimum level of at-sea observer coverage to acquire initial bycatch information with which to calculate variance estimates that in turn can be use to further define the level of sampling needed. Based on NMFS (2004), pilot coverage can range between 0.5 and 2 percent. In this analysis, pilot observer coverage was set based on the number of fishing trips needed to cover at least 2 percent of the annual FVTR trips for a fishing mode, with a minimum of 12 trips per year (3 trips per quarter) and a maximum of 400 trips per year (100 trips per quarter). The fishing modes that needed pilot coverage are indicated in Table 38 and Table 39.

Based on 2004 observer coverage, four scenarios were developed to determine when to use imputation or pilot coverage: (1) If observer coverage exists in all 4 quarters with sufficient sample sizes to generate quarterly CVs, then no imputation or pilot coverage was used; (2) if observer coverage exists in 3 quarters with sufficient sample sizes to generate a CV, then the missing quarter was imputed using half-year estimates; (3) if observer coverage exists in 1 or 2 quarters with sufficient sample sizes to generate a CV and the other 2 or 3 quarters had zero or 1 trips, then there were insufficient data to apply simple imputation and pilot coverage was used instead for those quarters; or (4) if no observer coverage exists in all 4 quarters; then pilot coverage was used.

5.4. Bycatch Rates and Total Discards

5.4.1. Estimation of Bycatch Rates

There are many different established methods for estimating bycatch rates in fisheries based on at-sea observer data. Design-based estimators are often used for finfish bycatch (e.g., Pikitch et al. 1998; Stratoudakis et al. 1999; Rochet et al. 2002), while model-based estimators are more commonly used for predicting less frequent bycatch events (e.g., Walsh et al. 2002; Perkins and Edwards 1996). Ratio estimators represent a simple form of model-based estimation within a sampling design. Studies that have compared the use of ratio estimators with other simple and proportional probability estimators have reported mixed results. Diamond (2003) found that ratio estimators overestimated discards compared to simple means-based estimators. However, Allen et al. (2001) found that ratio estimators performed better but that the appropriate covariate varied among species. Discard estimation is a very active area of fisheries and statistical research and the techniques and approaches used are undergoing continual development and refinement (e.g., Miller and Skalski 2006; Kaiser 2006). The sampling design proposed in this document is considered sufficiently robust to meet the needs of the Councils and NMFS.

For the purpose of the SBRM, a number of design-based approaches were examined that have been advocated in the literature and the assumptions of each were tested. Bycatch rates are expressed as: (1) The ratio of total weight of one or more species discarded to total weight of one or more species kept (d/k); (2) the ratio of total weight of one or more species discarded to days absent (d/da); and (3) discards per trip The basic difference between methods (2) and (3) is that "days absent" is assumed to contain more information about fishing effort than the sampling unit "trip." For the ratio estimators (1) and (2), we examined the effects of pooling ratios over strata, using the "separate" and "combined" approaches given in Cochran (1963). Details of the separate and combined estimators follow a brief introduction to ratio estimators. Overall, we examined two different ratio estimators (discard/kept (d/k) vs. discard/days absent (d/da)) for two different pooling strategies (separate vs. combined). In addition, the discard per trip estimator (3) was applied individually to the datasets for d/k and d/da. The only differences between the two datasets were slight variations in the number of cases available in each stratum. Thus a total of six different estimators were applied to the set of 45 fleets and 60 species/species groups.

5.4.1.1. Ratio Estimators

Bycatch rates for each fleet, quarter, and species/species groups (stratum) were estimated using two ratios: Discard to all species kept (d/k) and discard to days absent (d/da) (equations 1a and 1b, respectively).

$$(1a)\quad \hat{R}_{jh} = \frac{\sum_{i=1}^{n_h} d_{ijh}}{\sum_{i=1}^{n_h} k_{ih}} \qquad \text{and} \qquad (1b)\quad \hat{R}_{jh} = \frac{\sum_{i=1}^{n_h} d_{ijh}}{\sum_{i=1}^{n_h} da_{ih}}$$

where R_{jh} is the bycatch rate of species group j in stratum h; d_{ijh} is the discards (for fish, weight in pounds; for protected species, in numbers of animals) for species group j within trip i in stratum h; k_{ih} is the kept weight, in pounds, of all species within trip i in stratum h; and da_{ih} is the days absent of trip i in stratum h.

The approximate variance of the estimate of R_{jh} is obtained from a first order Taylor series expansion about the mean. The computational formula for these quantities can be expressed as:

$$(2a)\quad V\left(\hat{R}_{jh}\right) = \frac{1}{n_h \bar{k}_h^2}\left[\frac{\left(\sum_{i=1}^{n_h} d_{ijh}^2\right) + \hat{R}_{jh}^2\left(\sum_{i=1}^{n_h} k_{ih}^2\right) - 2\hat{R}_{jh}\left(\sum_{i=1}^{n_h} d_{ijh} k_{ih}\right)}{(n_h - 1)}\right]\left[\frac{N_h - n_h}{N_h}\right]$$

and

$$(2b)\quad V\left(\hat{R}_{jh}\right) = \frac{1}{n_h \overline{da}_h^2}\left[\frac{\left(\sum_{i=1}^{n_h} d_{ijh}^2\right) + \hat{R}_{jh}^2\left(\sum_{i=1}^{n_h} da_{ih}^2\right) - 2\hat{R}_{jh}\left(\sum_{i=1}^{n_h} d_{ijh} da_{ih}\right)}{(n_h - 1)}\right]\left[\frac{N_h - n_h}{N_h}\right]$$

where d_{ijh} is the total discard weight of species group j in trip i within stratum h; k_{ih} is the total kept weight of all species in trip i within stratum h; da_{ih} is the days absent of trip I in stratum h; n_h is the number of observed trips in stratum h; N_h is the number of FVTR trips in stratum h; k_h^{bar} is the mean kept landings of all species within the stratum, and da_h^{bar} is the mean days absent within stratum h.

The coefficient of variation for the bycatch ratio for species group j in stratum h is defined as:

$$(3)\quad CV(\hat{R}_{jh}) = \frac{\sqrt{V(\hat{R}_{jh})}}{\hat{R}_{jh}}$$

It should be noted that when only one stratum is considered, the CV of the total discards for species group j in stratum h is the same as the CV of the bycatch ration.

The number of trips necessary to achieve a 30 percent CV for species group j in stratum h is defined as:

$$(4)\quad \hat{T}_{jh} = \frac{N_h\left(\dfrac{n_h N_h}{N_h - n_h}\right)V(\hat{R}_{jh})}{(0.09)\hat{R}^2 N_h + \left(\dfrac{n_h N_h}{N_h - n_h}\right)V(\hat{R}_{jh})}$$

where n_h is the number of observed trips in stratum h; N_h is the number of FVTR trips in stratum h; R_{jh}^{hat} is the discard ratio of species group j in stratum h; and $V(R_{jh}^{hat})$ is the variance of the discard ratio of species group j in stratum h.

The number of sea days necessary to achieve a 30 percent CV for species group j in stratum h is defined as:

$$(5)\quad \hat{S}_{30\,jh} = \hat{T}_{jh} * \overline{DA_h}$$

where DA_h^{bar} is the average trip length of FVTR trips in stratum h.

The calculation of sea days uses the average FVTR trip length and not average observer trip length. Use of the FVTR data, which represent the entire industry, guards against sampling variability induced by small sample sizes. Sampling variability may be bi-directional with observers sampling trips that may be longer or shorter trips, on average, than industry is making overall.

Due to minor difficulties with fleet identification, including limitations in identifying FVTR trips with regard to access area, some sample size irregularities occur where $N_h < n_h$. This occurred in three fishing modes: (1) The New England limited access closed area scallop dredge mode in the first three quarters; (2) the Mid-Atlantic limited access closed area scallop dredge mode in the first three quarters; and (3) the Mid-Atlantic mid-water paired and single trawl mode in the first and fourth quarters (Table 38). To prevent negative sampling fractions in equations 2, 4, and 16, when $N_h < n_h$, N_h was assigned the value of $n_h + 1$.

5.4.1.2. Ratio Assumptions

Equations 2a and 2b are the computational formulas for a more general expression of the variance of a ratio (R=y/x) estimate that incorporates the covariance of the relationship between the numerator y and denominator x. The correlation (ρ) between the numerator and denominator is simply the covariance divided by the product of the standard errors of the numerator and denominator. The ratio estimator of a total Y can be written as the Y=(y/x)X where X is the total value of the covariate. The approximate variance of Y based on a ratio estimator can be written as:

$$(5.1)\quad V\left(\hat{Y}_R\right) = \frac{N^2(1-f)}{n}\left(S_y^2 + R^2 S_x^2 - 2R\rho S_y S_x\right)$$

where S_y and S_x are the standard errors of y and x. Note that increases in the correlation coefficient (ρ) will decrease the variance of the total. Increases in ρ imply a higher degree of association between the numerator and denominator and imply that the variance will decrease when the ratio model is appropriate. When ρ approaches zero the benefits of ratio estimation decrease and the variance may actually increase because the squared ratio estimate (the second term within the parentheses on the right hand side of equation 5.1) could increase the variance of the total.

In general, the ratio estimate has a bias of order 1/n (Cochran 1963). For moderate and large sample sizes, the bias is negligible. In this study, approximately three quarters of the strata have sample sizes of 30 or smaller. To evaluate the impact of bias in this study, the significance of correlation between sample size and ρ (the correlation of the ratio estimate, rho) was examined.

The correlation of the ratio estimate is defined as:

$$(6)\quad L_{xy,j} = n_h \sum_{i=1}^{n_h} x_{i,j} y_{i,j} - \left(\sum_{i=1}^{n_h} x_{i,j}\right)\left(\sum_{i=1}^{n_h} y_{i,j}\right)$$

$$(7)\quad L_{xx,j} = n_h \sum_{i=1}^{n_h} x_{i,j}^2 - \left(\sum_{i=1}^{n_h} x_{i,j}\right)^2$$

$$(8)\quad L_{yy,j} = n_h \sum_{i=1}^{n_h} y_{i,j}^2 - \left(\sum_{i=1}^{n_h} y_{i,j}\right)^2$$

$$(9)\quad \rho_j{}^2 = \frac{L_{xy,j}^2}{L_{xx,j} L_{yy,j}}$$

where x_{ij} is days absent or kept pounds for species j in trip i; y_{ij} is discarded pounds of species j on trip i; n_h is number of observed trips in stratum h; and ρ^2 is squared correlation coefficient for species j.

The results of the correlation analyses are summarized in Table 42 and Table 43 for the ratio of discards by species group to total kept. Overall, the correlation coefficients were low but the exceptions are important and notable. Correlations exceeded 0.47 in the New England large-mesh trawl fishery for monkfish, and the large- and small-mesh multispecies fisheries. Associations for small-mesh otter trawls in New England were also strong for squid, mackerel, and butterfish and small-mesh multispecies. Correlations for skate discard rates were above 0.32 in the New England and Mid-Atlantic large-mesh trawl fisheries, above 0.48 in the New England and Mid-Atlantic extra-large-mesh gillnet fisheries, and above 0.2 in four of the six scallop dredge fisheries. A high correlation indicates a strong relationship between the two variables measured (in this case, the numerator and denominator of the discard ratio). The evidence indicates strong relationships for the three primary fisheries (large-mesh otter trawls, extra-large-mesh gillnets, and scallop dredges).

5.4.1.3. Linearity Assumptions

The ratio estimator assumes that a zero intercept regression is an appropriate model of the relationship between discard and kept (or days absent). The putative linear relationship between discarded and kept components of observed trips was examined by gear type and species group. For illustration purposes, two example plots of discard and kept are given using two different scales: Nominal scale and fourth root transformation.[37] These two illustrative plots (Figure 34 and Figure 35) reveal that the fourth root transformation facilitates the depiction of information and does not obscure the underlying pattern of increasing variance and a zero intercept. Thus, using a fourth root transformation, examples of the comparison between discard and kept (or days absent) are illustrated by thirteen fish species groups in otter trawl and gillnet gears by mesh sizes (presented in Appendix B, Figures B-1a to B-1xx) and by five protected species groups for longline, otter trawl, gillnet and scallop dredge (Appendix B, Figures B-2a to B-2j**)**. Departures from linearity are often controlled by large numbers of trips with zero discards. When trips with zero discards are removed, improvement in linearity occurs. Examples of these are given for large-mesh groundfish discarded in the otter trawl and gillnet fleets (Appendix B, Figures B-3a to B-3d). Rho and sample size analyses (using power = 0.80, alpha = 0.10; alternative hypothesis = 'not equal' and null value = 0) indicated that a low percentage of fleets and species groups had linear relationships using a ratio estimator (d/k or d/da).

5.4.2. Estimation of Total Discards

Three methods were examined to estimate annual total discards, precision, and coverage necessary to achieve a 30 percent CV for fleets and species/species groups: (1) A separate ratio method; (2) a combined ratio method; and (3) a simple expansion method (mean discard per trip). Cochran (1963) discusses these three methods in greater detail. Each method utilized quarterly estimates of bycatch rates (d/k and d/da) and associated CV, and the number of sea days necessary to achieve a CV of 30 percent. In these analyses, stratum is defined as fleet and species group. Significant improvements in discard estimation may be possible through a variety of species-specific refinements. These might be accomplished via use of additional covariates, post stratification, or other model-based approaches.

In the notation that follows, we consider the definition of strata in general terms such that 'h' refers to a set of unique attributes. Recall that the observations are stratified by gear, access area, trip category, geographic region, mesh, and calendar quarter. These strata are nested, but not factorial. Totals can be computed over specific temporal, spatial, and 'type' strata by holding other strata values constant. In equations 10-15, we illustrate the mean and variances of the total discards, where the summation is over calendar quarter. Implicitly, the other strata values are held constant.

[37] The fourth root transformation approximates a natural logarithm transformation without the difficulty of adding a constant (Green 1979).

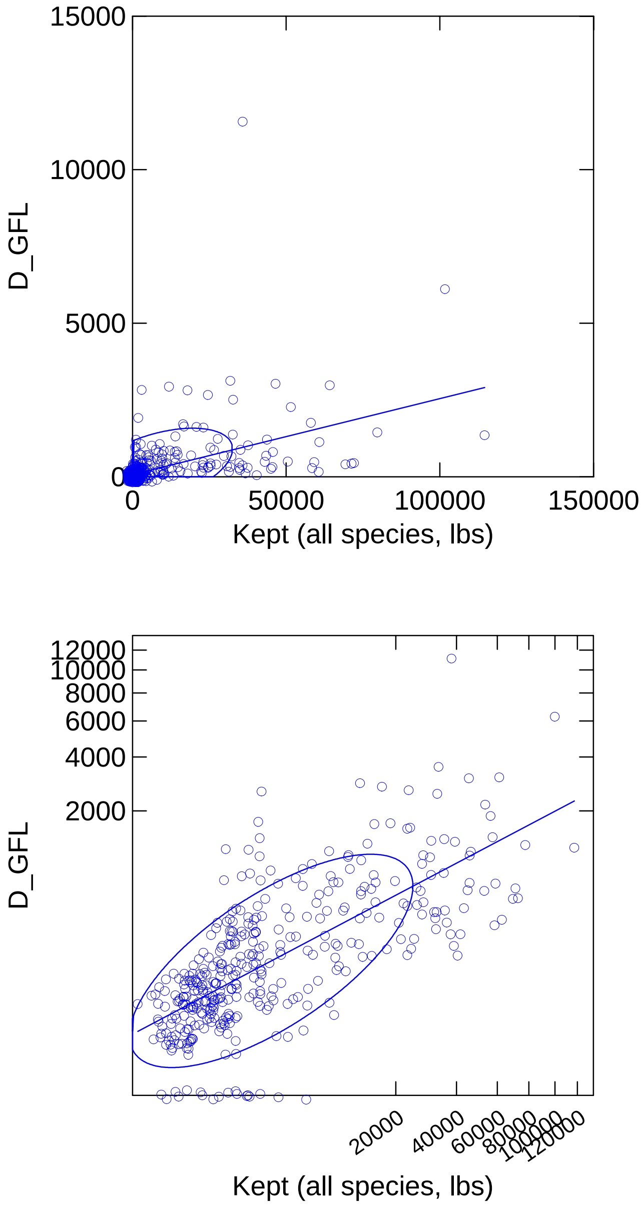

Figure 34. Comparison of nominal scale (top) and fourth root transformation (bottom) of Northeast multispecies (large-mesh) discards and kept weight of all species from 2004 observed large-mesh otter trawl trips in New England; each dot represents one fishing trip.

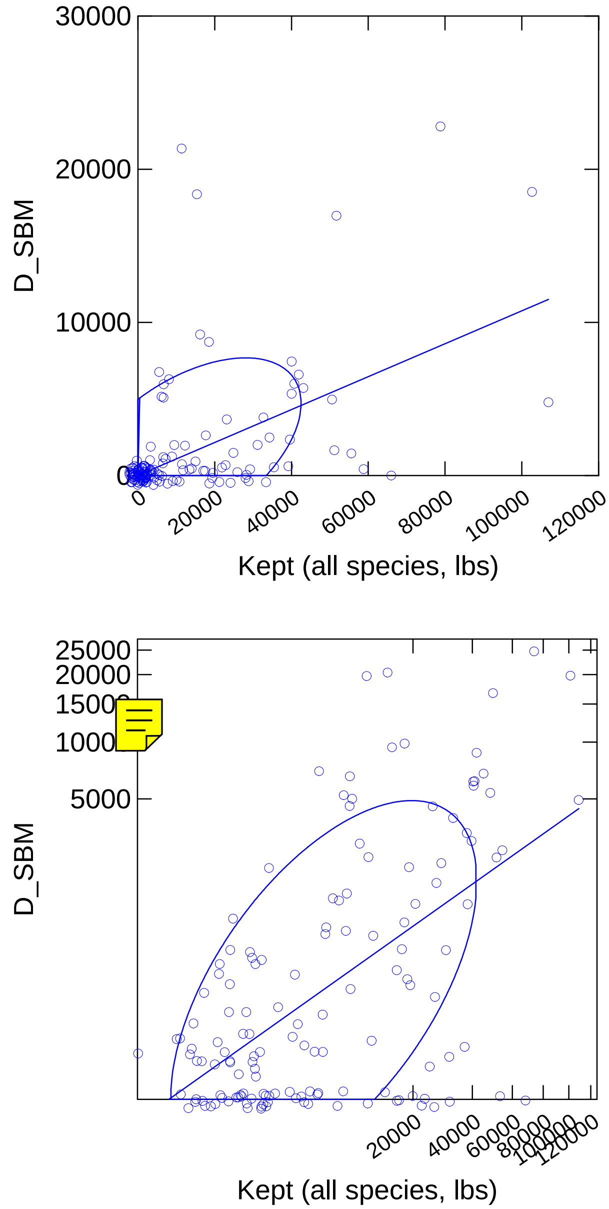

Figure 35. Comparison of nominal scale (top) and fourth root transformation (bottom) of squid, butterfish, and mackerel discards and kept weight of all species from 2004 observed small-mesh otter trawl trips in New England; each dot represents one fishing trip.

5.4.2.1. Separate Ratio Method (Method 1)

The total discarded pounds of species j using method 1 are defined as:

(10a) $\hat{D}_{1,j} = \sum_{h=1}^{L} K_h r_{s,jh}$ and (10b) $\hat{D}_{1,j} = \sum_{h=1}^{L} DA_h r'_{s,jh}$

where

(11a) $r_{s,jh} = \dfrac{\sum_{i=1}^{n_h} d_{jih}}{\sum_{i=1}^{n_h} k_{ih}}$ and (11b) $r'_{s,jh} = \dfrac{\sum_{i=1}^{n_h} d_{jih}}{\sum_{i=1}^{n_h} da_{ih}}$

where $D_{1,j}^{hat}$ is the total discarded pounds for species j; K_h is the FVTR total kept pounds in stratum h; DA_h is the FVTR total days absent in stratum h; $r_{s,jh}$ is the separate ratio for species j in stratum h; d_{jih} is discards of species j from trip i in stratum h; k_{ih} is kept pounds of all species on trip i in stratum h; and da_{ih} = days absent from trip i in stratum h.

The variance of $D_{1,j}^{hat}$ is defined as:

(12a) $$V(\hat{D}_{1,j}) = \sum_{h=1}^{L} K_h^2 \left(\frac{N_h - n_h}{n_h N_h} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{ih}}{n_h} \right)^2} \left[\frac{\sum_{i=1}^{n_h} \left(d_{jih}^2 + \left(r_{s,jh}\right)^2 k_{ih}^2 - 2 r_{s,jh} d_{jih} k_{ih} \right)}{n_h - 1} \right]$$

and

(12b) $$V(\hat{D}_{1,j}) = \sum_{h=1}^{L} DA_h^2 \left(\frac{N_h - n_h}{n_h N_h} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} da_{ih}}{n_h} \right)^2} \left[\frac{\sum_{i=1}^{n_h} \left(d_{jih}^2 + \left(r'_{s,jh}\right)^2 da_{ih}^2 - 2 r'_{s,jh} d_{jih} da_{ih} \right)}{n_h - 1} \right]$$

where $D_{1,j}^{hat}$ is the total discarded pounds for species j; K_h is the FVTR total kept pounds in stratum h; DA_h is the FVTR total days absent in stratum h; $r_{s,jh}$ is the separate ratio for species j in stratum h; d_{jih} is discards of species j from trip i in stratum h; k_{ih} is kept pounds of all species on trip i in stratum h; da_{ih} = days absent from trip i in stratum h; N_h is the number of FVTR trips in stratum h; and n_h is the number of observed trips in stratum h.

The coefficient of variation of $D_{1,j}^{hat}$ is defined as:

(13) $$CV(\hat{D}_{1,j}) = \frac{\sqrt{V(\hat{D}_{1,j})}}{\hat{D}_{1,j}}$$

5.4.2.2. Combined Ratio Method (Method 2)

The combined ratio method is based on a ratio estimate pooled over all strata and trips within strata. The total discarded pounds for species j are given by:

$$(14a) \quad \hat{D}_{2,j} = \sum_{h=1}^{L} K_h r_{c,j} \quad \text{and} \quad (14b) \quad \hat{D}_{2,j} = \sum_{h=1}^{L} DA_h r'_{c,j}$$

where

$$(15a) \quad r_{c,j} = \frac{\sum_{h=1}^{L} N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^{L} N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}} \quad \text{and} \quad (15b) \quad r'_{c,j} = \frac{\sum_{h=1}^{L} N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^{L} N_h \sum_{i=1}^{n_h} \frac{da_{ih}}{n_h}}$$

where $D_{2,j}^{hat}$ is total discarded pounds for species j; K_h is FVTR total kept pounds in stratum h; DA_h is FVTR total days absent in stratum h; $r_{c,j}$ is the combined ratio of species j; d_{jih} is discards of species j from trip i in stratum h; k_{ih} is kept pounds of all species on trip i in stratum h; da_{ih} is days absent from trip i in stratum h; N_h is the number of FVTR trips in stratum h; and n_h is the number of observed trips in stratum h. In equations 15a and 15b, the summation over strata h = 1 to L is over calendar quarters and the other strata values are held constant. Equations 16a and 16b require a more explicit definition of the stratum designation since the summation over quarter relies on an annual average ratio defined in equation 15.

The variance of $D_{2,j}^{hat}$ for species j is defined as:

$$(16a) \quad V(\hat{D}_{2,j}) = \sum_{q=1}^{4} K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jiqh}^2 + (r_{c,j})^2 k_{iqh}^2 - 2 r_{c,j} \; d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right]$$

and

$$(16b) \quad V(D_{2,j}) = \sum_{q=1}^{4} DA_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} da_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jiqh}^2 + (r'_{c,j})^2 da_{iqh}^2 - 2 r'_{c,j} \; d_{jiqh} da_{iqh} \right)}{n_{qh} - 1} \right]$$

where $D_{2,j}^{hat}$ is total discarded pounds for species j; K_{qh} is FVTR total kept pounds in quarter q and stratum h; DA_{qh} is FVTR total days absent in quarter q and stratum h; $r_{c,j}$ is the combined ratio of species j; d_{jiqh} is discards of species j from trip i in quarter q and stratum h; k_{iqh} is kept pounds of all species on trip i in quarter q and stratum h; da_{iqh} is days absent from trip i in quarter q and stratum h; N_{qh} is the number of FVTR trips in quarter q and stratum h; and n_{qh} is the number of observed trips in quarter q and stratum h.

The coefficient of variation of $D_{2,j}^{hat}$ is defined as:

$$(17) \quad CV(\hat{D}_{2,j}) = \frac{\sqrt{V(\hat{D}_{2,j})}}{\hat{D}_{2,j}}$$

5.4.2.3. Simple Expansion Method: mean discard per trip (Method 3)

The total discarded pounds for species j using method 3 is given by:

$$(18) \quad \hat{D}_{3,j} = \sum_{h=1}^{L} N_h \left(\frac{\sum_{i=1}^{n_h} d_{jih}}{n_h} \right)$$

where d_{jih} is discards of species j from trip i in stratum h; N_h is the number of FVTR trips in stratum h; and n_h is the number of observed trips in stratum h. Note that D_3^{hat} will differ between d/da and d/kl sets due to expansion of discards to account for non-observed hauls in the d/da set.

The variance of $D_{3,j}^{hat}$ for total discarded pounds using method 3 for species j is defined as:

$$(19) \quad V(\hat{D}_{3,j}) = \sum_{h=1}^{L} N_h^2 \left(\frac{N_h - n_h}{N_h} \right) \left[\frac{\sum_{i=1}^{n_h} d_{jih}^2 - \frac{\left(\sum_{i=1}^{n_h} d_{jih} \right)^2}{n_h}}{n(n_h - 1)} \right]$$

where $D_{3,j}^{hat}$ is total discarded pounds for species j; d_{jih} is discards of species j from trip i in stratum h; N_h is the number of FVTR trips in stratum h; and n_h is the number of observed trips in stratum h.

The coefficient of variation of $D_{3,j}^{hat}$ is defined as:

$$(20) \quad CV(\hat{D}_{3,j}) = \frac{\sqrt{V(\hat{D}_{3,j})}}{\hat{D}_{3,j}}.$$

5.5. Sample Size Analysis

A sample size analysis was conducted to estimate the number of trips and sea days needed to achieve a 30 percent CV for each species group and fishing mode. Two alternative methods are used: (1) The sample size based upon the variance of the quarterly bycatch ratio; and (2) the sample size based upon the variance of the composite annual total discard.

5.5.1. Sample Size Based Upon the Variance of the Quarterly Bycatch Ratio

The number of observer sea days (S_{30}) necessary to achieve a 30 percent CV for a fleet and species/species group is defined as:

$$(21)\quad \hat{S}_{30,jh} = \sum_{q=1}^{4} \hat{S}_{30,jhq} \ .$$

If a quarterly sea day estimate was not available (due to no observer coverage or the CV could not be estimated due to a bycatch rate of zero), then the quarterly sea days were estimated by pilot coverage, as follows:

$$(22)\quad \hat{S}_{30,jhq} = \hat{T}_{hq} * \overline{DA_{hq}}$$

where T^{hat} is 2 percent of the FVTR trips in stratum h and quarter q, and 3 <= T_{hq}^{hat} <= 100 trips, and DA_{hq}^{bar} is the average trip length of FVTR trips in stratum h and quarter q.

Equations 2–5 were applied to each quarter and the total number of trips and sea days for the year were obtained by summing over the quarterly estimates. In this approach, the number of sea days and trips necessary to achieve a 30 percent CV does not depend on any of the three methods used to estimate total discards. Instead, it depends on the estimated variance of the discard ratio within each quarter.

5.5.2. Sample Size Based Upon the Variance of the Composite Annual Total Discard

The number of sea days and trips needed to achieve a 30 percent CV were derived based on the variance of the composite annual total discards using the combined ratio method and the d/k bycatch ratio (equation 16a). From equation 16a, let:

$$(23)\quad \hat{S}^2_{jqh} = \left[\frac{\sum_{i=1}^{n_{qh}} \left(d^2_{jiqh} + \left(r_{c,jh}\right)^2 k^2_{iqh} - 2r_{c,j}\ d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right] \text{ and}$$

(24) $$\delta_{qh} = \frac{n_{qh}}{\sum_{q=1}^{4} n_{qh}}$$

where δ_{qh} is the fraction of the trips in quarter q in stratum h; $r_{c,jh}$ is the combined annual ratio of species j in stratum h; d_{jiqh} is discards of species j from trip i in stratum h in quarter q; k_{iqh} is kept pounds of all species on trip i in stratum h in quarter q; and n_{qh} is the number of observed trips in stratum h in quarter q. The $r_{c,jh}$ in equation 23 is defined in equation 15a where the summation is over quarters within a given strata defined by gear, region, access area, trip type, and so forth.

The number of trips necessary to achieve a 30 percent CV based on the variance of the composite annual total discards for species group j in stratum h is defined as:

(25) $$\hat{T}D_{30\,jh} = \frac{\sum_{q=1}^{4}\left(\frac{K_{qh}^{2}}{\bar{k}_{qh}^{2}}\hat{S}_{jqh}^{2}\frac{1}{\delta_{qh}}\right)}{(0.09)D_{jh}^{2} + \frac{\sum_{q=1}^{4}\frac{K_{qh}^{2}}{\bar{k}_{qh}^{2}}\hat{S}_{jqh}^{2}}{N_h}}$$

The number of sea days necessary to achieve a 30 percent CV based on the variance of the composite annual total discards for species group j in stratum h is defined as:

(26) $$\hat{S}D_{30\,jh} = \hat{T}D_{30\,jh} * \overline{DA_h}$$

where DA_h bar is the weighted average trip length of FVTR trips in stratum h (weighted by the number of FVTR trips in each quarter) .

When total discards could not be estimated due to little or no observer coverage (i.e., pilot coverage will be needed) or when total discards are zero (no variance), the sum of the quarterly trips and sum of the quarterly sea days are used (i.e., TD_{30} = sum of quarterly T_{30} and SD_{30} = sum of quarterly S_{30}).

Pilot coverage has been used when the bycatch ratio is zero or when variance of the bycatch ratio or the variance of the composite total discards is zero. It is recognized that pilot coverage may result in excessive coverage in cases where no observer coverage is needed for a cell. As new bycatch information is obtained, the unlikely (gray-shaded) cells should be re-evaluated and updated to prevent the overuse of unnecessary pilot coverage. As discussed later in section 6.2.3, when "importance filters" are applied, cells with pilot coverage may be excluded when cells have little or no discards due to other factors (e.g., discard amount is extremely low compared to total landings, etc.). It should be noted that pilot coverage plays an important role in determining coverage for protected species (species where bycatch may be a rare event) and only the unlikely (gray-shaded) filter is applied to protected species groups (other importance filters are not applied to protected species).

5.6. Additional Analyses

5.6.1. Meta-Analysis

A meta-analysis of the 60 species groups and 39 fishing modes (excluding the 5 quota-monitoring modes and the Scottish seine mode in the Mid-Atlantic) was conducted to compare estimates of total discards and the precision of the three methods and two bycatch ratio estimators.

The total discards derived from each method and each ratio estimator were compared to each other by plotting all combinations within a single graph for each major gear type and region. The comparisons of total discard for four major gear types (longline, otter trawl, scallop dredge, and gillnet) and region are presented in Appendix B, Figures B-4a to B-4g. The comparisons of standard error (SE) of total discard and the CV of total discards for the four major gear types by region are presented in Appendix B, Figures B-5a to B-5n. For Figures B-4 and B-5 of Appendix B, the symbol within each subplot represents a species/species group and mesh size, the line represents a regression through the data points and the ellipse is the 68 percent confidence region.

Generally, there is a close relationship between all methods and ratio estimators for longline, otter trawl, and scallop dredge for total discards (Appendix B, Figures B-4a to B-4g). For longline and scallop dredge gear, the estimated total discards were strongly correlated among estimators (Appendix B, Figures B-4a,d,e). Differences between the “combined” and “separate” estimators of total discards in the trawl fisheries were negligible, but differences between d/k- and d/da-based estimates were more pronounced (Appendix B, Figures B-4b,c), especially for high values of discard.

There is some departure between methods and ratio estimators for gillnets in the Mid-Atlantic (Appendix B, Figure B-4f), but not in New England (Appendix B, Figure B-4g). This may be attributed to the use of days absent with a fixed gear fishery. Some vessels actively tend (stand by) their nets while the gear is in the water; thus, days absent is correlated with soak time—this may not be true for fleets who do not tend their gear (i.e., vessels that set their gillnets and return to port, returning to retrieve their nets at a later time or date).

For measures of uncertainty of the estimate, there was general agreement among the three methods and two ratio estimators (Appendix B, Figures B-5a to B-5g). Confidence ellipses for longline, gillnet, and scallop dredge were stronger than for otter trawl; however, although the otter trawl ellipses (measuring the strength of the associations) were wider than for gillnet and longline, they remain relatively narrow, indicating not much variability and a strong association. In general, results in Figures B-5h to B-5n of Appendix B suggested a greater degree of dispersion among methods 1 to 3 when days absent was used as a measure of fishing effort. Since days absent does not account for variations in steam time versus fishing time nor the effects of soak time for fixed gear, it was judged to be less useful than estimators based on a discard-to-kept ratio.

In particular, estimators based on the separate ratio method were more variable than those based on the combined ratio method.

Closer examination of the comparison of precision from the combined ratio method and the simple expansion method are presented in Appendix B, Figures B-6a to B-6g, for four major gear types (longline, otter trawl, gillnet, and scallop dredge). In these figures, the identity line and a reference line representing a 30 percent CV are given; the symbol represents a species/species group and mesh size. There is general symmetry above and below the identity line, except for Mid-Atlantic otter trawl where coverage is low and precision estimates are higher, consequentially leading to higher coverage.

The meta-analyses indicate that generally there was little difference between the two bycatch ratios (d/da and d/k) for most species in most fleets, with the exception of gillnets where the d/da provided lower estimates of variation of total discards compared with d/k ratios. Generally, there was little difference between the three methods, but the ratio estimators tended to give higher CVs of the total than the simple expansion method. A relatively large fraction of the overall estimates for species, gear, and mesh size had CVs less than 30 percent, irrespective of which method was used.

The tables presenting precision (Table 44 and Table 45), ranking of total discards (Table 46, Table 47, Table 48, and Table 49), and the sea days and trips necessary to achieve a CV of 30 percent (Table 50-Table 55) are based upon the variance of the composite annual total discards using the combined ratio method (method 2).

The precision of the total discards by fleet and species is presented in Table 44 and Table 45 (see Appendix B, Table B-1 for individual species). Cells with adequate precision (at or below a CV of 30 percent) are identified with bold font. Note that when a CV is reported for a fishing mode where pilot coverage is needed, the CV is based upon the available, limited observer coverage.

For the 28 fishing modes for which a CV could be estimated, 19 (68 percent) had CVs less than or equal to 30 percent for all species combined (Table 44 and Table 45). For tilefish, three of the four fishing modes where discarded tilefish occurred had a CV above 30 percent. Of the 600 cells in the fleet by species matrix, 29 percent of the cells had a CV less than or equal to 30 percent. Caution should be used in evaluating the matrix in this manner, as this percentage does not include the cells where no discarding occurred (CV = null), nor does it incorporate the unlikely cells (gray-shaded cells). Additionally, the relative magnitude of the discard should also be considered when evaluating the precision. There are cases, such as encounters of large-mesh Northeast multispecies in mid-water trawls, that are examples of where the magnitude of the total catch, rather than the precision of the estimate, is the most important factor.

Looking at the non-gray cells for which there was observer coverage, the majority (58 percent) had either no discards or CVs of 30 percent or less. By definition, those cells that had either no discards or CVs less than 30 percent were of sufficient quality to meet the performance standard proposed to be implemented through this amendment.

Less than 25 percent of the non-gray cells for which there was observer coverage in 2004 had CVs in excess of 50 percent, while the remainder of cells (18 percent) had CVs between 30 percent and 50 percent.

To provide insight into which species are discarded in each fleet, the total discard of each species group was ranked (highest in lb = 1, lowest in lb = n) within a fishing mode. The rank indicates the relative magnitude of the discarded species group within a fishing mode. Ranking of total discard weight within a fishing mode for fish species groups are presented in Table 46, and the ranking of total number of incidental takes of sea turtles, marine mammals, and sea birds within a fishing mode are presented in Table 47 (see Appendix B, Table B-2 for individual species). In the gillnet modes, spiny dogfish are discarded the most (rank = 1 for all gillnet modes), while in the scallop dredge modes, scallops and skates are the two species most heavily discarded. Although protected species are not often encountered, dolphins/porpoises are encountered more often in otter trawl modes than other protected species, while sea birds and sea turtles are encountered more frequently than other protected species in the gillnet and scallop dredge modes. Ranking of total discard weight for fish species and ranking of total numbers of incidental takes were also ranked within species group (Table 48 and Table 49, respectively; see Appendix B, Table B-3 for individual species). Compared to other fishing modes, the New England large-mesh otter trawl mode discards the most dogfish and Northeast multispecies. The open area, limited access scallop dredge modes discard the most scallops and monkfish. Sea turtles are taken most often in the Mid-Atlantic scallop trawl modes.

The sea days and trips needed to achieve a 30 percent CV based on the variance of the composite annual total discard for each species group and fishing mode are presented in Table 50 and Table 51 (sea days) and Table 52 and Table 53 (trips), respectively (see Appendix B, Tables B-4 and B-5 for individual species). Similar to the sea days and trips based on the variance of the quarterly bycatch ratio, the sea days and trips are additive across fishing modes within species groups (i.e., column sums); however, the sea days and trips are not additive across species groups within fishing modes (i.e., row sums). Fine-tuning of the unlikely (gray-shaded) cells may be necessary before making a final determination of the number of sea days and trips needed to monitor bycatch in the Northeast region due to exceptions to the 30 percent CV standard and the relative magnitude of the discards. For example, the apparent need for 15,593 observer sea days to estimate surfclam discards in the New England large-mesh otter trawl fishery is driven by imprecise estimates of small amounts. Such an allocation of observer days would be wasteful with respect to surfclam discards and would over-sample by a factor of 145 the estimated days necessary to obtain a CV of 30 percent for large-mesh groundfish species (107 days).

To determine the number of sea days and trips needed to achieve a 30 percent CV within a fishing mode, the maximum number of sea days for all species groups in the study (i.e., the maximum number of days within a row) is used. This ensures that all other species groups will have a CV of 30 percent or less. Based on this approach, Table 54 and Table 55 present the number of sea days and trips needed for each fishing mode for: (1) All 20 species groups considered in the study; (2) 15 species groups required under the Magnuson-Stevens Act (all of the fish species groups plus sea turtles); (3) the 20 species groups, filtering our the unlikely (gray-shaded) cells; and (4) the 15 Magnuson-Stevens Act species groups filtering out the unlikely cells. In Table 54 and Table 55, the total number of sea days and trips needed to achieve a CV of 30 percent for each of the these four scenarios is attained by summing each column. These totals range from 56,427 to 73,524 days; for comparative purposes, approximately 8,000 observer sea days were utilized by the NEFOP in 2004.

While the seasonal variation is captured more effectively in the variance of the quarterly bycatch ratio, the composite annual total discard captures the aggregated pattern of bycatch and its variability. Finer-scale variation of bycatch patterns at the quarterly level are not specifically addressed but implicitly assume that the estimates of total days at sea would be allocated in the same proportions as the original sample, i.e., δ_{qh}. Variation in the allocation factors, such as might be obtained via optimal allocation (Cochran 1963) or use of the optimization model (Rago et al. 2005) could further reduce the annual estimate.

Given the four-fold disparity between the projected number of sea days needed to meet the CV performance standard and the number of observer sea days generally available through the NEFOP, further refinements in the number of sea days may be necessary. This could be accomplished by applying a series of "importance filter" to the number of sea days (see section 6.2.3).

5.6.2. Accuracy Analyses

As noted above and elsewhere (Rago et al. 2005; Methot 2005), the most effective means to ensure the accuracy of a sampling program is to eliminate potential sources of bias that may be associated with the design of the sampling program.

Several analytical tests were conducted to evaluate the potential sources of bias in the 2004 observer data. We compared several measures of fishing performance for vessels with and without observers present. Bias can arise if the observed vessels and trips within a stratum are not representative of the unobserved vessels and trips within the stratum. Such bias could arise if the vessels with observers on board consistently catch more or less than unobserved vessels, if the average trip durations are different, or if observed vessels fish in different areas than the rest of the fleet. All federally permitted fishing vessels are required to report the total trip landings, the number of days absent from port, and the primary statistical area fished. This information provides a means to directly compare trips between observed and unobserved vessels.

Based on analysis that compared available FVTR data from unobserved vessels with data recorded by observers, average catches (kept pounds) by species groups for observed and total trips compare favorably (Appendix B, Figure B-7) and followed an expected linear relationship. If the observed and unobserved trips within a stratum measure the same underlying fishing processes, one would expect not to detect a significant statistical difference in the average catches (and the standard deviations) between the FVTR and observer datasets. An examination of the distribution of these differences (Appendix B, Figures B-8 and B-9), by species group, indicates no evidence of systematic bias and general symmetry in the pattern of positive and negative differences.[38]

The average difference in catch, by species, between the observed and unobserved trips was generally small as a proportion of total catch, and the average catch rates between the two datasets were not significantly different from zero in 12 of the 14 comparisons (Table 56). As well, a paired t-test of the stratum-specific standard deviations of pounds kept showed significant differences from six of the 14 comparisons. A strong correlation was detected in trip duration between observed and unobserved trips (Appendix B, Figure B-10), with observed trips averaging about a quarter-day longer (Table 56 and Appendix B, Figure B-11). However, the difference in stratum-specific standard deviations of trip length was significantly different from zero ($p = 0.002$). Some skewing of the differences in mean trip duration is evident, with observed trips being slightly longer.

These results suggest that average catch rates on observed trips were not significantly different from average catch rates reported on FVTRs, indicating no evidence of bias in the observer data based on the measure of average catch rate. Some differences were detected in the standard deviations indicating more variability in the FVTR data than in the observer data. The results also suggest that average trip durations were similar between the observed trips and the FVTR trips, indicating no evidence of bias in the observer data based on the measure of average trip length. There is evidence of small skewing of the data on a small scale, with observer trips being slightly longer by 0.25 day. The standard deviations of the average trip duration between the two datasets were different, indicating that the observer data were more variable than the FVTR data. Overall, these results indicate that observer trips are generally similar to FVTR trips and there are no bias issues evident.

Two measures of spatial coherence were also examined. Within stratum h (fleet and quarter) the expected number of observer trips by statistical area j (E_{jh}) as the product of the proportion of FVTR trips in statistical area j and stratum h (V_{jh}) and the number of observed trips in stratum n_h. Thus, $E_{jh} = V_{jh} * n_h$. These expectations can then be compared to the actual frequencies (O_{jh}) of observed trips by statistical area. Results of these analyses indicate that the spatial distribution of fishing effort for trips with observers on board closely matches the spatial distribution of trips for the stratum as a whole (Table 57). It was possible to compute chi-square statistics for 86 strata. The null hypothesis of observer proportions equal to FVTR proportions was rejected ($P<0.05$) in 38 of the 86 comparisons, which suggests that there are some spatial differences in the

[38] From mid-November 2004 through October 2005, regulations for the Northeast multispecies fishery included a pilot program that prohibited discards of legal-sized groundfish and required fishermen to take specific actions when the catch of these species exceeded very low limits. There is evidence that compliance with these regulations was influenced by the presence of an observer (NEFMC 2006). Investigation of whether this effect also influenced discards was not attempted in this analysis since the program was in effect for just over one month in 2004, a small number of vessels participated during this period, and the trips cannot be (directly) identified in the FVTR data for comparison.

observed data compared with the FVTR data. This analysis included data collected on trips used for training observers, as well as quota-monitoring trips which have disproportionate higher rate of observer coverage than other observed trips, and this may explain the significant differences observed for otter fleets. Murawski et al. (2005) compared the spatial distribution of 2003 otter trawl fishing effort for vessels with VMS with the distribution of fishing effort from 2003 observed trips. Qualitatively, the spatial distributions match very well with high concentrations of effort near the boundaries of existing closed areas on Georges Bank and within the Gulf of Maine. Moreover, the effort concentration profiles deduced from VMS data coincide almost exactly with the profiles derived from the observed trips. Overall, these comparisons suggested strong coherency between these two independent measures of fishing locations; therefore, there is no evidence of bias in the observer data.

5.6.3. Overlap Analyses

Within a given fishing mode, it is rare that fishing vessels would not catch species from more than one species group. Thus, an observer documenting discards of skates on an otter trawl trip may also document discards of spiny dogfish on the same trip. The degree of overlap among species groups has important implications for the efficacy of sampling within strata. Accounting for the magnitude of overlap can circumvent this potential inefficiency. The overlap approach developed and described by Rago et al. (2005) for New England groundfish can be expanded and applied to all the species groups and fishing modes subject to the SBRM.

5.6.4. Optimization Tool

The optimization model described by Rago et al. (2005) can be expanded to encompass more species groups and gear types. For the optimization model to be useful, it will take extensive analyses to ensure that the assumptions necessary to set up the model are appropriate across a wider range of species and fishing modes. Even then, the optimization model is simply a tool to help guide the allocation process and would not replace other means by which observer effort is allocated across the fisheries.

The most important aspect of using the optimization model is that it explicitly incorporates a regular feedback mechanism for continuously improving the performance of the bycatch monitoring. The optimization tool should be viewed as a set of quality assurance/quality control measures that provide a formal way of updating and improving the sampling design as new information is obtained. The optimization tool interacts with the formal sampling design by using updated estimates of variances and overall patterns of fishing effort to improve, via reallocation of observer coverage, the overall performance of the sampling program. The overall performance of the observer sampling program is measured as a composite of the precision of discard estimates. Developing a composite measure of performance requires developing weighting factors for each species group and fishery to account for differences in the scope and scale among the fishing modes.. As the number of combinations of species and fishing modes is high, defining a complete set of weighting factors is challenging.

The optimization tool also explicitly incorporates external constraints that affect the allocation of observer effort, such as the annual budget available to the observer program. While the budget is ultimately the most important constraint, prescribed coverage levels for regulatory programs (e.g., US/Canada resource sharing areas, B DAS, and scallop vessels in closed areas), have substantial impacts on the overall performance of the program. The optimization tool provides at least one measure of the potential impacts of externally imposed constraints.

The use of observer data for single species stock assessments and the sea day allocation are presented in Figure 36. This overview illustrates the 'feed-back' loop and the use of observer data in the stock assessment process and in the sea day allocation process. The stock assessment analyses benefit from the sea day allocation process through improved monitoring of bycatch.

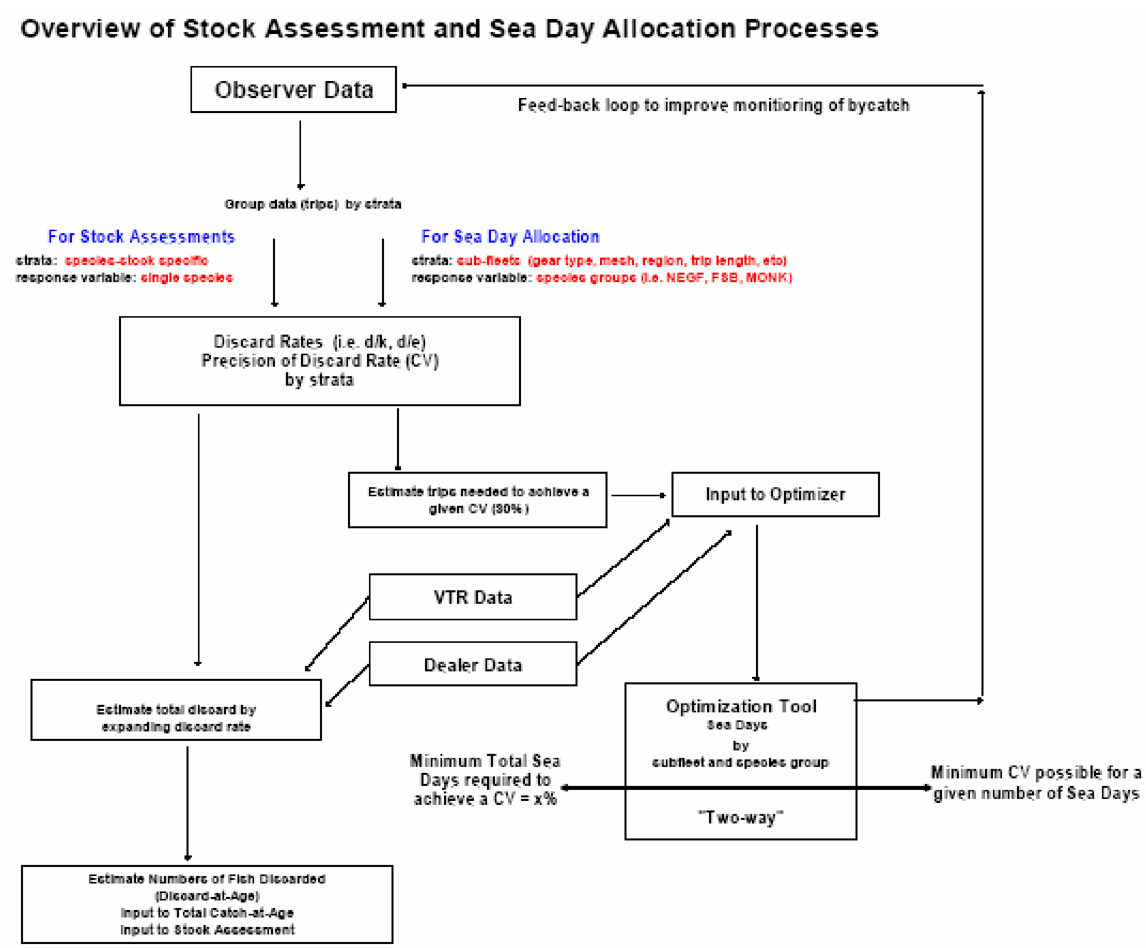

Figure 36. Overview of feedback loop used to improve bycatch monitoring in the Northeast Region (status quo).

5.7. Sources of Uncertainty and General Discussion

The difficulties of discard estimation are well known and have been described extensively in the literature (e.g., Rochet et al. 2002; Diamond 2002; Rago et al. 2005; Kaiser 2006). In this analysis, a design-based approach was used to organize the basic concepts of inferring the behavior of a population from the properties of a sample. The design-based approach should be viewed as a first approximation of the overall efficacy of an observer sampling program. As additional information is obtained, more refined estimators of discards for individual or groups of species can be devised. The design approach does not preclude such development. Instead, it facilitates further development by ensuring that the sampling is sufficiently robust to address uncertainties associated with fishing operations. Allocation of observer effort to independent fishing modes, by quarter, protects against unforeseen changes in seasonal effort patterns, shifts to new fisheries (e.g., trawlers to general category scallopers), or the effects of closed areas. Moreover, the design-based approach can help smooth out the allocation process over time, thereby reducing potential problems associated with the logistics of running a large observer program (e.g., recruiting observers, training, ability to deploy observers, etc.). A design-based approach for biological sampling has proven to be an excellent technique for monitoring the biological attributes of landings. Extension of this approach to observer coverage allocation has similar advantages.

In spite of the many advantages associated with the current observer allocation approach, several areas of concern remain. These include:

1. How to appropriately address/minimize the influence of zero values (no discards) in the observer datasets;

2. How to appropriately address/minimize the influence of extremely high variation on measures of central tendency;

3. Developing alternative predictive variables;

4. Developing adequate measures of performance/efficacy for the observer program;

5. Improving the relationship between design and model based estimators;

6. The influence over-stratification may have estimation (potential bias);

7. The lack of persistence in fishing behavior over years;

8. Addressing the influence of fishing regulations on fishing operations and vessel behavior;

9. The imprecise estimation of location reported on the FVTR;

10. The utility of using aggregate species measures of discards;

11. Improving the correspondence between FVTR and dealer data;

12. Incorporating more advanced statistical estimators that explicitly account for zero observations and over-dispersion; and

13. Developing appropriate criteria to filter the importance of fisheries and species combinations for the estimation of adequate sampling coverage.

The statistical theory applicable to the estimation of fisheries bycatch is evolving and significant advances are anticipated during the next few years. Several promising methods, recently published or now under development, are expected to advance the reliability of discard estimation; however, field testing these newer methods for multiple geographical regions and fisheries will take time. Meanwhile, the sampling design described in this chapter and, more importantly, the underlying data collected by NMFS should retain enough flexibility to accommodate/support using many of these newer methods.

Gear Type	Access Area (Open/ Closed)	Trip Category (General/ Limited)	Region	mesh groups	NUMBER OF TRIPS IN 2004 OBSERVER PROGRAM: FISH SET QTR 1	QTR 2	QTR 3	QTR 4	TOTAL	PROTECTED SPECIES SET QTR 1	QTR 2	QTR 3	QTR 4	TOTAL	NUMBER OF TRIPS IN 2004 VTR (commercial): INDUSTRY ACTIVITY QTR1	QTR 2	QTR 3	QTR 4	VTR TOTAL	Comments
Longline	all	all	NE	all	5	1	3	3	12	8	1	8	102	119	470	63	277	424	1234	impute
Longline	all	all	MA	all	0	0	0	0	0	0	0	0	2	2	84	51	38	32	205	Pilot
Otter Trawl	all	all	NE	small	19	27	41	55	142	21	40	54	85	200	851	941	882	810	3484	
Otter Trawl	all	all	NE	large	75	69	119	123	386	81	99	176	183	539	2778	3714	5965	3699	16156	
Otter Trawl	all	all	MA	small	41	33	51	69	194	42	34	53	76	205	733	1517	1830	1142	5222	
Otter Trawl	all	all	MA	large	24	9	16	26	75	25	9	16	26	76	1406	3198	2579	1667	8850	
Scallop Trawl	open	limited	MA	all	0	0	0	1	1	0	0	2	1	3	23	62	68	45	198	Pilot
Scallop Trawl	open	general	MA	all	0	0	24	7	31	0	1	29	9	39	12	311	599	166	1088	Pilot
Shrimp Trawl	all	all	NE	all	12	0	0	0	12	12	0	0	0	12	1805	36	0	127	1968	impute
Shrimp Trawl	all	all	MA	all	0	0	2	0	2	0	0	2	0	2	1	45	214	74	334	Pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	0	1	0	0	1	0	1	0	0	1	5	3	18	16	42	Pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	84	90	232	171	577	157	119	277	219	772	1183	975	2004	1027	5189	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	25	72	206	142	445	42	101	231	195	569	610	1245	1587	1270	4712	
Sink, Anchor, Drift Gillnet	all	all	MA	small	1	0	1	1	3	53	96	77	132	358	536	688	1115	585	2924	Pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	0	1	0	3	4	12	25	15	29	81	95	424	264	510	1293	Pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	1	0	0	26	27	21	52	3	66	142	546	1073	148	801	2568	Pilot for fish
Scallop Dredge	open	limited	NE	all	4	5	5	12	26	5	5	11	15	36	277	420	345	187	1229	
Scallop Dredge	open	limited	MA	all	7	8	31	23	69	7	14	33	24	78	359	584	560	319	1822	
Scallop Dredge	open	general	NE	all	1	0	1	7	9	1	0	2	17	20	620	1291	1166	489	3566	Pilot
Scallop Dredge	open	general	MA	all	0	5	13	4	22	0	6	22	11	39	228	1103	1343	759	3433	impute
Scallop Dredge	closed	limited	NE	all	8	23	20	35	86	8	23	20	35	86	2	4	3	283	292	
Scallop Dredge	closed	limited	MA	all	2	14	12	7	35	2	14	12	7	35	7	6	9	56	78	
Scallop Dredge	closed	general	NE	all	0	0	0	0	0	0	0	0	0	0	1	31	15	3	50	Pilot
Scallop Dredge	closed	general	MA	all	0	0	0	1	1	0	0	0	1	1	8	66	231	241	546	Pilot
Mid-water paired & single Trawl	all	all	NE	all	5	13	19	29	66	9	21	32	37	99	248	250	330	233	1061	
Mid-water paired & single Trawl	all	all	MA	all	5	0	6	2	13	5	0	7	2	14	103	9	8	1	121	impute
Fish Pots/ Traps	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	289	531	153	973	Pilot
Fish Pots/ Traps	all	all	MA	all	0	5	1	0	6	1	6	1	0	8	44	619	556	531	1750	Pilot
Purse Seine	all	all	NE	all	0	2	11	3	16	0	3	19	4	26	0	34	185	45	264	
Purse Seine	all	all	MA	all	0	0	0	0	0	0	2	0	0	2	0	31	21	24	76	Pilot
Hand Line	all	all	NE	all	0	0	4	2	6	0	0	6	3	9	251	709	1857	561	3378	Pilot
Hand Line	all	all	MA	all	0	0	0	0	0	0	2	1	0	3	141	1466	3122	1554	6283	Pilot
Scottish Seine	all	all	NE	all	0	3	1	1	5	0	4	2	2	8	3	40	39	11	93	Pilot
Scottish Seine	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	
Clam Quahog Dredge	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	700	1132	800	834	3466	Pilot
Clam Quahog Dredge	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	763	1018	933	747	3461	Pilot
Crab Pots	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	10	17	37	39	103	Pilot
Crab Pots	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	7	392	642	92	1133	Pilot
Lobster Pots	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	2638	6039	14487	10937	34101	Pilot
Lobster Pots	all	all	MA	all	0	0	0	0	0	0	0	1	2	3	165	1218	1718	649	3750	Pilot
Quota Monitored Longline	all	all	NE	all	0	0	0	96	96											
Quota Monitored Otter Trawl (U/C)	all	all	NE	large	0	24	43	25	92											
Quota Monitored Otter Trawl (U/C)	all	all	NE	small	0	1	4	2	7											
Quota Monitored Otter Trawl (B)	all	all	NE	large	0	0	0	20	20											
Quota Monitored Otter Trawl (B)	all	all	NE	small	0	0	0	1	1											
TOTAL									2488					3587	17713	31114	46526	31145	126498	

Table 38. Number of trips in the 2004 Northeast Fisheries Observer Program and Vessel Trip Reports, by fishing mode and quarter. The comments indicate where imputation and pilot coverage were used (shading indicates cells used in the imputation) in the fish and protected species datasets.

Gear Type	Access Area (Open/ Closed)	Trip Category (General/ Limited)	Region	mesh groups	NUMBER OF SEA DAYS IN 2004 OBSERVER PROGRAM – FISH SET: QTR 1	QTR 2	QTR 3	QTR 4	TOTAL	PROTECTED SPECIES SET: QTR 1	QTR 2	QTR 3	QTR 4	TOTAL	NUMBER OF SEA DAYS IN 2004 VTR (commercial) – INDUSTRY ACTIVITY: QTR1	QTR 2	QTR 3	QTR 4	VTR TOTAL	Comments
Longline	all	all	NE	all	5	1	3	3	12	8	1	8	116	133	654	132	319	474	1579	impute
Longline	all	all	MA	all	0	0	0	0	0	0	0	0	11	11	290	310	277	272	1149	Pilot
Otter Trawl	all	all	NE	small	84	100	79	186	449	86	128	118	245	577	3093	2608	2422	2442	10565	
Otter Trawl	all	all	NE	large	377	207	152	340	1076	390	389	484	684	1947	8231	9997	11445	8660	38333	
Otter Trawl	all	all	MA	small	162	56	100	153	471	165	57	102	175	499	2363	2539	2855	2047	9804	
Otter Trawl	all	all	MA	large	100	15	26	42	183	103	15	26	42	186	4935	4563	3791	3787	17076	
Scallop Trawl	open	limited	MA	all	0	0	0	11	11	0	0	11	11	22	154	591	593	305	1643	Pilot
Scallop Trawl	open	general	MA	all	0	0	48	8	56	0	3	58	10	71	27	633	1215	365	2240	Pilot
Shrimp Trawl	all	all	NE	all	12	0	0	0	12	12	0	0	0	12	1822	46	0	127	1995	impute
Shrimp Trawl	all	all	MA	all	0	0	2	0	2	0	0	2	0	2	6	276	1100	442	1824	Pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	0	1	0	0	1	0	1	0	0	1	5	3	18	17	43	Pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	84	98	276	199	657	169	138	322	247	876	1526	1602	2514	1388	7030	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	54	92	232	155	533	80	152	258	211	701	1252	2327	2006	1611	7196	
Sink, Anchor, Drift Gillnet	all	all	MA	small	1	0	1	1	3	57	99	82	137	375	560	744	1172	605	3081	Pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	0	1	0	3	4	13	28	15	29	85	121	481	266	529	1397	Pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	1	0	0	29	30	23	54	3	72	152	787	1299	170	1164	3420	Pilot for fish
Scallop Dredge	open	limited	NE	all	52	78	53	161	344	61	78	123	195	457	3106	4628	3780	1915	13429	
Scallop Dredge	open	limited	MA	all	45	91	263	192	591	45	146	280	204	675	3220	5624	4779	2802	16425	
Scallop Dredge	open	general	NE	all	1	0	2	8	11	1	0	5	18	24	773	1562	1565	699	4599	Pilot
Scallop Dredge	open	general	MA	all	0	6	19	8	33	0	7	29	19	55	362	1487	1808	1133	4790	impute
Scallop Dredge	closed	limited	NE	all	90	214	200	301	805	90	214	200	301	805	24	41	25	2372	2462	
Scallop Dredge	closed	limited	MA	all	21	145	124	83	373	21	145	124	83	373	57	63	75	510	705	
Scallop Dredge	closed	general	NE	all	0	0	0	0	0	0	0	0	0	0	3	37	21	7	68	Pilot
Scallop Dredge	closed	general	MA	all	0	0	0	2	2	0	0	0	2	2	13	75	274	341	703	Pilot
Mid-water paired & single Trawl	all	all	NE	all	25	21	56	63	165	39	36	90	77	242	882	537	870	495	2784	
Mid-water paired & single Trawl	all	all	MA	all	14	0	19	6	39	14	0	22	6	42	364	40	22	1	427	impute
Fish Pots/ Traps	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	0	294	538	156	988	Pilot
Fish Pots/ Traps	all	all	MA	all	0	5	1	0	6	2	6	1	0	9	70	651	568	544	1833	Pilot
Purse Seine	all	all	NE	all	0	4	22	7	33	0	6	38	9	53	0	58	384	91	533	
Purse Seine	all	all	MA	all	0	0	0	0	0	0	2	0	0	2	0	36	21	24	81	Pilot
Hand Line	all	all	NE	all	0	0	4	2	6	0	0	15	3	18	273	743	1967	598	3581	Pilot
Hand Line	all	all	MA	all	0	0	0	0	0	0	2	9	0	11	152	1514	3350	1623	6639	Pilot
Scottish Seine	all	all	NE	all	0	3	1	1	5	0	4	2	2	8	3	40	39	11	93	Pilot
Scottish Seine	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	
Clam Quahog Dredge	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	437	780	624	646	2487	Pilot
Clam Quahog Dredge	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	862	1239	1115	963	4179	Pilot
Crab Pots	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	124	172	223	200	719	Pilot
Crab Pots	all	all	MA	all	0	0	0	0	0	0	0	0	0	0	7	412	647	102	1168	Pilot
Lobster Pots	all	all	NE	all	0	0	0	0	0	0	0	0	0	0	3699	7701	16980	13154	41534	Pilot
Lobster Pots	all	all	MA	all	0	0	0	0	0	0	0	1	2	3	193	1397	2034	835	4459	Pilot
Quota Monitored Longline	all	all	NE	all	0	0	0	110	110											
Quota Monitored Otter Trawl (U/C)	all	all	NE	large	0	175	318	201	694											
Quota Monitored Otter Trawl (U/C)	all	all	NE	small	0	10	30	19	59											
Quota Monitored Otter Trawl (B)	all	all	NE	large	0	0	0	126	126											
Quota Monitored Otter Trawl (B)	all	all	NE	small	0	0	0	6	6											
TOTAL									6908					8429	40450	57282	71872	53459	223063	

Table 39. Number of sea days in the 2004 Northeast Fisheries Observer Program and Vessel Trip Reports, by fishing mode and quarter. The comments indicate where imputation and pilot coverage were used (shading indicates the cells used in the imputation) in the fish and protected species datasets.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Total Trips (FISH)	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE COMPLEX	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH	ALL SPECIES
Longline	all	all	NE	all	12	100%	100%	100%	100%	100%	100%	100%	0%	92%	25%	33%	100%	100%	100%	0%
Longline	all	all	MA	all	0															
Otter Trawl	all	all	NE	small	142	85%	74%	100%	90%	89%	35%	36%	4%	35%	14%	21%	41%	99%	87%	0%
Otter Trawl	all	all	NE	large	386	98%	90%	100%	82%	88%	70%	49%	5%	53%	6%	28%	72%	99%	99%	0%
Otter Trawl	all	all	MA	small	194	90%	96%	100%	99%	90%	55%	67%	44%	73%	23%	37%	28%	96%	99%	5%
Otter Trawl	all	all	MA	large	75	92%	96%	100%	100%	80%	59%	44%	35%	77%	5%	31%	20%	93%	100%	0%
Scallop Trawl	open	limited	MA	all	1	100%	100%	100%	100%	0%	0%	0%	0%	100%	0%	100%	0%	100%	100%	0%
Scallop Trawl	open	general	MA	all	31	97%	100%	100%	97%	35%	58%	29%	32%	77%	3%	77%	74%	100%	100%	0%
Shrimp Trawl	all	all	NE	all	12	100%	0%	100%	100%	92%	92%	17%	0%	50%	50%	92%	100%	100%	100%	0%
Shrimp Trawl	all	all	MA	all	2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%	0%
Sink, Anchor, Drift Gillnet	all	all	NE	large	577	93%	93%	100%	99%	99%	95%	81%	22%	81%	44%	28%	98%	100%	100%	2%
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	445	85%	96%	100%	100%	97%	95%	57%	48%	88%	30%	29%	92%	100%	98%	2%
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	100%	100%	100%	100%	100%	67%	100%	100%	100%	100%	33%	67%	100%	100%	0%
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	75%	100%	100%	100%	100%	100%	100%	75%	100%	50%	25%	100%	100%	100%	0%
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	27	56%	100%	100%	100%	81%	100%	37%	100%	100%	4%	11%	74%	100%	100%	0%
Scallop Dredge	open	limited	NE	all	26	100%	100%	100%	96%	19%	50%	8%	0%	38%	0%	46%	35%	62%	100%	0%
Scallop Dredge	open	limited	MA	all	69	100%	100%	100%	99%	26%	42%	1%	25%	57%	0%	62%	33%	81%	100%	0%
Scallop Dredge	open	general	NE	all	9	100%	100%	100%	100%	67%	89%	33%	0%	56%	11%	78%	89%	89%	100%	0%
Scallop Dredge	open	general	MA	all	22	100%	100%	100%	100%	41%	95%	18%	41%	77%	9%	86%	73%	95%	100%	5%
Scallop Dredge	closed	limited	NE	all	86	99%	97%	100%	98%	20%	43%	5%	1%	16%	0%	51%	26%	85%	100%	0%
Scallop Dredge	closed	limited	MA	all	35	97%	91%	100%	97%	17%	26%	0%	9%	23%	0%	46%	29%	91%	100%	0%
Scallop Dredge	closed	general	NE	all	0															
Scallop Dredge	closed	general	MA	all	1	100%	100%	100%	100%	0%	100%	0%	100%	100%	0%	100%	0%	100%	100%	0%
Mid-water paired & single Trawl	all	all	NE	all	66	89%	86%	100%	100%	98%	62%	85%	73%	79%	95%	30%	97%	100%	100%	9%
Mid-water paired & single Trawl	all	all	MA	all	13	92%	92%	100%	100%	100%	69%	77%	38%	77%	100%	54%	85%	100%	100%	0%
Fish Pots/ Traps	all	all	NE	all	0															
Fish Pots/ Traps	all	all	MA	all	6	100%	100%	100%	100%	100%	100%	83%	100%	100%	100%	100%	0%	100%	100%	0%
Purse Seine	all	all	NE	all	16	100%	88%	100%	100%	100%	88%	100%	94%	100%	100%	44%	100%	100%	100%	31%
Purse Seine	all	all	MA	all	0															
Hand Line	all	all	NE	all	6	100%	100%	100%	100%	100%	100%	100%	67%	100%	100%	100%	100%	100%	100%	67%
Hand Line	all	all	MA	all	0															
Scottish Seine	all	all	NE	all	5	100%	100%	100%	100%	100%	100%	100%	0%	80%	40%	100%	60%	100%	100%	0%
Scottish Seine	all	all	MA	all	0															
Clam Quahog Dredge	all	all	NE	all	0															
Clam Quahog Dredge	all	all	MA	all	0															
Crab Pots	all	all	NE	all	0															
Crab Pots	all	all	MA	all	0															
Lobster Pots	all	all	NE	all	0															
Lobster Pots	all	all	MA	all	0															
Quota Monitored Longline	all	all	NE	all	92	92%	63%	100%	71%	54%	26%	9%	0%	9%	0%	45%	47%	88%	100%	0%
Quota Monitored Otter Trawl (U/C)	all	all	NE	large	7	100%	71%	100%	86%	86%	43%	14%	0%	14%	0%	43%	86%	100%	100%	0%
Quota Monitored Otter Trawl (U/C)	all	all	NE	small	96	100%	100%	100%	100%	100%	100%	98%	3%	57%	11%	1%	100%	100%	100%	0%
Quota Monitored Otter Trawl (B)	all	all	NE	large	20	100%	80%	100%	70%	70%	80%	40%	0%	45%	0%	0%	70%	95%	100%	0%
Quota Monitored Otter Trawl (B)	all	all	NE	small	1	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	0%

Table 40. Number of observed trips in 2004 and the percent of observed trips with zero discard, by fishing mode, for fish species groups. Note: Gray-shade cells indicate unlikely species/gear combinations; U/C = US/Canada; B = B-DAS.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Total Trips (PSPP)	TURTLES	SEALS	WHALES	DOLPHINS/-PORPOISE	SEA BIRDS (ALL)
Longline	all	all	NE	all	119	100.0%	100.0%	100.0%	100.0%	96.6%
Longline	all	all	MA	all	2	100.0%	100.0%	100.0%	100.0%	100.0%
Otter Trawl	all	all	NE	small	200	100.0%	100.0%	99.5%	97.5%	99.0%
Otter Trawl	all	all	NE	large	539	100.0%	100.0%	99.8%	98.5%	99.1%
Otter Trawl	all	all	MA	small	205	98.5%	100.0%	100.0%	98.5%	99.5%
Otter Trawl	all	all	MA	large	76	100.0%	100.0%	100.0%	100.0%	98.7%
Scallop Trawl	open	limited	MA	all	3	66.7%	100.0%	100.0%	100.0%	100.0%
Scallop Trawl	open	general	MA	all	39	100.0%	100.0%	100.0%	100.0%	100.0%
Shrimp Trawl	all	all	NE	all	12	100.0%	100.0%	100.0%	100.0%	100.0%
Shrimp Trawl	all	all	MA	all	2	100.0%	100.0%	100.0%	100.0%	100.0%
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	100.0%	100.0%	100.0%	100.0%	100.0%
Sink, Anchor, Drift Gillnet	all	all	NE	large	772	100.0%	96.6%	100.0%	99.1%	98.3%
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	569	100.0%	94.0%	100.0%	97.7%	99.5%
Sink, Anchor, Drift Gillnet	all	all	MA	small	358	99.4%	100.0%	100.0%	100.0%	98.9%
Sink, Anchor, Drift Gillnet	all	all	MA	large	81	97.5%	100.0%	100.0%	100.0%	97.5%
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	142	97.2%	98.6%	100.0%	99.3%	98.6%
Scallop Dredge	open	limited	NE	all	36	88.9%	100.0%	100.0%	100.0%	97.2%
Scallop Dredge	open	limited	MA	all	78	97.4%	100.0%	100.0%	100.0%	100.0%
Scallop Dredge	open	general	NE	all	20	100.0%	100.0%	100.0%	100.0%	100.0%
Scallop Dredge	open	general	MA	all	39	100.0%	100.0%	100.0%	100.0%	100.0%
Scallop Dredge	closed	limited	NE	all	86	98.8%	100.0%	100.0%	100.0%	98.8%
Scallop Dredge	closed	limited	MA	all	35	100.0%	100.0%	100.0%	100.0%	100.0%
Scallop Dredge	closed	general	NE	all	0					
Scallop Dredge	closed	general	MA	all	1	100.0%	100.0%	100.0%	100.0%	100.0%
Mid-water paired & single Trawl	all	all	NE	all	99	100.0%	100.0%	99.0%	99.0%	97.0%
Mid-water paired & single Trawl	all	all	MA	all	14	100.0%	100.0%	100.0%	100.0%	100.0%
Fish Pots/ Traps	all	all	NE	all	0					
Fish Pots/ Traps	all	all	MA	all	8	100.0%	100.0%	100.0%	100.0%	100.0%
Purse Seine	all	all	NE	all	26	100.0%	100.0%	100.0%	100.0%	100.0%
Purse Seine	all	all	MA	all	2	100.0%	100.0%	100.0%	100.0%	100.0%
Hand Line	all	all	NE	all	9	100.0%	100.0%	100.0%	100.0%	100.0%
Hand Line	all	all	MA	all	3	100.0%	100.0%	100.0%	100.0%	100.0%
Scottish Seine	all	all	NE	all	8	100.0%	100.0%	100.0%	100.0%	100.0%
Scottish Seine	all	all	MA	all	0					
Clam Quahog Dredge	all	all	NE	all	0					
Clam Quahog Dredge	all	all	MA	all	0					
Crab Pots	all	all	NE	all	0					
Crab Pots	all	all	MA	all	0					
Lobster Pots	all	all	NE	all	3	100.0%	100.0%	100.0%	100.0%	100.0%
Lobster Pots	all	all	MA	all	0					

Table 41. Number of observed trips in 2004 and the percent of observed trips with zero incidental takes, by fishing mode, for protected species groups.

Gear Type	Access Area (Open-Closed)	Trip Category (General/Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all								0.418	0.364	0.444	0.139			
Longline	all	all	MA	all														
Otter Trawl	all	all	NE	small	0.338	0.066		0.158	0.059	0.530	0.118	0.178	0.407	0.040	0.047	0.035	0.009	0.277
Otter Trawl	all	all	NE	large	0.116	0.107		0.437	0.069	0.059	0.650	0.479	0.511	0.353	0.312	0.024	0.020	0.016
Otter Trawl	all	all	MA	small	0.090	0.022		0.013	0.020	0.205	0.015	0.096	0.198	0.220	0.028	0.000	0.056	0.149
Otter Trawl	all	all	MA	large	0.080	0.084			0.418	0.420	0.468	0.010	0.239	0.319	0.111	0.185	0.135	
Scallop Trawl	open	limited	MA	all														
Scallop Trawl	open	general	MA	all	0.164			0.067	0.034	0.337	0.238	0.397	0.204	0.210	0.167	0.108		
Shrimp Trawl	all	all	NE	all		0.783			0.034	0.136	0.420	0.099	0.255	0.153	0.004			
Shrimp Trawl	all	all	MA	all														
Sink, Anchor, Drift Gillnet	all	all	NE	small														
Sink, Anchor, Drift Gillnet	all	all	NE	large	0.020	0.167		0.455	0.005	0.005	0.015	0.315	0.136	0.002	0.233	0.032		
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	0.303	0.048		0.013	0.174	0.029	0.362	0.086	0.038	0.481	0.055	0.244		0.162
Sink, Anchor, Drift Gillnet	all	all	MA	small						0.993					0.981	0.993		
Sink, Anchor, Drift Gillnet	all	all	MA	large	0.575							0.507		0.652	0.644			
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.381				0.071		0.251			0.199	0.078	0.130		
Scallop Dredge	open	limited	NE	all				0.199	0.537	0.055	0.452	0.016	0.177	0.228	0.194	0.225	0.278	
Scallop Dredge	open	limited	MA	all				0.078	0.097	0.144	0.262	0.185	0.056	0.275	0.309	0.206	0.004	
Scallop Dredge	open	general	NE	all					0.375	0.112	0.126	0.658	0.174	0.001	0.809	0.491	0.064	
Scallop Dredge	open	general	MA	all					0.295	0.168	0.555	0.332	0.032	0.439	0.103	0.155	0.417	
Scallop Dredge	closed	limited	NE	all	0.035	0.082		0.099	0.115	0.005	0.006	0.172	0.015	0.124	0.058	0.267	0.078	
Scallop Dredge	closed	limited	MA	all	0.022	0.155		0.105	0.429	0.122	0.205	0.064	0.085	0.211	0.239	0.144	0.093	
Scallop Dredge	closed	general	NE	all														
Scallop Dredge	closed	general	MA	all														
Mid-water paired & single Trawl	all	all	NE	all	0.157	0.142			0.133	0.383	0.152	0.148	0.008	0.140	0.030	0.387		
Mid-water paired & single Trawl	all	all	MA	all	0.243	0.214				0.234	0.465	0.437	0.244		0.854	0.371		
Fish Pots/ Traps	all	all	NE	all														
Fish Pots/ Traps	all	all	MA	all							0.377					0.658		
Purse Seine	all	all	NE	all		0.235				0.095		0.085			0.003			
Purse Seine	all	all	MA	all														
Hand Line	all	all	NE	all								0.521						
Hand Line	all	all	MA	all														
Scottish Seine	all	all	NE	all								0.007	0.859	0.083		0.734		
Clam Quahog Dredge	all	all	NE	all														
Clam Quahog Dredge	all	all	MA	all														
Crab Pots	all	all	NE	all														
Crab Pots	all	all	MA	all														
Lobster Pots	all	all	NE	all														
Lobster Pots	all	all	MA	all														

Table 42. Summary of correlation (rho) of the ratio estimate (discard to kept estimator), by fish species group and fishing mode.

Gear Type	Access Area (Open-Closed)	Trip Category (General/Limited)	Region	mesh groups	TURTLES	SEALS	WHALES	DOLPHINS/-PORPOISE	SEA BIRDS (ALL)	ALL SPECIES	PILOT coverage
Longline	all	all	NE	all					0.002	0.208	
Longline	all	all	MA	all							pilot
Otter Trawl	all	all	NE	small			0.102	0.255	0.080	0.411	
Otter Trawl	all	all	NE	large			0.042	0.210	0.111	0.470	
Otter Trawl	all	all	MA	small	0.044			0.110	0.108	0.099	
Otter Trawl	all	all	MA	large					0.064	0.415	
Scallop Trawl	open	limited	MA	all	0.981						pilot
Scallop Trawl	open	general	MA	all						0.266	pilot
Shrimp Trawl	all	all	NE	all						0.592	
Shrimp Trawl	all	all	MA	all						1.000	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small							pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large		0.014		0.014	0.292	0.265	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg		0.006		0.018	0.108	0.244	
Sink, Anchor, Drift Gillnet	all	all	MA	small	0.006				0.042	0.977	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	0.090				0.073	0.636	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.031	0.125		0.034	0.093	0.238	pilot for fish
Scallop Dredge	open	limited	NE	all	0.077				0.025	0.389	
Scallop Dredge	open	limited	MA	all	0.091					0.394	
Scallop Dredge	open	general	NE	all						0.452	pilot
Scallop Dredge	open	general	MA	all						0.353	
Scallop Dredge	closed	limited	NE	all	0.230				0.143	0.112	
Scallop Dredge	closed	limited	MA	all						0.446	
Scallop Dredge	closed	general	NE	all							pilot
Scallop Dredge	closed	general	MA	all							pilot
Mid-water paired & single Trawl	all	all	NE	all			0.003	0.139	0.182	0.272	
Mid-water paired & single Trawl	all	all	MA	all						0.203	
Fish Pots/ Traps	all	all	NE	all							pilot
Fish Pots/ Traps	all	all	MA	all						0.686	pilot
Purse Seine	all	all	NE	all						0.098	
Purse Seine	all	all	MA	all							pilot
Hand Line	all	all	NE	all						0.521	pilot
Hand Line	all	all	MA	all							pilot
Scottish Seine	all	all	NE	all						0.109	pilot
Clam Quahog Dredge	all	all	NE	all							pilot
Clam Quahog Dredge	all	all	MA	all							pilot
Crab Pots	all	all	NE	all							pilot
Crab Pots	all	all	MA	all							pilot
Lobster Pots	all	all	NE	all							pilot
Lobster Pots	all	all	MA	all							pilot

Table 43. Summary of correlation (rho) of the ratio estimate (discard to kept estimator), by protected species group and fishing mode.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB FISH TRIPS	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH	PILOT coverage
Longline	all	all	NE	all	12	*	*	*	*	*	*	*	0.335	0.910	0.614	0.654	*	*	*	
Longline	all	all	MA	all	0															pilot
Otter Trawl	all	all	NE	small	142	0.508	0.437	*	0.428	0.710	**0.227**	0.405	**0.233**	**0.235**	0.691	0.322	0.309	1.028	0.304	
Otter Trawl	all	all	NE	large	386	2.474	1.313	*	**0.280**	0.350	0.572	**0.088**	**0.101**	**0.182**	**0.175**	**0.245**	0.319	1.512	0.529	
Otter Trawl	all	all	MA	small	194	0.903	0.784	*	1.394	0.574	0.561	0.354	0.326	0.508	**0.222**	0.367	0.386	0.464	1.155	
Otter Trawl	all	all	MA	large	75	1.906	0.775	*	*	0.444	0.390	**0.295**	**0.251**	0.827	**0.209**	0.557	**0.246**	0.609	*	
Scallop Trawl	open	limited	MA	all	1	*	*	*	*	**0.000**	**0.000**	**0.000**	**0.000**	*	**0.000**	*	**0.000**	*	*	pilot
Scallop Trawl	open	general	MA	all	31	1.141	*	*	0.640	**0.224**	0.354	**0.194**	**0.170**	0.496	0.347	0.675	0.505	*	*	pilot
Shrimp Trawl	all	all	NE	all	12	*	0.479	*	*	0.965	0.981	**0.235**	**0.224**	0.557	0.799	0.960	*	*	*	
Shrimp Trawl	all	all	MA	all	2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	*	*	*	*	*	**0.000**	*	*	*	*	**0.000**	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	577	**0.220**	**0.229**	*	0.625	0.969	0.841	**0.210**	**0.092**	**0.183**	**0.228**	**0.106**	0.845	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	445	**0.181**	0.378	*	0.998	0.421	0.498	**0.174**	**0.159**	0.624	**0.117**	**0.162**	**0.233**	*	**0.256**	
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	*	*	*	*	*	**0.000**	*	*	*	*	**0.000**	**0.000**	*	*	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	1.216	*	*	*	*	*	*	0.868	*	1.118	1.083	*	*	*	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	27	0.304	*	*	*	0.587	*	**0.273**	*	*	**0.115**	**0.129**	0.303	*	*	pilot for fish
Scallop Dredge	open	limited	NE	all	26	*	*	*	0.842	**0.159**	0.689	0.319	0.480	0.414	**0.236**	0.515	0.458	0.391	*	
Scallop Dredge	open	limited	MA	all	69	*	*	*	1.304	**0.200**	0.305	**0.174**	**0.242**	0.758	**0.126**	**0.230**	**0.259**	0.771	*	
Scallop Dredge	open	general	NE	all	9	*	*	*	*	**0.094**	1.274	0.560	0.358	**0.104**	**0.177**	0.318	**0.092**	1.287	*	pilot
Scallop Dredge	open	general	MA	all	22	*	*	*	*	0.359	0.865	**0.202**	0.311	0.482	**0.202**	0.550	0.461	0.830	*	
Scallop Dredge	closed	limited	NE	all	86	1.077	**0.168**	*	0.482	**0.135**	0.421	**0.222**	**0.159**	0.396	**0.126**	0.326	**0.291**	**0.198**	*	
Scallop Dredge	closed	limited	MA	all	35	1.208	0.660	*	0.357	**0.198**	0.310	**0.280**	0.712	**0.268**	**0.142**	0.425	0.383	0.321	*	
Scallop Dredge	closed	general	NE	all	0															pilot
Scallop Dredge	closed	general	MA	all	1	*	*	*	*	**0.000**	*	**0.000**	*	*	**0.000**	*	**0.000**	*	*	pilot
Mid-water paired & single Trawl	all	all	NE	all	66	0.770	0.770	*	*	1.464	0.429	0.724	0.669	0.994	1.177	0.418	0.628	*	*	
Mid-water paired & single Trawl	all	all	MA	all	13	0.539	0.982	*	*	*	0.545	1.048	0.708	0.539	*	**0.246**	1.165	*	*	
Fish Pots/ Traps	all	all	NE	all	0															pilot
Fish Pots/ Traps	all	all	MA	all	6	*	*	*	*	*	*	0.408	*	*	*	*	**0.161**	*	*	pilot
Purse Seine	all	all	NE	all	16	*	0.981	*	*	*	0.935	*	0.973	*	*	0.972	*	*	*	
Purse Seine	all	all	MA	all	0															pilot
Hand Line	all	all	NE	all	6	*	*	*	*	*	*	*	4.030	*	*	*	*	*	*	pilot
Hand Line	all	all	MA	all	0															pilot
Scottish Seine	all	all	NE	all	5	*	*	*	*	*	*	*	**0.289**	**0.279**	0.319	*	**0.253**	*	*	pilot
Clam Quahog Dredge	all	all	NE	all	0															pilot
Clam Quahog Dredge	all	all	MA	all	0															pilot
Crab Pots	all	all	NE	all	0															pilot
Crab Pots	all	all	MA	all	0															pilot
Lobster Pots	all	all	NE	all	0															pilot
Lobster Pots	all	all	MA	all	0															pilot

Table 44. The coefficient of variation (CV) of composite annual total discards, by fleet and species group (bold font indicates CV is less or equal to 30 percent) derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-1 for all species. Note, when bycatch ratio = 0, CV = null (*); blank = no observer coverage.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB PSPP TRIPS	TURTLES	SEALS	WHALES	DOLPHINS/-PORPOISE	SEA BIRDS (ALL)	ALL SPECIES	PILOT coverage
Longline	all	all	NE	all	119	*	*	*	*	0.425	0.489	
Longline	all	all	MA	all	2	*	*	*	*	*		pilot
Otter Trawl	all	all	NE	small	200	*	*	0.931	0.650	0.548	**0.193**	
Otter Trawl	all	all	NE	large	539	*	*	1.089	0.389	0.489	**0.124**	
Otter Trawl	all	all	MA	small	205	0.573	*	*	0.557	0.706	**0.247**	
Otter Trawl	all	all	MA	large	76	*	*	*	*	0.672	**0.185**	
Scallop Trawl	open	limited	MA	all	3	0.381	*	*	*	*	**0.000**	pilot
Scallop Trawl	open	general	MA	all	39	*	*	*	*	*	**0.243**	pilot
Shrimp Trawl	all	all	NE	all	12	*	*	*	*	*	0.310	
Shrimp Trawl	all	all	MA	all	2	*	*	*	*	*	**0.052**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	*	*	*	*	*	**0.000**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	772	*	**0.206**	*	0.359	0.342	**0.092**	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	569	*	**0.215**	*	**0.288**	0.602	**0.085**	
Sink, Anchor, Drift Gillnet	all	all	MA	small	358	0.626	*	*	*	0.582	**0.000**	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	81	1.052	*	*	*	0.618	1.078	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	142	0.495	0.692	*	0.924	0.693	**0.052**	pilot for fish
Scallop Dredge	open	limited	NE	all	36	0.551	*	*	*	0.896	**0.197**	
Scallop Dredge	open	limited	MA	all	78	0.770	*	*	*	*	**0.112**	
Scallop Dredge	open	general	NE	all	20	*	*	*	*	*	0.325	pilot
Scallop Dredge	open	general	MA	all	39	*	*	*	*	*	**0.184**	
Scallop Dredge	closed	limited	NE	all	86	**0.165**	*	*	*	**0.163**	**0.119**	
Scallop Dredge	closed	limited	MA	all	35	*	*	*	*	*	**0.119**	
Scallop Dredge	closed	general	NE	all	0							pilot
Scallop Dredge	closed	general	MA	all	1	*	*	*	*	*	**0.000**	pilot
Mid-water paired & single Trawl	all	all	NE	all	99	*	*	1.114	0.786	0.554	0.317	
Mid-water paired & single Trawl	all	all	MA	all	14	*	*	*	*	*	0.408	
Fish Pots/ Traps	all	all	NE	all	0							pilot
Fish Pots/ Traps	all	all	MA	all	8	*	*	*	*	*	**0.137**	pilot
Purse Seine	all	all	NE	all	26	*	*	*	*	*	0.715	
Purse Seine	all	all	MA	all	2	*	*	*	*	*		pilot
Hand Line	all	all	NE	all	9	*	*	*	*	*	4.030	pilot
Hand Line	all	all	MA	all	3	*	*	*	*	*		pilot
Scottish Seine	all	all	NE	all	8	*	*	*	*	*	0.423	pilot
Clam Quahog Dredge	all	all	NE	all	0							pilot
Clam Quahog Dredge	all	all	MA	all	0							pilot
Crab Pots	all	all	NE	all	0							pilot
Crab Pots	all	all	MA	all	0							pilot
Lobster Pots	all	all	NE	all	3	*	*	*	*	*		pilot
Lobster Pots	all	all	MA	all	0							pilot

Table 45. The coefficient of variation (CV) of composite annual total discard, by fleet and species group (bold font indicates CV is less or equal to 30%) derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-1 for all species. Note, when bycatch ratio = 0, CV = null (*); blank = no observer coverage.

Gear Type	Access Area (Open-Closed)	Trip Category (General/Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH	
Longline	all	all	NE	all	5	5	*	5	5	5	5	2	4	3	1	5	5	5	
Longline	all	all	MA	all															
Otter Trawl	all	all	NE	small	9	8	*	10	12	1	7	6	3	2	4	5	13	11	
Otter Trawl	all	all	NE	large	9	10	*	6	8	11	4	3	7	1	2	5	13	12	
Otter Trawl	all	all	MA	small	8	11	*	12	9	2	7	6	5	1	3	4	10	13	
Otter Trawl	all	all	MA	large	10	11	*	12	5	7	6	4	8	1	2	3	9	12	
Scallop Trawl	open	limited	MA	all	7	7	*	7	1	6	4	3	7	2	7	5	7	7	
Scallop Trawl	open	general	MA	all	10	11	*	9	2	8	4	5	7	1	3	6	11	11	
Shrimp Trawl	all	all	NE	all	9	1	*	9	6	8	5	2	3	4	7	9	9	9	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	*	3	3	2	3	3	3	3	1	3	3	3	
Sink, Anchor, Drift Gillnet	all	all	NE	large	5	8	*	10	11	7	4	2	6	3	1	9	12	12	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	6	11	*	12	10	7	3	4	8	2	1	5	13	9	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	*	4	4	2	4	4	4	4	1	3	4	4	
Sink, Anchor, Drift Gillnet	all	all	MA	large	2	5	*	5	5	5	5	4	5	3	1	5	5	5	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	4	7	*	7	6	7	3	7	7	2	1	5	7	7	
Scallop Dredge	open	limited	NE	all	11	11	*	10	1	9	3	5	7	2	8	4	6	11	
Scallop Dredge	open	limited	MA	all	11	11	*	10	1	9	3	5	8	2	6	4	7	11	
Scallop Dredge	open	general	NE	all	10	10	*	10	3	9	1	4	7	2	5	6	8	10	
Scallop Dredge	open	general	MA	all	10	10	*	10	2	9	3	4	8	1	7	5	6	10	
Scallop Dredge	closed	limited	NE	all	10	12	*	11	1	8	3	4	6	2	7	5	9	13	
Scallop Dredge	closed	limited	MA	all	10	9	*	12	1	8	3	6	7	2	5	4	11	13	
Scallop Dredge	closed	general	NE	all															
Scallop Dredge	closed	general	MA	all	5	5	*	5	1	5	3	5	5	2	5	4	5	5	
Mid-water paired & single Trawl	all	all	NE	all	6	3	*	11	10	1	8	4	5	7	2	9	11	11	
Mid-water paired & single Trawl	all	all	MA	all	8	6	*	9	9	2	3	7	5	9	1	4	9	9	
Fish Pots/ Traps	all	all	NE	all															
Fish Pots/ Traps	all	all	MA	all	3	3	*	3	3	3	2	3	3	3	3	1	3	3	
Purse Seine	all	all	NE	all	5	2	*	5	5	4	5	3	5	5	1	5	5	5	
Purse Seine	all	all	MA	all															
Hand Line	all	all	NE	all	2	2	*	2	2	2	2	1	2	2	2	2	2	2	
Hand Line	all	all	MA	all															
Scottish Seine	all	all	NE	all	5	5	*	5	5	5	5	2	3	4	5	1	5	5	
Clam Quahog Dredge	all	all	NE	all															
Clam Quahog Dredge	all	all	MA	all															
Crab Pots	all	all	NE	all															
Crab Pots	all	all	MA	all															
Lobster Pots	all	all	NE	all															
Lobster Pots	all	all	MA	all															

Table 46. Rank of total discard weight within fleet for fish species groups derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-2 for all species. Note, "*" indicates no discards of these species occurred.

Gear Type	Access Area (Open-Closed)	Trip Category (General/Limited)	Region	mesh groups	TURTLES	SEALS	WHALES	DOLPHINS/-PORPOISE	SEA BIRDS (ALL)
Longline	all	all	NE	all	2	2	2	2	1
Longline	all	all	MA	all	*	*	*	*	*
Otter Trawl	all	all	NE	small	4	4	3	1	2
Otter Trawl	all	all	NE	large	4	4	3	1	2
Otter Trawl	all	all	MA	small	2	4	4	1	3
Otter Trawl	all	all	MA	large	2	2	2	2	1
Scallop Trawl	open	limited	MA	all	1	2	2	2	2
Scallop Trawl	open	general	MA	all	*	*	*	*	*
Shrimp Trawl	all	all	NE	all	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	4	2	4	3	1
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	1	4	2	3
Sink, Anchor, Drift Gillnet	all	all	MA	small	2	3	3	3	1
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	3	3	3	2
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	1	3	5	2	3
Scallop Dredge	open	limited	NE	all	1	3	3	3	2
Scallop Dredge	open	limited	MA	all	1	2	2	2	2
Scallop Dredge	open	general	NE	all	*	*	*	*	*
Scallop Dredge	open	general	MA	all	*	*	*	*	*
Scallop Dredge	closed	limited	NE	all	2	3	3	3	1
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*
Scallop Dredge	closed	general	NE	all					
Scallop Dredge	closed	general	MA	all	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	4	4	3	2	1
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*
Fish Pots/ Traps	all	all	NE	all					
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*
Purse Seine	all	all	MA	all	*	*	*	*	*
Hand Line	all	all	NE	all	*	*	*	*	*
Hand Line	all	all	MA	all	*	*	*	*	*
Scottish Seine	all	all	NE	all	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all					
Clam Quahog Dredge	all	all	MA	all					
Crab Pots	all	all	NE	all					
Crab Pots	all	all	MA	all					
Lobster Pots	all	all	NE	all	*	*	*	*	*
Lobster Pots	all	all	MA	all					

Table 47. Rank of total number of incidental takes within fleet for protected species groups derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-2 for all species. Note, "*" indicates no discards of these species occurred.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/SCUP/ BLK SEA BASS	SURF CLAM/ OCEAN QUAHOG	TILEFISH	
Longline	all	all	NE	all	14	13	*	11	19	21	21	6	16	17	10	22	11	5	
Longline	all	all	MA	all															
Otter Trawl	all	all	NE	small	2	2	*	2	13	1	4	2	1	3	4	1	8	1	
Otter Trawl	all	all	NE	large	4	5	*	1	11	6	3	1	3	1	3	5	6	2	
Otter Trawl	all	all	MA	small	3	7	*	6	10	3	11	10	2	6	7	3	5	4	
Otter Trawl	all	all	MA	large	8	9	*	11	7	4	10	4	9	5	5	4	3	5	
Scallop Trawl	open	limited	MA	all	14	13	*	11	3	13	13	5	19	8	23	12	11	5	
Scallop Trawl	open	general	MA	all	11	13	*	3	8	15	14	18	13	10	13	17	11	5	
Shrimp Trawl	all	all	NE	all	14	3	*	11	16	20	19	12	5	18	22	22	11	5	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	14	13	*	11	19	12	21	23	19	22	20	22	11	5	
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	6	*	4	17	11	15	3	10	15	2	18	11	5	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	5	8	*	5	15	9	5	7	11	11	8	10	11	3	
Sink, Anchor, Drift Gillnet	all	all	MA	small	14	13	*	11	19	5	21	23	19	22	6	14	11	5	
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	13	*	11	19	21	21	15	19	16	1	22	11	5	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	6	13	*	11	14	21	12	23	19	14	12	16	11	5	
Scallop Dredge	open	limited	NE	all	14	13	*	7	2	7	1	8	4	2	16	6	1	5	
Scallop Dredge	open	limited	MA	all	14	13	*	8	1	10	2	11	7	4	14	7	2	5	
Scallop Dredge	open	general	NE	all	14	13	*	11	9	19	6	16	12	13	19	15	7	5	
Scallop Dredge	open	general	MA	all	14	13	*	11	6	18	9	14	15	7	21	11	4	5	
Scallop Dredge	closed	limited	NE	all	10	12	*	9	4	14	7	9	8	9	17	8	9	5	
Scallop Dredge	closed	limited	MA	all	13	11	*	10	5	16	8	19	17	12	18	9	10	5	
Scallop Dredge	closed	general	NE	all															
Scallop Dredge	closed	general	MA	all	14	13	*	11	12	21	16	23	19	19	23	19	11	5	
Mid-water paired & single Trawl	all	all	NE	all	9	1	*	11	18	2	17	13	6	20	9	21	11	5	
Mid-water paired & single Trawl	all	all	MA	all	12	10	*	11	19	8	18	22	18	22	15	20	11	5	
Fish Pots/ Traps	all	all	NE	all															
Fish Pots/ Traps	all	all	MA	all	14	13	*	11	19	21	20	23	19	22	23	2	11	5	
Purse Seine	all	all	NE	all	14	4	*	11	19	17	21	21	19	22	11	22	11	5	
Purse Seine	all	all	MA	all															
Hand Line	all	all	NE	all	14	13	*	11	19	21	21	17	19	22	23	22	11	5	
Hand Line	all	all	MA	all															
Scottish Seine	all	all	NE	all	14	13	*	11	19	21	21	20	14	21	23	13	11	5	
Clam Quahog Dredge	all	all	NE	all															
Clam Quahog Dredge	all	all	MA	all															
Crab Pots	all	all	NE	all															
Crab Pots	all	all	MA	all															
Lobster Pots	all	all	NE	all															
Lobster Pots	all	all	MA	all															

Table 48. Rank of total discard weight within species group for fish species groups derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-3 for all species. Note, "*" indicates no discards of these species occurred.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	SEALS	WHALES	DOLPHINS/-PORPOISE	SEA BIRDS (ALL)	
Longline	all	all	NE	all	9	4	4	8	12	
Longline	all	all	MA	all	*	*	*	*	*	
Otter Trawl	all	all	NE	small	9	4	1	3	6	
Otter Trawl	all	all	NE	large	9	4	2	2	5	
Otter Trawl	all	all	MA	small	6	4	4	4	11	
Otter Trawl	all	all	MA	large	9	4	4	8	3	
Scallop Trawl	open	limited	MA	all	1	4	4	8	14	
Scallop Trawl	open	general	MA	all	*	*	*	*	*	
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	large	9	2	4	5	1	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	9	1	4	1	9	
Sink, Anchor, Drift Gillnet	all	all	MA	small	7	4	4	8	8	
Sink, Anchor, Drift Gillnet	all	all	MA	large	5	4	4	8	7	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	3	3	4	6	10	
Scallop Dredge	open	limited	NE	all	2	4	4	8	4	
Scallop Dredge	open	limited	MA	all	4	4	4	8	14	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	
Scallop Dredge	open	general	MA	all	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	8	4	4	8	13	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all						
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	
Mid-water paired & single Trawl	all	all	NE	all	9	4	3	7	2	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all						
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	
Purse Seine	all	all	NE	all	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	
Hand Line	all	all	NE	all	*	*	*	*	*	
Hand Line	all	all	MA	all	*	*	*	*	*	
Scottish Seine	all	all	NE	all	*	*	*	*	*	
Clam Quahog Dredge	all	all	NE	all						
Clam Quahog Dredge	all	all	MA	all						
Crab Pots	all	all	NE	all						
Crab Pots	all	all	MA	all						
Lobster Pots	all	all	NE	all	*	*	*	*	*	
Lobster Pots	all	all	MA	all						

Table 49. Rank of total number of incidental takes within species group for protected species groups derived from 2004 Northeast Fisheries Observer Program data; see Appendix B, Table B-3 for all species. Note, "*" indicates no discards of these species occurred.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB FISH sea days	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	12	35	35	35	35	35	35	35	27	185	89	99	35	35	35
Longline	all	all	MA	all	0	76	76	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	449	1103	882	211	848	1998	249	757	266	269	2024	492	455	3822	441
Otter Trawl	all	all	NE	large	1076	26644	12864	730	798	1233	3159	81	107	341	316	614	1034	15593	2692
Otter Trawl	all	all	MA	small	471	2231	1869	196	5417	1162	1125	497	429	944	202	532	584	836	3057
Otter Trawl	all	all	MA	large	183	3625	883	342	342	311	242	140	101	998	70	481	98	584	342
Scallop Trawl	open	limited	MA	all	11	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	56	155	51	51	399	119	181	115	85	292	80	443	408	51	51
Shrimp Trawl	all	all	NE	all	12	42	92	42	42	353	364	22	20	123	247	349	42	42	42
Shrimp Trawl	all	all	MA	all	2	76	76	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	657	443	486	141	2592	4357	3758	408	83	313	482	109	3767	141	141
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	533	267	1004	144	3266	1255	1701	238	206	2059	109	214	417	144	502
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	105	29	29	29	29	29	29	19	29	99	96	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	30	131	68	68	68	301	68	104	68	68	55	58	120	68	68
Scallop Dredge	open	limited	NE	all	344	269	269	269	1596	80	1380	320	708	534	177	807	649	478	269
Scallop Dredge	open	limited	MA	all	591	329	329	329	8713	280	641	213	411	3080	114	371	465	2958	329
Scallop Dredge	open	general	NE	all	11	92	92	92	92	204	176	117	82	135	120	120	92	190	92
Scallop Dredge	open	general	MA	all	33	96	96	96	96	54	293	17	40	96	17	124	88	271	96
Scallop Dredge	closed	limited	NE	all	805	3861	344	139	1473	167	1301	429	227	1180	145	857	703	375	139
Scallop Dredge	closed	limited	MA	all	373	1777	772	108	341	157	337	283	1136	287	88	567	481	334	108
Scallop Dredge	closed	general	NE	all	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	2	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	165	699	747	56	56	1793	346	718	688	1218	1034	316	697	56	56
Mid-water paired & single Trawl	all	all	MA	all	39	182	453	35	35	35	167	492	281	182	35	43	557	35	35
Fish Pots/ Traps	all	all	NE	all	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	6	40	40	40	40	40	40	103	40	40	40	40	40	40	40
Purse Seine	all	all	NE	all	33	19	219	19	19	19	206	19	217	19	19	217	19	19	19
Purse Seine	all	all	MA	all	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	6	72	72	72	72	72	72	72	137	72	72	72	72	72	72
Hand Line	all	all	MA	all	0	133	133	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	5	12	12	12	12	12	12	12	14	12	12	12	30	12	12
Clam Quahog Dredge	all	all	NE	all	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	0	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	0	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	0	439	439	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	0	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					5,913	43,547	23,025	4,573	27,698	15,384	17,200	6,541	6,712	13,792	6,965	8,351	12,200	27,502	9,984
Total Sea Days excluding shaded cells						35,867	19,828	0	5,547	6,049	15,522	5,528	6,450	12,562	4,901	6,943	9,850	133	6,703

Table 50. Number of sea days needed to achieve a 30 percent CV based on the composite annual total discards and the 2004 observed sea days for fish species, by fishing mode and species group; see Appendix B, Table B-4 for all species.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB PSPP sea days	TURTLES	SEALS	WHALES	DOLPHINS/- PORPOISE	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	133	35	35	35	35	267	57
Longline	all	all	MA	all	11	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	577	211	211	3082	2265	1870	183
Otter Trawl	all	all	NE	large	1947	730	730	10526	2111	3237	159
Otter Trawl	all	all	MA	small	499	1229	196	196	1164	1880	250
Otter Trawl	all	all	MA	large	186	342	342	342	342	727	55
Scallop Trawl	open	limited	MA	all	22	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	71	51	51	51	51	51	38
Shrimp Trawl	all	all	NE	all	12	42	42	42	42	42	39
Shrimp Trawl	all	all	MA	all	2	76	76	76	76	76	55
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	876	141	531	141	1398	1306	82
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	701	144	470	144	806	2661	59
Sink, Anchor, Drift Gillnet	all	all	MA	small	375	1259	62	62	62	880	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	85	653	29	29	29	311	95
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	152	468	804	68	1272	806	51
Scallop Dredge	open	limited	NE	all	457	1261	269	269	269	3194	123
Scallop Dredge	open	limited	MA	all	675	3956	329	329	329	329	89
Scallop Dredge	open	general	NE	all	24	92	92	92	92	92	88
Scallop Dredge	open	general	MA	all	55	96	96	96	96	96	14
Scallop Dredge	closed	limited	NE	all	805	414	139	139	139	407	130
Scallop Dredge	closed	limited	MA	all	373	108	108	108	108	108	61
Scallop Dredge	closed	general	NE	all	0	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	2	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	242	56	56	1606	1464	808	193
Mid-water paired & single Trawl	all	all	MA	all	42	35	35	35	35	35	111
Fish Pots/ Traps	all	all	NE	all	0	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	9	40	40	40	40	40	37
Purse Seine	all	all	NE	all	53	19	19	19	19	19	143
Purse Seine	all	all	MA	all	2	9	9	9	9	9	9
Hand Line	all	all	NE	all	18	72	72	72	72	72	137
Hand Line	all	all	MA	all	11	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	8	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	0	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	0	84	84	84	84	84	84
Crab Pots	all	all	NE	all	0	101	101	101	101	101	101
Crab Pots	all	all	MA	all	0	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	3	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	0	89	89	89	89	89	89
Total Sea Days					8,429	12,721	6,025	18,791	13,507	20,503	3,513
Total Sea Days excluding shaded cells						12,721	4,742	17,714	13,507	20,503	3,513

Table 51. Number of sea days needed to achieve a 30 percent CV based on the composite annual total discards and the 2004 observed sea days for protected species, by fishing mode and species group; see Appendix B, Table B-4 for all species.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB FISH TRIPS	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	MONKFISH	NE MULTI-SPP (LARGE-MESH)	NE MULTI-SPP (SMALL-MESH)	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	12	26	26	26	26	26	26	26	21	144	69	78	26	26	26
Longline	all	all	MA	all	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	142	364	291	70	280	659	82	250	88	89	668	162	150	1260	146
Otter Trawl	all	all	NE	large	386	11227	5420	304	336	520	1331	34	45	143	133	259	436	6570	1134
Otter Trawl	all	all	MA	small	194	1189	995	104	2885	619	599	265	229	503	108	283	311	445	1628
Otter Trawl	all	all	MA	large	75	1879	458	177	177	161	125	72	52	517	36	249	51	303	177
Scallop Trawl	open	limited	MA	all	1	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	31	72	25	25	196	56	85	54	41	142	39	216	200	25	25
Shrimp Trawl	all	all	NE	all	12	42	91	42	42	350	361	22	20	122	245	346	42	42	42
Shrimp Trawl	all	all	MA	all	2	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	577	327	359	104	1913	3216	2774	301	61	231	356	81	2780	104	104
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	445	175	657	94	2139	822	1114	156	135	1348	71	140	273	94	329
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	58	58	58	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	100	27	27	27	27	27	27	17	27	95	91	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	27	94	51	51	51	211	51	76	51	51	42	44	87	51	51
Scallop Dredge	open	limited	NE	all	26	25	25	25	146	7	126	29	65	49	16	74	59	44	25
Scallop Dredge	open	limited	MA	all	69	36	36	36	966	31	71	24	46	342	13	41	52	328	36
Scallop Dredge	open	general	NE	all	9	71	71	71	71	149	130	89	64	102	91	91	71	140	71
Scallop Dredge	open	general	MA	all	22	69	69	69	69	39	210	12	29	69	12	89	63	194	69
Scallop Dredge	closed	limited	NE	all	86	449	40	15	171	19	151	50	26	137	17	100	82	44	15
Scallop Dredge	closed	limited	MA	all	35	194	84	12	37	17	37	31	124	31	10	62	53	37	12
Scallop Dredge	closed	general	NE	all	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	1	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	66	266	285	21	21	683	132	274	262	464	394	121	266	21	21
Mid-water paired & single Trawl	all	all	MA	all	13	52	130	12	12	12	48	141	81	52	12	12	160	12	12
Fish Pots/ Traps	all	all	NE	all	0	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	6	37	37	37	37	37	37	97	37	37	37	37	37	37	37
Purse Seine	all	all	NE	all	16	10	108	10	10	10	102	10	107	10	10	107	10	10	10
Purse Seine	all	all	MA	all	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	6	68	68	68	68	68	68	68	129	68	68	68	68	68	68
Hand Line	all	all	MA	all	0	126	126	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	5	12	12	12	12	12	12	12	14	12	12	12	30	12	12
Clam Quahog Dredge	all	all	NE	all	0	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	0	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	0	353	353	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	0	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					2,272	17,678	10,260	2,306	10,588	8,647	8,594	3,015	2,641	5,584	3,447	3,658	6,227	10,788	4,971
Total Trips excluding shaded cells						15,925	9,034	0	1,539	2,468	7,333	2,219	2,464	4,637	2,243	2,511	4,981	139	3,180

Table 52. Number of trips needed to achieve a 30 percent CV based on composite annual total discards and the 2004 observed trips of fish species, by fishing mode and species group; see Appendix B, Table B-5 for all species.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB PSPP TRIPS	TURTLES	SEALS	WHALES	DOLPHINS/ PORPOISE	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	119	26	26	26	26	208	44
Longline	all	all	MA	all	2	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	200	70	70	1016	747	617	60
Otter Trawl	all	all	NE	large	539	304	304	4435	890	1364	67
Otter Trawl	all	all	MA	small	205	654	104	104	620	1001	133
Otter Trawl	all	all	MA	large	76	177	177	177	177	377	29
Scallop Trawl	open	limited	MA	all	3	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	39	25	25	25	25	25	18
Shrimp Trawl	all	all	NE	all	12	42	42	42	42	42	38
Shrimp Trawl	all	all	MA	all	2	13	13	13	13	13	9
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	772	104	392	104	1032	964	61
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	569	94	308	94	528	1742	38
Sink, Anchor, Drift Gillnet	all	all	MA	small	358	1195	58	58	58	835	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	81	604	27	27	27	288	91
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	142	351	604	51	955	605	39
Scallop Dredge	open	limited	NE	all	36	115	25	25	25	292	11
Scallop Dredge	open	limited	MA	all	78	439	36	36	36	36	10
Scallop Dredge	open	general	NE	all	20	71	71	71	71	71	69
Scallop Dredge	open	general	MA	all	39	69	69	69	69	69	10
Scallop Dredge	closed	limited	NE	all	86	48	15	15	15	47	15
Scallop Dredge	closed	limited	MA	all	35	12	12	12	12	12	7
Scallop Dredge	closed	general	NE	all	0	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	1	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	99	21	21	612	558	308	73
Mid-water paired & single Trawl	all	all	MA	all	14	12	12	12	12	12	32
Fish Pots/ Traps	all	all	NE	all	0	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	8	37	37	37	37	37	34
Purse Seine	all	all	NE	all	26	10	10	10	10	10	71
Purse Seine	all	all	MA	all	2	9	9	9	9	9	9
Hand Line	all	all	NE	all	9	68	68	68	68	68	129
Hand Line	all	all	MA	all	3	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	8	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	0	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	0	69	69	69	69	69	69
Crab Pots	all	all	NE	all	0	12	12	12	12	12	12
Crab Pots	all	all	MA	all	0	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	3	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	0	75	75	75	75	75	75
Total Trips					3,587	5,397	3,360	7,975	6,887	9,877	1,992
Total Trips excluding shaded cells						5,397	3,023	7,720	6,887	9,877	1,992

Table 53. Number of fishing trips needed to achieve a 30 percent CV based on composite annual total discards and the 2004 observed trips for protected species, by fishing mode and species group; see Appendix B, Table B-5 for all species.

Gear Type	Access Area (Open-Closed)	Trip Category (General/Limited)	Region	mesh groups	2004 OB FISH sea days	2004 OB PSPP sea days	BASELINE: Sea days needed for 20 species groups by fleet	BASELINE: Sea days needed for 15 species groups by fleet	FILTER APPLIED: Sea days needed for 20 species groups by fleet	FILTER APPLIED: Sea days needed for 15 species groups by fleet
Longline	all	all	NE	all	12	133	267	185	267	185
Longline	all	all	MA	all	0	11	76	76	76	76
Otter Trawl	all	all	NE	small	449	577	3822	3822	3082	2024
Otter Trawl	all	all	NE	large	1076	1947	26644	26644	26644	26644
Otter Trawl	all	all	MA	small	471	499	5417	5417	3057	3057
Otter Trawl	all	all	MA	large	183	186	3625	3625	3625	3625
Scallop Trawl	open	limited	MA	all	11	22	95	95	95	95
Scallop Trawl	open	general	MA	all	56	71	443	443	443	443
Shrimp Trawl	all	all	NE	all	12	12	364	364	364	364
Shrimp Trawl	all	all	MA	all	2	2	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	1	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	657	876	4357	4357	3767	3767
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	533	701	3266	3266	2661	2059
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	375	1259	1259	1259	1259
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	85	653	653	653	653
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	30	152	1272	468	1272	468
Scallop Dredge	open	limited	NE	all	344	457	3194	1596	3194	1596
Scallop Dredge	open	limited	MA	all	591	675	8713	8713	3956	3956
Scallop Dredge	open	general	NE	all	11	24	204	204	204	204
Scallop Dredge	open	general	MA	all	33	55	293	293	124	124
Scallop Dredge	closed	limited	NE	all	805	805	3861	3861	1473	1473
Scallop Dredge	closed	limited	MA	all	373	373	1777	1777	1136	1136
Scallop Dredge	closed	general	NE	all	0	0	24	24	24	24
Scallop Dredge	closed	general	MA	all	2	2	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	165	242	1793	1793	1606	1218
Mid-water paired & single Trawl	all	all	MA	all	39	42	557	557	492	492
Fish Pots/ Traps	all	all	NE	all	0	0	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	6	9	103	103	40	40
Purse Seine	all	all	NE	all	33	53	219	219	219	219
Purse Seine	all	all	MA	all	0	2	9	9	9	9
Hand Line	all	all	NE	all	6	18	137	137	137	137
Hand Line	all	all	MA	all	0	11	133	133	133	133
Scottish Seine	all	all	NE	all	5	8	30	30	30	30
Clam Quahog Dredge	all	all	NE	all	0	0	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	0	0	84	84	84	84
Crab Pots	all	all	NE	all	0	0	101	101	101	101
Crab Pots	all	all	MA	all	0	0	28	28	28	28
Lobster Pots	all	all	NE	all	0	3	439	439	439	439
Lobster Pots	all	all	MA	all	0	0	89	89	89	89
Total Sea Days					5,913	8,429	73,524	71,041	60,959	56,427

Table 54. The maximum number of sea days (baseline and filtered) needed to achieve a 30 percent CV based on the composite annual total discards for any of the species groups (20 species groups) and for any of the fish and turtle species groups (15 species groups), by fishing mode. Filtered values exclude gray-shaded cells within a fishing mode. The 2004 observed sea days for fish species and protected species are presented for comparison.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	2004 OB FISH TRIPS	2004 OB PSPP TRIPS	BASELINE: Trips needed for 20 species groups by fleet	BASELINE: Trips needed for 15 species groups by fleet	FILTER APPLIED: Trips needed for 20 species groups by fleet	FILTER APPLIED: Trips needed for 15 species groups by fleet
Longline	all	all	NE	all	12	119	208	144	208	144
Longline	all	all	MA	all	0	2	12	12	12	12
Otter Trawl	all	all	NE	small	142	200	1260	1260	1016	668
Otter Trawl	all	all	NE	large	386	539	11227	11227	11227	11227
Otter Trawl	all	all	MA	small	194	205	2885	2885	1628	1628
Otter Trawl	all	all	MA	large	75	76	1879	1879	1879	1879
Scallop Trawl	open	limited	MA	all	1	3	12	12	12	12
Scallop Trawl	open	general	MA	all	31	39	216	216	216	216
Shrimp Trawl	all	all	NE	all	12	12	361	361	361	361
Shrimp Trawl	all	all	MA	all	2	2	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	1	1	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	577	772	3216	3216	2780	2780
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	445	569	2139	2139	1742	1348
Sink, Anchor, Drift Gillnet	all	all	MA	small	3	358	1195	1195	1195	1195
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	81	604	604	604	604
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	27	142	955	351	955	351
Scallop Dredge	open	limited	NE	all	26	36	292	146	292	146
Scallop Dredge	open	limited	MA	all	69	78	966	966	439	439
Scallop Dredge	open	general	NE	all	9	20	149	149	149	149
Scallop Dredge	open	general	MA	all	22	39	210	210	89	89
Scallop Dredge	closed	limited	NE	all	86	86	449	449	171	171
Scallop Dredge	closed	limited	MA	all	35	35	194	194	124	124
Scallop Dredge	closed	general	NE	all	0	0	12	12	12	12
Scallop Dredge	closed	general	MA	all	1	1	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	66	99	683	683	612	464
Mid-water paired & single Trawl	all	all	MA	all	13	14	160	160	141	141
Fish Pots/ Traps	all	all	NE	all	0	0	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	6	8	97	97	37	37
Purse Seine	all	all	NE	all	16	26	108	108	108	108
Purse Seine	all	all	MA	all	0	2	9	9	9	9
Hand Line	all	all	NE	all	6	9	129	129	129	129
Hand Line	all	all	MA	all	0	3	126	126	126	126
Scottish Seine	all	all	NE	all	5	8	30	30	30	30
Clam Quahog Dredge	all	all	NE	all	0	0	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	0	0	69	69	69	69
Crab Pots	all	all	NE	all	0	0	12	12	12	12
Crab Pots	all	all	MA	all	0	0	27	27	27	27
Lobster Pots	all	all	NE	all	0	3	353	353	353	353
Lobster Pots	all	all	MA	all	0	0	75	75	75	75
Total Trips					2,272	3,587	30,450	29,636	26,971	25,266

Table 55. The maximum number of trips (baseline and filtered) needed to achieve a 30 percent CV based on composite annual total discards for any of the species groups (20 species groups) and for any of the fish and turtle species groups (15 species groups). Filtered values exclude gray-shaded cells within a fishing mode. The 2004 observed sea days for fish species and protected species are presented for comparison.

Species	VTR - OB Avg Kept	N	SE	t-value	Pr >|t|		VTR-OB SD Kept	N	SE	t-value	Pr >|t|
Bluefish	192.04	89	127.171	1.51	0.135		324.19	79	157.262	2.06	**0.043**
Dogfish	-15.70	89	17.962	-0.87	0.385		30.65	79	14.318	2.14	**0.035**
Fluke-Scup-Blk Sea Bass	-51.04	89	54.436	-0.94	0.351		157.76	79	76.790	2.05	**0.043**
NE Multi-species Large mesh	-357.86	89	134.004	-2.67	**0.009**		-476.10	79	220.113	-2.16	**0.034**
NE Multi-species Small mesh	157.08	89	64.444	2.44	**0.017**		508.04	79	153.252	3.32	**0.001**
Herring	-2317.45	89	1722.540	-1.35	0.182		-629.71	79	1485.460	-0.42	0.673
Monkfish	-152.02	89	79.585	-1.91	0.059		-231.12	79	167.885	-1.38	0.173
Red crab	0.00	89	0.006	0.31	0.754		0.08	79	0.093	0.86	0.395
Mackerel-Squid-Butterfish	-11705.74	89	8118.610	-1.44	0.153		860.00	79	4483.930	0.19	0.848
Scallop	-608.13	89	1730.680	-0.35	0.726		5098.35	79	1631.770	3.12	**0.003**
Surf Clam/Ocean Quahog	0.00	89	0.007	-0.73	0.466		0.00	79	0.060	-0.02	0.986
Skate Complex	-47.31	89	33.559	-1.41	0.162		26.24	79	82.646	0.32	0.752
Tilefish	97.62	89	89.291	1.09	0.277		90.44	79	57.857	1.56	0.122
All species	-16787.50	89	8372.200	-2.01	**0.048**		1864.35	79	4740.290	0.39	0.695

VTR - OB Avg Trip Duration	N	SE	t-value	Pr >|t|		VTR-OB SD Trip Duration	N	SE	t-value	Pr >|t|
-0.2133396	89.000	0.15309	-1.390	0.167		0.2989122	79.000	0.094976	3.150	**0.002**

Table 56. Summary of statistical comparisons of differences in average kept pounds, standard error of average kept pounds (SE), average trip duration, and standard deviation of average trip duration between 2004 FVTR and observer (OB) trips.

Quarter	Gear	Acces Area	Region	Mesh	Trip Duration	df	Chi Sqr Test Statistic	Chi Sqr Crit Value	Signif Level
4	Longline	N/A	MA	all	all	3	0.215	7.815	0.9751
1	Longline	N/A	NE	all	all	7	2.844	14.067	0.8991
2	Longline	N/A	NE	all	all	4	2.500	9.488	0.6446
3	Longline	N/A	NE	all	all	10	5.291	18.307	0.8709
4	Longline	N/A	NE	all	all	10	40.599	18.307	0.0000
2	Handline	N/A	MA	all	all	18	92.581	28.869	0.0000
3	Handline	N/A	NE	all	all	21	5.024	32.671	0.9999
4	Handline	N/A	NE	all	all	13	2.267	22.362	0.9995
1	Otter Trawl	N/A	MA	lg	all	25	44.504	37.652	0.0095
1	Otter Trawl	N/A	MA	sm	all	19	63.025	30.144	0.0000
2	Otter Trawl	N/A	MA	lg	all	20	37.788	31.410	0.0094
2	Otter Trawl	N/A	MA	sm	all	22	228.933	33.924	0.0000
3	Otter Trawl	N/A	MA	lg	all	17	120.121	27.587	0.0000
3	Otter Trawl	N/A	MA	sm	all	22	271.477	33.924	0.0000
4	Otter Trawl	N/A	MA	lg	all	21	16.469	32.671	0.7427
4	Otter Trawl	N/A	MA	sm	all	19	88.007	30.144	0.0000
1	Otter Trawl	N/A	NE	lg	all	23	242.863	35.172	0.0000
1	Otter Trawl	N/A	NE	sm	all	24	181.785	36.415	0.0000
2	Otter Trawl	N/A	NE	lg	all	24	155.561	36.415	0.0000
2	Otter Trawl	N/A	NE	sm	all	25	133.612	37.652	0.0000
3	Otter Trawl	N/A	NE	lg	all	23	302.233	35.172	0.0000
3	Otter Trawl	N/A	NE	sm	all	26	42.856	38.885	0.0200
4	Otter Trawl	N/A	NE	lg	all	26	250.108	38.885	0.0000
4	Otter Trawl	N/A	NE	sm	all	26	152.285	38.885	0.0000
2	Scallop Trawl	OPEN	MA	all	GEN	11	310.000	19.675	0.0000
3	Scallop Trawl	OPEN	MA	all	GEN	10	4.431	18.307	0.9258
4	Scallop Trawl	OPEN	MA	all	GEN	10	120.884	18.307	0.0000
1	Shrimp Trawl	N/A	NE	all	all	7	33.307	14.067	0.0000
1	Gillnets	N/A	MA	lg	all	6	2.278	12.592	0.8925
1	Gillnets	N/A	MA	sm	all	12	10.915	21.026	0.5362
1	Gillnets	N/A	MA	xlg	all	12	76.243	21.026	0.0000
2	Gillnets	N/A	MA	lg	all	12	45.891	21.026	0.0000
2	Gillnets	N/A	MA	sm	all	13	358.693	22.362	0.0000
2	Gillnets	N/A	MA	xlg	all	16	36.796	26.296	0.0022
3	Gillnets	N/A	MA	lg	all	8	46.832	15.507	0.0000
3	Gillnets	N/A	MA	sm	all	16	55.543	26.296	0.0000
3	Gillnets	N/A	MA	xlg	all	9	4.674	16.919	0.8617
4	Gillnets	N/A	MA	lg	all	16	37.909	26.296	0.0016
4	Gillnets	N/A	MA	sm	all	14	28.583	23.685	0.0119
4	Gillnets	N/A	MA	xlg	all	12	8.187	21.026	0.7704
1	Gillnets	N/A	NE	lg	all	9	9.442	16.919	0.3975
1	Gillnets	N/A	NE	xlg	all	11	14.015	19.675	0.2322
2	Gillnets	N/A	NE	lg	all	13	85.201	22.362	0.0000
2	Gillnets	N/A	NE	xlg	all	19	54.954	30.144	0.0000
3	Gillnets	N/A	NE	lg	all	16	228.757	26.296	0.0000
3	Gillnets	N/A	NE	xlg	all	16	108.983	26.296	0.0000
4	Gillnets	N/A	NE	lg	all	15	102.635	24.996	0.0000
4	Gillnets	N/A	NE	xlg	all	15	83.781	24.996	0.0000

Quarter	Gear	Acces Area	Region	Mesh	Trip Duration	df	Chi Sqr Test Statistic	Chi Sqr Crit Value	Signif Level
2	Purse Seine	N/A	NE	all	all	1	0.048	3.841	0.8257
3	Purse Seine	N/A	NE	all	all	3	1.673	7.815	0.6429
4	Purse Seine	N/A	NE	all	all	3	4.540	7.815	0.2087
1	Scallop Dredge	CLOSE	MA	all	LIM	1	6.722	3.841	0.0095
2	Scallop Dredge	CLOSE	MA	all	LIM	1	0.727	3.841	0.3938
3	Scallop Dredge	CLOSE	MA	all	LIM	1	5.009	3.841	0.0252
4	Scallop Dredge	CLOSE	MA	all	GEN	1	19.083	3.841	0.0000
4	Scallop Dredge	CLOSE	MA	all	LIM	3	14.834	7.815	0.0020
1	Scallop Dredge	CLOSE	NE	all	LIM	1	8.000	3.841	0.0047
2	Scallop Dredge	CLOSE	NE	all	LIM	1	11.701	3.841	0.0006
3	Scallop Dredge	CLOSE	NE	all	LIM	1	10.000	3.841	0.0016
4	Scallop Dredge	CLOSE	NE	all	LIM	3	412.873	7.815	0.0000
1	Scallop Dredge	OPEN	MA	all	LIM	9	2.266	16.919	0.9865
2	Scallop Dredge	OPEN	MA	all	GEN	15	2.931	24.996	0.9997
2	Scallop Dredge	OPEN	MA	all	LIM	14	37.021	23.685	0.0007
3	Scallop Dredge	OPEN	MA	all	GEN	14	20.087	23.685	0.1274
3	Scallop Dredge	OPEN	MA	all	LIM	15	18.187	24.996	0.2530
4	Scallop Dredge	OPEN	MA	all	GEN	12	10.077	21.026	0.6092
4	Scallop Dredge	OPEN	MA	all	LIM	15	6.035	24.996	0.9792
1	Scallop Dredge	OPEN	NE	all	GEN	12	1.175	21.026	1.0000
1	Scallop Dredge	OPEN	NE	all	LIM	15	28.176	24.996	0.0205
2	Scallop Dredge	OPEN	NE	all	LIM	17	15.682	27.587	0.5464
3	Scallop Dredge	OPEN	NE	all	GEN	17	75.386	27.587	0.0000
3	Scallop Dredge	OPEN	NE	all	LIM	15	34.112	24.996	0.0033
4	Scallop Dredge	OPEN	NE	all	GEN	15	30.304	24.996	0.0109
4	Scallop Dredge	OPEN	NE	all	LIM	14	20.032	23.685	0.1291
1	Mid-water Trawls	N/A	MA	all	all	9	3.455	16.919	0.9435
1	Mid-water Trawls	N/A	NE	all	all	13	12.966	22.362	0.4505
2	Mid-water Trawls	N/A	NE	all	all	12	6.588	21.026	0.8836
3	Mid-water Trawls	N/A	NE	all	all	10	10.498	18.307	0.3979
4	Mid-water Trawls	N/A	NE	all	all	11	8.442	19.675	0.6732
2	Fish Pots/Traps	N/A	MA	all	all	13	34.188	22.362	0.0011
3	Fish Pots/Traps	N/A	MA	all	all	11	14.444	19.675	0.2094
3	Lobster Pots	N/A	NE	all	all	28	3.031	41.337	1.0000
4	Lobster Pots	N/A	NE	all	all	25	4.020	37.652	1.0000
2	Scottish Seine	N/A	NE	all	all	2	1.476	5.991	0.4780
3	Scottish Seine	N/A	NE	all	all	2	0.238	5.991	0.8880
4	Scottish Seine	N/A	NE	all	all	1	0.750	3.841	0.3865

Table 57. Summary of contingency table analyses of spatial distribution of 2004 FVTR and observed trips. Expected value of observed trips is based of proportions of FVTR trips by Statistical Areas. Critical value of Chi-Square statistics is based on alpha level of 0.05. Degrees of freedom as based on number of Statistical Areas reported in the FVTR database. Shading indicates p-value greater than 0.05.

Chapter 6
Proposed Action and Other Alternatives Considered

This chapter presents the alternatives for the SBRM for Northeast Region FMP fisheries, including those preferred alternatives identified as the proposed action, considered during the development of this amendment. Following the public review and hearing phase of the process, the Councils reevaluated their initial preferred alternatives, and made several changes based on the comments received on the draft amendment. This chapter has been revised to reflect these changes and to clearly identify the final preferred alternatives (i.e., the proposed action).

According to NMFS (2004), an SBRM is the "combination of data collection and analyses that [is] used to estimate bycatch in a fishery." However, it is important to distinguish between analytical techniques and procedures used to determine the precision of estimates of total discards and the appropriate observer sea day allocation levels from those analytical techniques and procedures used to incorporate discard data into and conduct stock assessments. Different analytical tools and models are used for these purposes, and the techniques and models used for stock assessments vary by species and stocks assessed.[39]

For the purposes of this amendment, the SBRM to be established for the FMPs of the Northeast Region would specify how the relevant data are to be collected and how those data, once collected, would be analyzed to develop estimates of the precision associated with discard estimates and to determine the appropriate allocation of observer coverage. Further, the amendment would establish standards for the SBRM, per the Court findings in *Oceana* v. *Evans I* and *Oceana* v. *Evans II*. Therefore, based on the NMFS' definition and recent Court findings, there are three principal components of the SBRM for which alternatives are presented: (1) The suite of reporting and monitoring mechanisms used to collect bycatch-related data; (2) the analytical techniques or procedures used to develop estimates of the precision associated with bycatch data; and (3) the performance measure (standard) used to determine the adequacy of the data collected. The SBRM Amendment includes additional supporting elements regarding a process by which bycatch data collected under the SBRM will be evaluated, framework adjustment procedures, a prioritization process, and provisions for industry-funded observer programs.

The presentation of alternatives in this chapter is structured around the seven components identified above. For each component, or element, two to four alternatives

[39] The analytical techniques, procedures, and models employed in stock assessments vary by stock assessment and are reviewed as part of each stock assessment (the NEFSC SAW/SARC process). These techniques, procedures, and models are updated with each stock assessment as new data are incorporated into the stock assessment process and as new techniques, procedures, and models are developed and refined. It would be neither practicable nor appropriate to attempt to identify or prescribe the analytical tools to be used in future stock assessments.

are presented: The status quo alternative, which reflects the current bycatch monitoring and reporting program; and an action(s) that could be taken to modify, supplement, or replace the relevant component of the current bycatch monitoring and reporting program. In some cases, there are options available for consideration within an alternative. In addition to the alternatives presented for each of the seven components identified above, there is a brief description and discussion of the alternatives that were considered but rejected from formal consideration during the development of this amendment.

In many fishery management actions, the "no action alternative" represents the outcome if the Councils and NMFS take no action to address the relevant issue (no FMP, amendment, framework adjustment, or annual specifications are prepared). In some cases, the current regulations would continue; but in other cases, the current regulations would expire or no longer be relevant.[40] In cases where current regulations or specifications would expire or no longer be relevant, the no action alternative can be distinguished from the status quo, which would represent a continuation of regulations or specifications from one year to the next. In cases where the current regulations would continue without interruption, and no other changes would occur, the no action alternative and the status quo would not be distinguished.

In this amendment, the "no action alternative" is considered to be an outcome in which the Councils and NMFS fail to develop, submit, approve, and implement an SBRM Amendment that documents and establishes those components of a bycatch reporting program required under the law. However, because the Magnuson-Stevens Act requires that an SBRM be established for each FMP, and because the Court, in rulings regarding *Oceana* v. *Evans I* and *Oceana* v. *Evans II*, remanded to the Secretary of Commerce both Amendment 13 to the Northeast Multispecies FMP and Amendment 10 to the Sea Scallop FMP pending development of said SBRM, such an outcome would be contrary to both law and the standing Court orders. Thus, the "no action alternative" is not a reasonable alternative for this action and will not be formally considered or analyzed in this document. However, for each element of the SBRM, the "status quo" is presented and analyzed.

Bycatch data are currently being collected by a variety of mechanisms on a variety of Northeast Region fisheries. These data are currently being utilized in stock assessments and are currently available to managers. Absent this amendment, these data would continue to be collected and utilized by managers and in stock assessments. Therefore, for the purposes of this amendment, the "status quo" is considered to represent the currently utilized data collection mechanisms or analytical procedures that provide data and information on bycatch in the Northeast Region. Furthermore, the status quo alternatives will provide the baseline against which alternatives are compared and analyzed. This amendment would formally specify the data collection and analytical mechanisms currently in use, considers changes or additions to these mechanisms,

[40] For example, some frameworks or annual adjustments set an annual quota or allocate DAS to a fleet. Absent the action, zero DAS may be allocated (no fishing), or no quota may be established (unlimited fishing). Thus, the implications of the no action alternative may be very different depending on the type of management system in place. In these cases, the status quo would continue a set of regulations that would provide for some level of controlled fishing activity.

discusses how these data are used and what constitutes standards of acceptability for these data, and would formally implement the resulting SBRM as an explicit element of each subject FMP.

The status quo is not limited to the methods by which at-sea observer trips and days are currently allocated. The status quo is the totality of all the ways in which data and information related to discards are currently collected, monitored, analyzed, and reported. Because all of the currently used data collection mechanisms are valid and contribute, at least in some way, to our understanding of discard rates in Northeast Region fisheries, all of the alternatives considered below represent modifications to the status quo. Thus, alternatives described below that would affirmatively and formally establish a current mechanism, procedure, or practice as a component of the Northeast Region SBRM are called the "status quo" alternatives. Alternatives that would modify, supplement, or replace the current program are named for their most distinguishing characteristic.

As fully described in each of the following subsections, the proposed action comprises the following preferred alternatives:

- Element 1: Alternative 1.1 – Status quo
- Element 2: Alternative 2.3 – Integrated allocation approach with importance filter (Option B)
- Element 3: Alternative 3.2 – Establish a CV SBRM standard
- Element 4: Alternative 4.2 – Specify an SBRM review process (Option D); and Alternative 4.3 – Require periodic discard reports (Option B)
- Element 5: Alternative 5.3 – Modify the framework adjustment and annual adjustment/specification procedures
- Element 6: Alternative 6.2 – Council consultation of proposed SBRM observer allocations
- Element 7: Alternative 7.2 – Authorize observer service provider approval and certification; and Alternative 7.3 – Addition of industry-funded observer and observer set-aside provisions as a measures that can be implemented through framework adjustments to the FMPs

6.1. Element 1: Bycatch Reporting and Monitoring Mechanisms

6.1.1. Alternative 1.1 – Status Quo (*Preferred Alternative*)

Under this preferred alternative, the bycatch reporting and monitoring mechanisms currently utilized for the fisheries subject to this amendment would continue to be utilized. The data collection mechanisms are tiered based on the relevance of the data. The primary mechanisms (Tier 1) used to provide direct information on fishery discards would include:

- At-sea fishery observers;[41]
- Marine Recreational Fishery Statistics Survey (MRFSS);[42]
- Vessel monitoring systems (VMS); and
- Fishing vessel trip reports (FVTRs) (limited utility for discards).

These information collection and reporting mechanisms, as well as the mechanisms identified below, are fully described in Chapter 4. There are several information collection mechanisms that are currently in use, and would remain in use, that serve as primary sources of fishery-related information (Tier 2) but do not directly provide information on fishery discards (including information used in conjunction with discard information to complete stock assessments). These include:

- Fishery independent surveys (state and Federal);
- Dealer purchase reports;
- Fishing vessel trip reports; and
- Port sampling.

In addition, three sources of information currently contribute to the universe of fishery data that are used by scientists and managers in the Northeast to understand and address bycatch-related issues (Tier 3). Although these mechanisms are much more limited in scope and applicability than those identified above, they have been used and may continue to be used in the future as one among many sources of fishery-related information. These include:

- Industry-based surveys;
- Study fleets; and

[41] Note that nothing in this alternative, or in this amendment, requires the *establishment* of a fisheries observer program. The Northeast Fisheries Observer Program (NEFOP) is a long-standing, well-established at-sea fisheries observer program that has been in place for over 15 years. The NEFOP observer program manual (NMFS 2005a), biological sampling manual (NMFS 2006a), training manuals, data handling procedures (see Appendix D), and formal training facility and training program serve as a model for other observer programs around the country and around the world. The focus of the amendment is on how the NEFOP is *utilized* to provide adequate data on discards occurring in fisheries.

[42] As noted in Chapter 4, the MRFSS program is currently under-going a system-wide review by NMFS. This review is a direct result of the assessment conducted by the NRC, and is intended to address the issues with the survey identified by the NRC. This review is being conducted on a national scale and has potentially far-reaching implications for how recreational fishery data are collected and analyzed. For the purposes of this amendment, it is intended that MRFSS or its replacement will continue to serve as the primary tool to collect information on discards in recreational fisheries. Therefore, all references to MRFSS in the discussion of alternatives should be considered as placeholders representing the recreational fishery survey program that results from this NMFS effort. The resulting program will serve as the primary source of information on discards in recreational fisheries in the Northeast Region.

- Alternate platforms.

Although not currently in use, other potential reporting and monitoring mechanisms may be developed and/or become sufficiently mature and cost-effective to be used to collect relevant data at some future time (Tier 4). These potential mechanisms include electronic monitoring and image processing systems. In addition, "specialized" bycatch monitoring to address specific issues that arise in particular fisheries (such as the incidental unobserved take of sea turtles by sea scallop dredges with chain mats) may be developed and requested by a Council or implemented as part of a future FMP action. While these technologies or monitoring programs are not presently proposed to be implemented, this alternative would not preclude adoption and implementation of one or more of these technologies in the future.

The status quo is defined to incorporate all results from the NRC-suggested and Congressionally-mandated changes to the Agency's recreational fishery data collection programs. The timing of the national effort in regards to redesigning MRFSS is unfortunately out of sync with the development of the SBRM Amendment for the Northeast Region. To be responsive to the Court order on the need for an SBRM, the Councils and NMFS intend to submit and implement the SBRM Amendment prior to completion of the recreational data collection effort. However, it would be redundant, inefficient, and contrary to the intent of the NRC and Congress to undertake a similar, but independent, effort as part of the SBRM Amendment that is focused only on collecting data on recreational fishing in the Northeast Region. Thus, the SBRM Amendment is intended to create a framework within which all national changes and upgrades to recreational fishing data collection methods would apply to and be incorporated into the Northeast Region SBRM, once they are implemented by the agency and partner states.

As summarized in Table 58, the preferred alternative proposes four tiers of information collection and monitoring as part of the SBRM for use by fishery scientists and managers to better understand and address the scope and nature of bycatch in Northeast Region fisheries.

Tier 1: Primary Sources of Fishery Discard Information	**Tier 2: Primary Sources of Fishery-Related Information**
• At-sea fishery observers • Marine Recreational Fishery Statistics Survey (or replacement) • Vessel monitoring system reports • Fishing vessel trip reports (limited)	• Fishery-independent surveys • Seafood dealer purchase reports • Port Agent sampling • Fishing vessel trip reports
Tier 3: Supplemental Sources of Discard and Fishery-Related Information	**Tier 4: Potential Future Sources of Discard and Fishery-Related Information**
• Industry-based surveys • Study fleets • Alternate platforms	• Electronic monitoring • Image capture and processing • Specialized monitoring programs

Table 58. Preferred alternative fishery information collection and monitoring in the Northeast Region SBRM.

6.1.2. Alternative 1.2 – Implement Electronic Monitoring to Collect Bycatch Information

As described in chapter 4, there are a variety of mechanisms by which information on discards can be collected. Many of these mechanisms are already employed in the Northeast Region, and these would continue to be employed under the status quo alternative described above. However, this alternative would require that one additional bycatch information collection mechanism be implemented as part of the SBRM—electronic monitoring. This alternative does not propose *replacing* any status quo mechanism, but rather would reflect an *expanded* suite of data collection mechanisms to include some form of this developing technology.

For each electronic monitoring development and deployment within the Northeast Region, the type of data, system specifications, and the planned application of the data must be clearly established for an effective program to be administered. Should this alternative be selected, further refinement would be required. For example, in a hook and line fishery, an electronic monitoring program utilizing the off-the-shelf technology that currently exists could be developed and deployed to collect a wide array of data elements. Some examples of data that could be collected under the existing regulatory environment include:

- Detailed gear setting and retrieval information;
- Estimates of total effort through hook counts per set;
- Visual confirmation of seabird, marine mammal, and protected species interactions, incidental takes, and possibly mortality events;
- Species identification of discards that occur at the hauling station or as ‘drop offs’ before catch is brought onboard. Identification may be limited to species of concern, general species groups, or only performed for a subset of all hooks observed.

Additional data elements that may be possible with additional regulatory requirements that specify how retained catch and discards must be handled may include:

- Identification of retained and discarded catch. Identification may be limited to species of concern, general species groups, or only performed for a subset of all fishing time observed.
- Size estimates of catch and discards. May be limited to market category or general size groups (e.g., small, medium, large, extra-large) pending type of visual reference available to cameras for scaling.
- Logbook verification of vessel operator catch and discard information.

Development of electronic monitoring into a tool that is usable for bycatch and discard monitoring may well be possible but will clearly take an extensive development effort, starting with the decision of what data electronic monitoring could provide and where electronic monitoring collection data could be useful. Within the Northeast

Region, an electronic monitoring pilot study has been conducted on hook and line vessels. Proof-of-concept studies are scheduled for small gillnet vessels and in pelagic herring trawl fisheries. Other fisheries may also be suitable for electronic monitoring development and deployments depending on the type(s) of data to be collected. Table 59 categorizes the degree of complexity considering the typical vessel size, gear type, and diversity of catch. The scale ranges from one to five, with one being the least complex and five being the most complex.

Electronic monitoring could, in theory, be developed to collect specific data elements in any fishery mode. There are limitations on how detailed the visual data can be and electronic monitoring is not capable of collecting biological data such as age, length, or sex. Electronic monitoring may be well suited for applications such as monitoring discards in pelagic trawl fishery modes or for monitoring turtle interactions with fishery modes operating in the Mid-Atlantic area. Clear establishment of data needs and project goals would be essential in moving any concept forward into an electronic monitoring pilot project.

Gear Type	Complexity Tier
Demersal Longline	2
Otter Trawl	5
Scallop Trawl	5
Scallop Dredge	5
Mid-water Trawl	5
Fish Pots/Traps	1
Crab Pots	1
Lobster Pots	1
Clam/Quahog Dredge	Unknown
Purse Seine	4
Hand Line	2
Gillnet (sink, anchor, or drift)	4

Table 59. Evaluation of fishery modes complexity for Northeast Region electronic monitoring programs (complexity scale: 1-low to 5-high). The complexity tiers were assigned based on a review of the available information and consideration of the appropriateness of the technology to each type of fishing gear.

6.2. Element 2: Analytical Techniques and Allocation of Observers

6.2.1. Alternative 2.1 – Status quo[43]

Under this alternative, the analytical techniques employed to estimate the precision of discard estimates and allocate at-sea fishery observer effort for the fisheries subject to this amendment would remain those currently in use. These analytical techniques and procedures are fully described in Appendix A and address such issues as sampling units, response variables, definitions of appropriate strata, data sources, imputation, and tests for sources of bias. The procedures and analyses described in Appendix A are currently applied to three species groups (large-mesh multispecies; summer flounder, scup, and black sea bass; and monkfish) and three gear types (otter trawls, gillnets, and longlines). These are the only species and gear types for which this methodology is currently applied in a formal manner. Observer coverage for other gear types and species is allocated on an ad hoc basis, or as requested by the Councils, if funding is available.

In addition to the analytical techniques described in Appendix A, this alternative addresses the mechanisms by which observer coverage is determined for the species and gear types addressed by these procedures. Under the status quo approach, observers would continue to be allocated using, among other means, the optimization tool described in Appendix A (see Figure 36). As noted above, the optimization tool is currently designed for the large-mesh otter trawl, gillnet, and longline fisheries, but could be expanded the encompass all fishing modes subject to the SBRM. Under the status quo, available observer sea days would first be allocated to programs with prescribed observer coverage levels (e.g., Northeast multispecies fishery SAPs and B-Regular DAS program). Remaining available observer sea days would then be allocated to the three fishing gear types noted above based on the optimization tool. Other factors, such as special requests of a Council (for example, the requested hagfish fishery information collection program) or an unforeseen circumstance or problem that arises in a fishery (such as increased monitoring of protected resources interactions), would be used to assign observer coverage to other fisheries on an ad hoc basis.

[43] The nomenclature of the alternatives presented under this item have changed slightly from the public hearing draft of the amendment. What had been called the "status quo" is now presented as the "integrated allocation approach." What is now called the "status quo" was not included in the earlier draft. This change is intended to correct an aspect of the public hearing draft that proved misleading and confusing. What was called the status quo actually presumed that the analytical methods and observer assignment procedures described in Chapter 5 would be implemented Region-wide for all fisheries. However, this is somewhat misleading as the methodology in Chapter 5, while based in large part on the current analytical techniques and observer allocation procedures, is more appropriately considered to be a substantial expansion and refinement of the status quo methodology. For example, the gray-cell filter, while a natural outcome of expanding this type of methodology across the full range of species groups and gear types, was not formally utilized prior to the development of the SBRM Amendment. Thus, the revised amendment more accurately represents the methodology as it was used previously (see Appendix A), and the methodologies proposed to be implemented as the Northeast Region SBRM.

As the primary source of bycatch data in commercial fisheries, at-sea observer coverage applies to all commercial fishing modes affected by the SBRM Amendment. Data on recreational fishing would be obtained through the data collection program(s) that result from the NRC-suggested and Congressionally-mandated changes to the MRFSS program. These data would serve the same function for recreational fisheries as at-sea observer data serve for commercial fisheries.

Regarding the use of at-sea fisheries observers, in the Northeast Region existing regulations require that, as a condition of all Federal fishing vessel permits issued in the Region, fishing vessels carry an observer anytime they are requested to do so. The regulations at § 648.11(a) stipulate that “The Regional Administrator may request any vessel holding a permit for Atlantic sea scallops, [Northeast] multispecies, monkfish, skates, Atlantic mackerel, squid, butterfish, scup, black sea bass, bluefish, spiny dogfish, Atlantic herring, tilefish, or Atlantic deep-sea red crab; or a moratorium permit for summer flounder; to carry a NMFS-approved sea sampler/observer.” A recent change in April 2007 extended this requirement to “any vessel . . . that fishes for, catches or lands hagfish, or intends to fish for, catch, or land hagfish in or from the [EEZ].” This requirement is reinforced in the “prohibitions” section of the regulations, which state at § 648.14(a)(9) that it is unlawful for an person to “refuse to carry an observer or sea sampler if requested to do so by the Regional Administrator.”

6.2.2. Alternative 2.2 – Integrated Allocation Approach

Building on the techniques and procedures described in Appendix A and utilized under the status quo alternative, this alternative would refine and expand the aforementioned methodology to apply to apply to 39 separate fishing modes across 14 gear types and 15 species/species groups (including sea turtles). The refined and expanded methodology proposed under this alternative is described in detail in chapter 5. In addition to being expanded to include all relevant gear types and applicable species, the bycatch variance assignment method also differs from the status quo by the inclusion of the gray-cell filter (as described in section 5.3.3.1).

Under this alternative, there are two ways in which the observer coverage may be determined for any combination of fishing gear type and species: The math-driven approach, which calculates the number of observer sea days necessary to attain the CV-based performance standard, based on the results of analysis using data from prior years; or the pilot coverage approach, which estimates a baseline level of pilot coverage expected to provide sufficient data to use the math-driven approach in the future. Wherever possible, the math-driven approach is used. The pilot coverage approach is used when prior sampling levels were too low to provide sufficient data with which to use the math-driven approach (see section 5.3.3.2).

Because the math-driven approach requires data collected by at-sea fisheries observers as input—in order to calculate a CV and then project the number of observed sea days are required to attain the CV-based performance standard—if there were no observed trips of a fishing mode, there would be no data available to serve as input to the math-driven approach. Pilot coverage allocates an initial level of observer coverage equivalent to 2 percent of the trips that occurred in the year on which the analysis is based. For example, if, in 2004, there were an average of 300 3-day long fishing trips per quarter for a fishing mode that had no observer coverage in 2004, in order to begin to collect data on this fishing mode, pilot coverage equivalent to 2 percent of these trips, or 72 sea days, would be allocated to this fishing mode. The pilot coverage level of 2 percent was selected based on the most conservative recommendation of the National Working Group on Bycatch, which suggested that pilot coverage, where needed, be based on a range of 0.5-2 percent of trips, with a minimum of 3 trips per quarter and a maximum of 100 trips per quarter (NMFS 2004).

Under this alternative, the target observer coverage allocation for each fishing mode would be the highest projected number of observer sea days needed to achieve the CV-based performance standard for each species or species group after the application of the gray-cell filter. The gray-cell filter is designed to eliminate combinations of fishing gear types and species under two scenarios: (1) The discards of a species in a gear type does not occur, either due to the area fished or to the design of the gear type (e.g., Atlantic salmon in Mid-Atlantic crab pots, sea scallops in longline gear, surfclams in mid-water trawls, etc.); or (2) the discards are extremely unlikely to occur, due to the nature of the gear and/or the nature/distribution of the species (e.g., deep-sea red crabs in New England large-mesh gillnets, surfclams in otter trawls, etc.). Either of these scenarios may be due to the nature/distribution of the species or its lack of interaction with a gear type, or may be due to specific regulations that have been implemented to reduce or eliminate the bycatch of certain species (e.g., sea turtles in scallop dredges operating with a turtle “chain mat” in place[44]). The premise behind the gray-cell filter is to recognize that there are certain combinations of species and fishing gear types for

[44] On August 25, 2006, NMFS published a final rule implementing a requirement that all vessels fishing with scallop dredges in the EEZ south of 41° 9.0’ N. latitude from May 1 through November 30 add a chain “mat” to the bottom of the dredge. The chain mat is a configuration of cross-wise and length-wise chains that prevent sea turtles from entering the dredge. On November 15, 2006, NMFS revised the chain mat regulations through an emergency rule to stipulate the maximum allowable spacing of the chains. This change was made to reduce confusion and a potential discrepancy regarding the configuration and spacing of the chains. Both rules were implemented based on the results of a 2-year scientific study demonstrating that, with the addition of the chain mat, the bycatch of sea turtles in scallop dredges was eliminated (DuPaul et al. 2004). The implementation of these regulations fundamentally changed the operational environment in which sea turtles may be encountered as bycatch by a sea scallop dredge. Because this action was implemented in late 2006, the data (from 2004) used to calculate observer coverage necessary to achieve a CV of 30 percent in each fishing mode do not reflect the change in the regulatory and operational environment that results. Eliminating the sea turtle/scallop dredge cells from the SBRM matrix for the purpose of determining required levels of observer coverage in each fishing mode does not mean that there would be no observer coverage in these fisheries. Observer coverage would still be required in the scallop dredge fisheries to account for the bycatch of other species. The classification of a cell in the gray-cell filter would always remain contingent upon the continued use/implementation of the regulation (in this case, the requirement to use a chain mat). If the regulation is lifted, the cell would no longer be included in the gray-cell filter. One of the reasons for the gray-cell filter is to provide a mechanism for the SBRM to explicitly account for changes that occur in the regulatory or operational environment of certain fisheries as regulations are implemented to reduce or eliminate bycatch, and to reduce the observer coverage level burdens in these fisheries to be consistent with such changes. However, nothing in the SBRM is intended to override monitoring requirements implemented or mandated pursuant to a Biological Opinion or any other applicable laws.

which bycatch is infeasible or occurs so infrequently that it would be imprudent to derive observer coverage levels for these gear types based on these species.

As the primary source of bycatch data in commercial fisheries, at-sea observer coverage applies to all commercial fishing modes affected by the SBRM Amendment. Data on recreational fishing would be obtained through the data collection program(s) that result from the NRC-suggested and Congressionally-mandated changes to the MRFSS program. These data would serve the same function for recreational fisheries as at-sea observer data serve for commercial fisheries.

6.2.3. Alternative 2.3 – Integrated Allocation Approach with Importance Filter (*Preferred Alternative*)[45,46]

This alternative would function the same as the previous alternative for determining the appropriate allocation of observer effort, but with the substantial addition of an "importance filter" beyond the gray-cell filter to further refine the appropriate target allocation of observer effort within each fishing mode.[47] Under the previous alternative, the necessary observer coverage allocation for each fishing mode would be the highest projected number of observer sea days to achieve the CV-based performance standard for each species or species group after the application of the gray-cell filter. However, one of the limitations of this method is that it does not account for the relevance of the discards of each species within each fishing mode. The intent is to distinguish between species for which the imprecision of the discard estimate may have the potential to affect a stock assessment, and those species for which it would not. The importance filter is intended to serve as a tool to illuminate that distinction, and to aid in establishing observer sea day allocations that are more meaningful and efficient at achieving the overall objectives of the SBRM and the at-sea observer program.

An importance filter, in this context, is a criteria-based tool applied to the projected observer sea days needed to achieve the CV-based performance standard. It is specifically designed to "weed out" particular combinations of fishing gear and bycatch species where the infrequency and variable amounts of discards would result in high observer sea day coverage levels, in spite of the fact that the actual magnitude and frequency of discards may be low and of small consequence to the discarded species in the larger context of all Northeast Region fisheries. For example, based on the initial

[45] Even though the names and numbers of the alternatives have changed from the public hearing draft of the SBRM Amendment, this alternative is functionally and operationally equivalent to the alternative selected by the Councils as the preferred alternative prior to the public hearing phase of the amendment's development. This alternative had been called "Status quo with importance filter."

[46] The numbers of observer sea days cited in this section as examples and results of the proposed filtering tool process differ from those presented in the Draft SBRM Amendment. These differences derive from the changes to the calculations of observer sea days, as explained in chapter 5 of this document.

[47] At a meeting on August 22, 2006, members of the Science and Statistical Committees of the New England and Mid-Atlantic Councils met to conduct a peer-review of the analytical components of this amendment. During the review and discussion, the SSC members agreed and recommended that the SBRM Amendment include an "importance filter" as a means to most effectively determine the appropriate target observer coverage levels for the various fishing modes.

calculations of observer coverage levels needed to achieve the objective of a CV of no more than 30 percent, 12,864 observer sea days would be required to monitor Atlantic herring bycatch in the New England large-mesh otter trawl fishery (see page 25 in Appendix C). However, in 2004 a *total* of 563 lb of herring were observed to be discarded in this fishery (a fishery in which over 1,000 fishing sea days were observed) and 90 percent of observed trips had zero discards of herring. Specifically, out of 386 observed trips within this fishing mode, 38 had discards of herring, and the sum of the discards on those 38 trips was 563 lb (< 15 lb per trip). This 563 lb represents roughly 0.0003 percent of the 2004 commercial landings in the herring fishery, and 0.000085 percent of the 2004 allowable biological catch (ABC). Without the application of an importance filter, the target observer sea day coverage level in this fishing mode would be 12,864 days, which is more than one-third the total number of days actually fished in the New England large-mesh otter trawl fishery in 2004. As such, allocating this level of coverage, based solely on the observed discards of Atlantic herring, would be an inefficient use of observer coverage resources.

The use of an importance filter is intended to eliminate these cases from the final calculation of target observer sea days for each fishing mode, so the bycatch species driving the target coverage level are ones for which the implications of the discards in the fishery are not negligible. Within this alternative, two options are presented for the final form of the importance filter: Option A, which reflects the importance filter alternative originally presented in the public hearing draft of the amendment; and Option B, which eliminates the CV-met filter and incorporates revisions to the third-level and fourth-level filters to address comments received during the public review and comment process. Option A is retained primarily to illustrate the differences between what was initially proposed in the public hearing draft of the amendment and the revised importance filter process proposed here.

Regardless of the option selected as the preferred alternative, there are several important issues that may require clarification. The options listed below function on three levels: As with the previous alternative, the gray-cell filter is designed to eliminate combinations of fishing gear types and species that either do not occur or occur so infrequently, due to the nature of the interaction between the gear and the species or due to regulations that have been implemented to reduce or eliminate the bycatch of certain species, that it would be imprudent to derive observer coverage levels based on these species; the second is to eliminate combinations of fishing gear types and species where the contribution of that gear type to the total discards of that species is negligible; and the third is to eliminate combinations where the magnitude of discards of a species relative to the overall landings or total fishing mortality (landings plus discards) of that species is negligible. While the proposed gray-cell filter addresses both fish species and sea turtles, the consideration of total discards and total landings/mortality in Option A and Option B focus solely on filtering observer coverage levels for commercially targeted fish species. The discards and landings/mortality based filters proposed in these options are not used to filter sea turtles as the basis for establishing the necessary observer coverage level in a fishing mode. This is explained further in each option below.

Both options presented below are designed to be used on an annual basis to determine the observer coverage levels necessary to achieve the CV-based performance standard annually. Prior to the start of each calendar year, scientists at the Center would utilize observer and landings data from the four most recent quarters for which data are available as input to the processes described in this amendment. These data would provide the basis to determine the number of sea days needed for each cell of the species-gear type matrix. The importance filter selected as the preferred alternative would then be applied to refine the total number of observer sea days needed in each fishing mode. This information would then be used by the Center and the NEFOP to allocate observer coverage levels across all fishing modes for the coming year.

As the primary source of bycatch data in commercial fisheries, at-sea observer coverage applies to all commercial fishing modes affected by the SBRM Amendment. Data on recreational fishing would be obtained through the data collection program(s) that result from the NRC-suggested and Congressionally-mandated changes to the MRFSS program. These data would serve the same function for recreational fisheries as at-sea observer data serve for commercial fisheries.

6.2.3.1. Importance Filter Option A

The first option for an importance filter is the original importance filter alternative described in the public hearing draft of the SBRM Amendment. This option focuses on the encounter rate (the proportion of trips in which the species was encountered and discarded), the relative proportion of discards of that particular species compared to discards of other species within the fishing mode, the magnitude of the observed discards, and the proportion of the discards of the species within the fishing mode to the total landings of the species among all fisheries. Under this option, sea turtles are filtered only at the initial gray-cell filter (level 1) or the CV-met filter (level 2). The third and fourth level filters would not reduce the observer sea days in any fishing mode below the number necessary to achieve the performance standard for sea turtles.

An example of how this importance filter could be applied is demonstrated with the bycatch of Atlantic herring in the New England small-mesh otter trawl fishing mode (see page 23 in Appendix C): In 2004, 142 trips out of 3,484 were observed. On 74 percent of the observed trips (105 trips), there were no discards of herring; but on the remaining 37 trips, herring totaling 13,687 lb were observed to be discarded. Relative to the 563 lb of discarded herring in the large-mesh otter trawl example above, this amount of discarded herring may appear to be substantial. However, even this amount of discarded herring only represents 1.24 percent of the total observed discards within the observed fishing mode, and is still less than 0.01 percent of the commercial landings of herring in 2004. Even though the 142 observed trips only represent 4 percent of all fishing trips in this mode in 2004, the total amount of herring discarded by this mode is estimated to be less than 0.3 percent of the commercial landings (which were only 28 percent of the total allowable biological catch for the year). So, the importance filter provides a way to identify that the 882 observer sea days calculated to be necessary to achieve a CV of 30 percent should not necessarily be used to determine the target observer coverage level for this fishing mode.

For each fishing gear mode, and for each of the 15 relevant species and species groups, a series of hierarchical filters would be applied to eliminate from consideration the species/species groups that fall below established thresholds for each relevant factor, and would function as follows (see Table 60):

(1) The first-level filter would be the gray-cell filter described in chapter 5 and in the previous alternative, which eliminates combinations of species and gear types in which encounters are infeasible or extremely unlikely;

(2) The second-level filter would eliminate species when the realized CV, based on the dataset analyzed to calculate the CV, is 30 percent or less (i.e., successfully achieved the performance standard), but the projected observer sea days exceeds the number of days actually observed in the year(s) in which the performance standard was achieved;

(3) The third-level filter would eliminate species when the discards of that species in a mode are less than a certain minimum percentage of the total discards for that mode (with the exception of protected species, for which none of the filters beyond the gray-cell filter would be applied); and

(4) The fourth-level filter would eliminate species when the total discards of that species in a mode are less than a certain minimum percentage of the total landings (commercial and recreational) of that species in all fisheries combined.

A potential fifth filter, which is not proposed at this time, would eliminate species when the total discards of that species in a mode are less than a certain minimum percentage of the total allowable catch, or, depending on the information available at the time, the total biomass, of the species.[48]

So, for example, in the Mid-Atlantic small-mesh otter trawl fishing mode (see page 23 in Appendix C), after eliminating the gray-celled salmon, red crab, and surfclam and ocean quahog, the importance filter could be used to eliminate sea scallops (with a total of 6,303 lb of observed discards, 0.81 percent of all discards in this fishing mode), and then to eliminate the mackerel, squid, and butterfish complex (while the percent of all discards in the fishing mode may exceed the threshold for this filter, with total discards at less than 0.90 percent of total landings of herring, it would likely fall below the threshold established for the fourth-level filter). Eliminating bluefish, herring, and tilefish for similar reasons would reduce the target observer sea days for this fishing mode from 5,417 to no more than 944. Given that the cost of each observer sea day is roughly $1,150, the reduction in the necessary coverage represents over $5.1 million.

The two most important aspects of the design and application of this importance filter option are the criteria selected as the filters (i.e., the discards of the species relative

[48] This last filter, described here as a placeholder for possible future action, is intended to address species, such as Atlantic herring or mackerel, for which the total landings of that species are markedly less than the total allowable catch and, therefore, may be an incomplete measure of the implications of the bycatch amount in the subject fishing mode.

to the total discards in the fishing mode, and the discards of the species relative to the total landings of that species in all fisheries), and the threshold levels established within each filter. The thresholds considered ranged from 0.5 percent to 3.0 percent, and a final threshold would be selected in the final version of the SBRM Amendment, after review by all appropriate technical groups and the two Councils, should this option be selected as the preferred alternative.

	Total Sea Days Required for All 15 Species Groups (including sea turtles)		
	Example 1 0.5%	**Example 2** 1.0%	**Example 3** 3.0%
Baseline	71,043	71,043	71,043
1. Gray-cell filter	55,554	55,554	55,554
2. CV-met filter	55,452	55,452	55,452
3. Discard ratio filter	14,516	13,151	12,065
4. Landings ratio filter	11,868	11,253	10,704
5. Discard % of TAC/B filter (*potential future upgrade*)	N/A	N/A	N/A

Table 60. Summary of the number of observer sea days needed to achieve a CV of 30 percent, based on the sequential application of the Option A importance filters at a variety of threshold levels.

It is important to understand that without the importance filter, as in the previous alternative, there would be no established protocol to refine the total target observer sea days to levels commensurate with the importance of the discard species within the overall fisheries observer program or within the context of the overall Northeast Region fisheries (see “baseline” row in Table 60). Again, consider red crab: Without any filter, including the gray-cell process, for red crab alone the total number of sea days needed to observe the fishing modes in which red crabs are discarded (to achieve the target CV of 30 percent) would be 27,698 days. With the gray-cell filter, but without an importance filter, the number decreases to 5,547 days. The cost to implement this level of observer coverage, however, far exceeds the total value of the red crab fishery (the cost to observe 27,698 days would be $31.8 million and the cost to observe 5,547 days would be $6.4 million, while the ex-vessel value of all red crab landings average less than $4 million annually). From a cost-benefit perspective it does not appear appropriate to expend more than one and a half times the value of a fishery to monitor potential discards of the target species in other fisheries. To maximize the value and benefit of the observer program, the importance filter would provide a tool to limit the projected observer sea days needed to more reasonable and effective levels, commensurate with the relative importance of the potential bycatch events.

6.2.3.2. Importance Filter Option B (*Preferred Option*)

The second option for an importance filter is a modification of the original importance filter alternative described in the public hearing draft of the SBRM Amendment, based on comments received during the comment period on the draft amendment. The differences between this and Option A are: (1) The CV-met filter is eliminated as unnecessary following the full incorporation of the finite population correction factor (see chapter 5); (2) the third-level filter is now based on the discards of a species in a fishing mode relative to the total discards of that species; and (3) the fourth-level filter is now based on the discards of a species in a fishing mode relative to the total known fishing mortality of that species (commercial landings, recreational landings, and discards). Under this option, sea turtles are filtered only at the initial gray-cell filter (level 1).

As noted above, the most significant differences between the revised filters in Option B and the original filters in Option A are the mechanisms by which the non-gray-cell filters are applied. Under Option A, the discard-to-discard (third level) filter was applied within a fishing mode; i.e., the filter operated on the proportion of discards of a species relative to the other species discarded by that fishing mode. In this way, if a species comprised a minor component of the discards of a fishing mode, it may have been filtered out, regardless of the proportion of the total discards of that species contributed by the subject fishing mode. Under Option B, there is still a comparison of discards to total discards, but instead of within a fishing mode and across species, it is within a species and across fishing modes. In this way, a species/fishing mode combination would only be filtered out at this stage if it contributed a minor amount of the total discards of that species.

The discards-to-landings filter in Option A operated by comparing the discards of a species in a fishing mode to the total landings (recreational and commercial) of that species. In this way, if the discards of a species were relatively minor in proportion to the landings of that species, it may have been filtered out. Under Option B, this filter expands the denominator of this function by adding discards so that the comparison is of the discards of a species relative to the total known fishing mortality on that species. In this way, when the discards of a species in a fishing mode contribute a relatively minor amount to the total fishing mortality on that species, it may be filtered out.

The other significant change from the filters initially proposed (now Option A) and the revised filters is the basis for selecting an appropriate threshold level for the filters to operate. Under Option A, the filter thresholds operated independently of the cumulative effect of the discards or mortality contributed by the various fishing modes. This created the impression (based on the comments received on the draft amendment) that the threshold levels could be selected on an arbitrary basis because there was no apparent relationship between the thresholds considered and the implications of these threshold levels to the fishery or the stock. Instead, under Option B, the threshold levels are set based on the cumulative effect of all the subject fishing modes. Thus, under Option A, a threshold of 10 percent for the discards to discards filter would mean that any species that individually comprised less than 10 percent of the total discards within a fishing mode would be filtered out. If all but one species each contributed less than 10 percent of total discards within that fishing mode, then all but that one species would be filtered out. Conversely, with Option B, a threshold of 90 percent for the discards to discards filter means that the species would only be filtered for those fishing modes that contribute, on a cumulative basis, less than 10 percent of the total discards of that species.

As an example of the functional difference between these approaches, see Table 61. Under Option A, individual species are filtered out for each fishing mode based on the individual contribution of discards associated with that fishing mode. Using a threshold of 5 percent for illustration, all species but Species A and Species B would be filtered out as contributing less than 5 percent of total discards, even though cumulatively these species combine for 25 percent of the total discards. In contrast, under Option B, fishing modes are filtered out for each species based on the cumulative discards each fishing mode contributes for that species. Thus, at a threshold of 5 percent, all fishing modes but the two that together contribute less than 5 percent of total discards are retained and only these two are filtered.

Option A			**Option B**		
Within Fishing Mode X			**Within Species X**		
	Individual % of discards	Cumulative % of discards		Individual % of discards	Cumulative % of discards
Species A	50%	50%	Mode 1	50%	50%
Species B	25%	75%	Mode 2	25%	75%
Species C	**4%**	79%	Mode 3	4%	79%
Species D	**4%**	83%	Mode 4	4%	83%
Species E	**4%**	87%	Mode 5	4%	87%
Species F	**3%**	90%	Mode 6	3%	90%
Species G	**3%**	93%	Mode 7	3%	93%
Species H	**3%**	96%	Mode 8	3%	96%
Species I	**2%**	98%	Mode 9	2%	**98%**
Species J	**2%**	100%	Mode 10	2%	**100%**

Table 61. Example of the functional differences between the discard ratio importance filters proposed in Option A and Option B. The shaded rows represent the species/fishing modes that would be filtered under each option using a filter threshold of 5 percent.

An example of how this importance filter could be applied is demonstrated with the bycatch of mackerel, squid, and butterfish in the New England large-mesh gillnet mode. Almost all discards of these species come from three fishing modes (New England small-mesh otter trawl, New England mid-water trawls, and Mid-Atlantic small-mesh otter trawls), which together account for 98.75 percent of the total discards. On the other hand, New England large-mesh gillnets contribute only 0.03 percent of the total discards of these species, yet the observer sea days for these species in this fishing mode were calculated to be 3,758 days. The importance filter under Option B would be a way to identify that the 3,758 observer sea days calculated to be necessary to achieve a CV of 30 percent should not necessarily be used to determine the target observer coverage level for this fishing mode.

For each fishing gear mode, and for each of the 15 relevant species and species groups, a combination of filters would be applied to eliminate from consideration the species/species groups that fall below established thresholds for each relevant factor, and would function as follows (see Table 62):

(1) The first-level filter would be the gray-cell filter described in chapter 5 and in the previous alternative, which eliminates combinations of species and gear types in which encounters are infeasible or extremely unlikely;

(2) The second-level filter is no longer applicable;

(3) The third-level filter would eliminate fishing modes for a species that together contribute less than a threshold level of the cumulative discards of that species in all fisheries combined; and

(4) The fourth-level filter would eliminate fishing modes for a species when the total discards of that species in a mode are less than a threshold level of the cumulative fishing mortality (commercial and recreational landings plus known discards) of that species in all fisheries combined.

The potential fifth filter, which is described in Option A, is not proposed under this option as a potential future filter. Because the fourth filter under Option B is calculated as a mortality ratio, rather than just landings, it would not be appropriate to incorporate the TAC into the importance evaluation.

So, for example, in the Mid-Atlantic small-mesh otter trawl mode, the baseline observer sea days would be 5,417 days (to achieve a 30 percent CV for red crab). The gray-cell filter reduces this amount to 3,057 days (to achieve the CV for tilefish), by eliminating red crabs, surfclams, and Atlantic salmon from further consideration. Applying the discard ratio filter (third level) at a threshold of 95 percent further reduces this amount to 2,231 (for bluefish). At this threshold level, tilefish are filtered because Mid-Atlantic small-mesh otter trawls contribute only 0.25 percent of the total discards of tilefish. Atlantic herring (1,869 observer sea days, but only 0.12 percent of total herring discards) are also filtered from further consideration at this stage. Applying the mortality ratio filter (fourth level) at a threshold of 98 percent reduces the observer sea days necessary for this fishing mode to 1,229 days, which is the target level for sea turtles. Bluefish (2,231 sea days) is filtered at this stage as the discards of bluefish associated with this fishing mode contribute only 0.16 percent of the total fishing mortality on bluefish (including all commercial and recreational landings plus discards). The observer coverage level of 1,229 days is projected to achieve a CV of at least 30 percent for sea turtles; sea scallops; mackerel, squid, and butterfish; small-mesh multispecies; summer flounder, scup, and black sea bass; spiny dogfish; monkfish; large-mesh multispecies; and skates. Thus, the application of the Option B importance filters served to reduce the necessary sea day coverage level for this fishing mode from 5,417 days to 1,229 days.

The two most important aspects of the design and application of this importance filter option are the criteria selected as the filters (i.e., the discards of a species within a fishing mode relative to the total discards of that species across all 39 fishing modes, and the contribution to total fishing mortality represented by the discards of a species in the fishing mode), and the threshold levels established within each filter. The thresholds considered ranged from a cumulative percentage of 90 percent to 99 percent.

	Total Sea Days Required for All 15 Species Groups (including sea turtles)		
	Example 1 99%	**Example 2** 95%	**Example 3** 90%
Baseline	71,043	71,043	71,043
1. Gray-cell filter	55,554	55,554	55,554
2. CV-met filter	N/A	N/A	N/A
3. Discard ratio filter	42,995	38,749	14,208
4. Mortality ratio filter	10,400	9,726	9,395

Table 62. Summary of the number of observer sea days needed to achieve a CV of 30 percent, based on the sequential application of the Option B importance filters at a variety of threshold levels.

As indicated in Table 62, application of the Option B importance filters at the range of thresholds considered has the potential to reduce the total observer sea day requirements from a baseline level of 71,043 days to as low as 9,395 days. The threshold levels for the Northeast Region SBRM, are as follows: Filter 3 – 95 percent of total discards; and Filter 4 – 98 percent of total mortality. At a discard ratio threshold of 95 percent and a mortality ratio threshold of 98 percent, and based on data from 2004, a total of 9,874 observer sea days would be needed. This set of importance filters provides a mechanism to account for the individual contributions of each fishing mode relative to the cumulative discards of each species across all fishing modes and the total fishing mortality of each species, filtering out those species (as the driving force behind setting the overall observer coverage levels for each fishing mode) for which the fishing mode contributes a relatively insignificant portion of the total discards of that species, the total fishing mortality of that species, or both.

At a discard ratio threshold of 95 percent and a mortality ratio threshold of 98 percent, a total of 9,874 observer sea days would be needed to be allocated across all 39 fishing modes (for the detailed allocation at these threshold levels, see Appendix C). Note that while this *threshold level* is intended to be implemented as a component of the Northeast Region SBRM, the specific level and allocation of observer coverage is not. The projected 9,874 observer sea days is the amount calculated based on implementation of the proposed Northeast Region SBRM using 2004 observer data as input values. Full and continued implementation of the SBRM would require annual updates using the most recent 4 quarters of data from the observer program. As new data are utilized in the SBRM following implementation, the overall number of projected observer days, as well as the fishing mode allocations, will change. This is analogous to establishing a survey index-based biological reference point that utilizes a 3-year moving average of the NEFSC survey weight per tow of the subject species. As new data are input into the calculation, the calculated reference point changes up or down to reflect the status of the stock. So, too, in the case of the SBRM, will the calculated number of observer sea days change as new, updated information is input in the methodology.

6.2.4. Alternative 2.4 – Minimum Percentage Observer Coverage

This alternative would establish a minimum percentage observer coverage level for each fishery. One method to reduce bias in observer estimates of bycatch suggested in Babcock et al. (2003) is to establish sufficiently high coverage levels. Babcock et al. (2003) suggest that observer programs adopt coverage levels of at least 20 percent for common species and 50 percent for rare species. Under this alternative, the current observer sea day allocation procedure (including the optimization tool, among other means, to minimize the overall CV) would be replaced by a process whereby fisheries for which the bycatch species are all considered "common" would have a target observer coverage rate of 20 percent of all trips, and fisheries for which the bycatch species include "rare" species would have a target observer coverage rate of 50 percent of all trips.

To implement this alternative, one of the first steps would be to determine appropriate definitions of rarity of the bycatch species. Babcock et al. (2003) distinguish rare species as those for which the weight of the discards is 0.1 percent or less of the total catch (landings plus discards) in the fishery. In some ways, this approach is counter-intuitive: In a relatively clean fishery with very low discards, each species that may occasionally be encountered would be considered rare and, therefore, the observer coverage level would be quite high (even if the magnitude of the discards is negligible). Other approaches to determine rarity could be: To look at the discards of each species proportional to the total discards of all species; to consider any species afforded protection under the Marine Mammal Protection Act and/or Endangered Species Act to be rare regardless of actual encounter rates; to set an upper and lower bound for non-protected species, such as 0.5 to 1.0 percent of total discards; or to develop an algorithm that incorporates both the frequency of encounter with the magnitude of potential encounters relative to stock size or landings of that species. Implementation of this alternative would require further consideration of the most appropriate way in which to define rare versus common species.

Under this alternative, the discards estimation analyses would continue to use the techniques and procedures described in chapter 5 and Appendix A that comprise the other alternatives. As the primary source of bycatch data in commercial fisheries, at-sea observer coverage applies to all commercial fishing modes affected by the SBRM Amendment. Data on recreational fishing would be obtained through the data collection program(s) that result from the NRC-suggested and Congressionally-mandated changes to the MRFSS program. These data would serve the same function for recreational fisheries as at-sea observer data serve for commercial fisheries.

6.3. Element 3: SBRM Standard

6.3.1. Alternative 3.1 – Status Quo

Under this alternative, the SBRM Amendment would not specify a target CV as a performance measure or standard against which to judge the adequacy of the bycatch monitoring program described in the amendment. This alternative would not preclude the establishment of CV standards at some time in the future. While there would be no requirement or expectation in this amendment that a standard be established, at any time target CVs could be established for all relevant fisheries, or could be established on an FMP-by-FMP basis in future management actions.

6.3.2. Alternative 3.2 – Establish a CV SBRM Standard (*Preferred Alternative*)

The preferred alternative for the Northeast Region SBRM would establish a performance standard to ensure that the bycatch-related data collected under the SBRM and utilized in stock assessments and management is adequate for those tasks. In order to ensure that the SBRM is performing to the expected level, this preferred alternative would establish a process to periodically review the adequacy of the SBRM, with consideration of how and when changes to the SBRM should be made.

The guidance provided in NMFS (2004) recommends establishing precision goals for a fishery as part of an SBRM. The recommended precision goals, as stated in the document (NMFS 2004) are as follows:

> For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30% CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch then the goal is a 20-30% CV for estimates of total catch.
>
> For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20-30% CV for estimates of bycatch for each species/stock taken in a fishery.

This preferred alternative would establish, as a performance measure of the SBRM, a standard that the Northeast Region SBRM be sufficient to attain a CV of no more than 30 percent for each applicable fishing mode. The 30-percent CV standard would apply, at least initially, to all applicable fishing modes for each species group (see Table 44 and Table 45). This SBRM standard addresses the precision of the estimates, not the accuracy of the estimates. For a full analysis and discussion of precision and accuracy, including a discussion of the ways in which accuracy can be improved, see Chapter 5 and Appendix A.

Although the proposed 30-percent CV standard is based on the recommendation in NMFS (2004), the proposed application of this standard differs in several important ways. First, the precision goal is recommended to apply to "a fishery," but in the proposed SBRM, the CV standard would apply at the level of the fishing mode. The Magnuson-Stevens Act defines "fishery" as "(A) one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics; and (B) any fishing for such stocks." Thus, under the Magnuson-Stevens Act definition, the monkfish fishery, for example, would be treated as a single fishery inclusive of all gillnet fishing, otter trawl fishing, scallop dredge fishing, and all other fishing regardless of gear type used and/or area fished, that catches monkfish. Employing the precision goal at the level of the fishery, then, could be inferred to mean that the precision of the estimate of monkfish discards across all types of fishing activities that catch monkfish should be between 20 and 30 percent.

In contrast, under the preferred alternative the SBRM CV standard would apply not at the level of the fishery, but at the finer scale of the individual fishing modes (described in Chapter 3). In the monkfish example, there would be 6 primary fishing modes associated with the monkfish fishery within a total of over 25 fishing modes for which the SBRM CV standard of 30 percent would separately apply. For the purposes of defining the SBRM, this amendment classifies the relevant fishing activity into 39 fishing modes (as explained in Chapter 3 and Chapter 5).

Another way in which the proposed application of the SBRM standard differs from the NMFS (2004) guidance is that while the guidance document indicates that the precision goal of 20-30 percent should apply to total discards "aggregated over *all* species" [emphasis added], this preferred alternative proposes disaggregating all species to the level of individual species or groups of related species. Continuing the example of the monkfish fishery, among the gear types that catch monkfish, there are more than 29 other FMP species caught in those gears (along with many other non-FMP species). The guidance in NMFS (2004), therefore, recommends that the precision of the estimate of total discards of all 30+ species across all applicable fishing gears would be sufficient if the single estimate had a CV between 20 and 30 percent. The SBRM proposed under the preferred alternative would separately track the precision of the discard estimates for each individual species, except for a few limited cases where a species complex is more appropriate, managed under a Northeast Region FMP. Thus, rather than tracking a single discard estimate for the monkfish fishery across 30+ species, the proposed SBRM would separately track discard estimates for 30 individual species or species groups.

In total, the proposed SBRM would separately track and report the precision associated with the discard estimates of 36 individual fishery resource species or species groups and 23 individual protected species or species groups across 39 separate fishing gear modes (see Table B-1 in Appendix B). In sum, this means that rather than trying to achieve a precision of 20-30 percent for a single estimate of total discards in each of 16 major fisheries (16 separate estimates), under this proposed SBRM, the Councils and NMFS will strive to achieve a precision of no more than 30 percent in each of up to 312 unique fishing gear mode and species combinations (see Table 44 and Table 45).

The proposed CV-based performance standard for the Northeast Region SBRM applies only to data collected by at-sea fisheries observers. Observer data are the primary sources of bycatch information in the commercial fisheries subject to an affected FMP. It is the intent of the agency to ensure that all future recreational fishing data collection programs minimize bias and maximize precision to the extent practicable, and to take all necessary steps, as suggested by the NRC and mandated by Congress, to develop and maintain a statistically valid and reliable recreational fishing data collection program.

6.4. Element 4: SBRM Review/Reporting Process

6.4.1. Alternative 4.1 – Status Quo

Under this alternative, the SBRM Amendment would neither include any specific process or requirement to conduct periodic reviews of the effectiveness of the SBRM, nor would it specify or suggest any particular process to be used by the Councils and/or NMFS to determine whether a CV standard should be changed, or whether additional steps are necessary to improve the SBRM.

6.4.2. Alternative 4.2 – Specify an SBRM Review Process (*Preferred Alternative*)

This preferred alternative would establish a periodic review and reporting process through which the Councils and NMFS would consider the effectiveness of the SBRM and, if necessary, take appropriate steps to improve the SBRM. The periodic review process established for the SBRM would specify how and when the Councils and NMFS would review information regarding the effectiveness of the SBRM relative to the CV standard. Note that the report specified under this alternative is separate from the discard reporting process described in alternative 4.3. The SBRM Review Report is intended to provide the information necessary to evaluate whether the SBRM has been effective at meeting its objectives. The discard report (alternative 4.3) is intended to present the most recent information on discards occurring in the relevant fisheries.

The cornerstone of the review process would be a report (SBRM Review Report), prepared by the Northeast Fisheries Science Center, that would provide the following information: (1) A review of the recent levels of observer coverage in each applicable fishery; (2) a review of recent observed encounters with each species in each fishery, and a summary of observed discards by weight; (3) a review of the CV of the discard information collected for each fishery; (4) an estimate of the total amount of discards associated with each fishery (these estimates may differ from estimates generated and used in stock assessments, as different methods and stratification may be used in each case); (5) an evaluation of the effectiveness of the SBRM at meeting the performance standard for each fishery; (6) a description of the methods used to calculate the reported CVs and to determine observer coverage levels, if the methods used are different from those described and evaluated in this amendment; (7) an updated assessment of potential sources of bias in the sampling program and analyses of accuracy; and (8) an evaluation of the implications of the discard information collected under the SBRM. This last item would apply in cases where the evaluation performed for item 5 indicates that the performance standard is not met for certain combinations of fishing modes and species groups. In these cases, the report would evaluate the implications of not meeting the performance standard. It is expected that the evaluation would focus on whether the data remain sufficiently precise to conduct sound stock assessments, whether the magnitude of the discards is such that the effect of less precise data is negligible, or whether the less precise data may actually compromise the stock assessment process.

The information to be provided in the report for the purpose of determining the effectiveness of the SBRM in meeting the CV standards should not be confused with the level of information a Council may want or need to address specific management issues. More detailed discard-related information, structured in a way and at a scale meaningful for the particular management issue, can always be provided at the Councils' request. For example, these reports could summarize bycatch data annually, by quarter, by month, for a region or by statistical area, by species groups or individual species, or other parameters requested by fisheries managers. Please note that the term "fishery" in the context of the SBRM Review Report maintains the usage indicated in this amendment, i.e., the fishing modes identified in chapter 3 based on the observable a priori attributes of a fishing trip. However, information requested by the Councils regarding discards occurring in specific fisheries, for the purpose of a fishery management action, may be organized based on primary species caught/targeted, area fished, trip length, or other feature of a fishing trip that would not be known until the trip is complete.

This preferred alternative would also specify the frequency of the SBRM review process. There are four options relative to the frequency with which the review process is conducted:[49]

> *Option A – Annually*. Under this option, the Councils would be presented with an annual SBRM Review Report that would address all fisheries for which the SBRM applies, including any new fisheries added to Council management since the last SBRM Review Report.

[49] In the draft SBRM Amendment, three options were presented: Annually; every 5 years; and according to the SAFE reporting schedule. Based upon further consideration and review, a fourth option was added to the final draft of the amendment to provide a comprehensive SBRM Review Report every 3 years.

Option B – Every 5 years. Under this option, the Councils would be presented with an SBRM Review Report once every 5 years that would address all fisheries for which the SBRM applies, including any new fisheries added to Council management since the last SBRM Review Report. The structure of this review would be similar to the 5-year review of Council EFH designations, with NMFS providing the information needed by the Councils and the Councils each incorporating that information into their management process either in an omnibus SBRM amendment (as the New England Council is doing with an omnibus EFH amendment) or on a case-by-case basis in conjunction with each new management action (as the Mid-Atlantic Council is doing for EFH with all upcoming amendments).

Option C – SAFE Report schedule. Instead of a single SBRM Review Report generated for all applicable fisheries, information relevant to the effectiveness of the SBRM for a fishery would be presented in separate reports for each fishery, at a time interval appropriate for that fishery. This option could capitalize on review processes and timeframes already established for each FMP. For example, under the Red Crab FMP, there is a Stock Assessment and Fishery Evaluation (SAFE) report prepared every 3 years, but the Skate FMP requires a SAFE report every 2 years and an annual report in the intervening years. Under this option, the SBRM Report for the red crab fishery could be incorporated into the Red Crab SAFE report and presented every 3 years, while the SBRM Report for the skate fisheries could be presented either annually or every 2 years.

Option D – Every 3 years. (*Preferred Option*) Under this option, the Councils would be presented with an SBRM Review Report once every 3 years that would address all fisheries for which the SBRM applies, including any new fisheries added to Council management since the last SBRM Review Report. This comprehensive report would address all items required of the report (see earlier paragraph) for all fisheries of both Councils.

The information provided to the Councils in the SBRM Review Report would indicate when and where any lack of precision around a bycatch estimate is different from the CV standard and whether this difference may be problematic for stock assessments or management decisions. With this information in hand, the Councils could initiate an action to change the appropriate SBRM standard and/or recommend additional management action(s) to address the problem. Under this preferred alternative, the SBRM Review Report would identify pertinent issues to the Councils, and the Councils would choose whether and how to most effectively address the issues raised. The SBRM Review Report may warrant peer review, particularly if there have been substantial changes or updates to the models and analytical methods used to calculate the reported CVs and to determine observer coverage levels (as provided in item 6 of the report). The peer review may take the form of an independent external peer review such as for a formal stock assessment, or through the Councils' Scientific and Statistical Committees (SSCs), as was done for the SBRM Amendment.

6.4.3. Alternative 4.3 – Require Periodic Discard Reports (*Preferred Alternative*)

This alternative would require, in addition to a periodic report on effectiveness of the SBRM (see Alternative 4.2), a periodic discard report prepared by the Northeast Fisheries Science Center on discards occurring in Council-managed fisheries. This Discard Report would detail information obtained from the Northeast Fisheries Observer Program (NEFOP). The report would be presented to the Councils and would include catch and discard data from all observed trips during the specified quarters and for the year to date.

The discard reports would include summaries of the trips observed, fisheries of particular interest in the relevant time period, funding issues and other related issues and developments, and projections of coverage across fisheries for upcoming quarters. More detailed information would be provided in tables that addressed: The number of observer sea days scheduled for each fishery, by area and gear type, in each quarter; the percent of total trips observed, by gear type, in each quarter; the distribution of sea sampling trips by gear type and statistical area in each fishery; the observed catch and discards of each species, by gear type and fishery, in each quarter; and the observed catch and discards of each species, by gear type and fishery, in each statistical area.

Appendix G to the amendment provides an outline as to how discard data could be summarized by fishery and presented to the Councils on a regular basis. There are two options regarding the frequency with which the reports would be prepared:

Option A – Semi-annually. Under this option, the Councils would be presented with an SBRM Discard Report every 6 months. The report would address all fisheries for which the SBRM applies.

Option B – Annually. (*Preferred Option*) Under this option, the Councils would be presented with an SBRM Discard Report once every year, The report would address all fisheries for which the SBRM applies.

6.5. Element 5: Changes to the Framework Adjustment and/or Annual Adjustment Provisions

6.5.1. Alternative 5.1 – Status Quo

Under the status quo, and notwithstanding the current framework adjustment provisions of any FMP, changes to the provisions of the SBRM implemented by this amendment could only be made through an amendment to the FMPs subject to this action. The SBRM Amendment would not modify the current framework adjustment or annual adjustment/specification provisions of the subject FMPs to explicitly include any of the new SBRM provisions as items that may be modified through either a framework adjustment or an annual adjustment/specification.

6.5.2. Alternative 5.2 – Modify the Framework Adjustment Provisions

Under this alternative, certain provisions of the SBRM implemented under this amendment could be changed by the Councils through a framework adjustment to an affected FMP. Subject to the framework adjustment provisions established in each FMP, the following management measures or provisions of the Northeast Region SBRM may be implemented and/or modified through a framework adjustment to the applicable FMP:

- The CV-based performance standard. This includes changes to the CV level established as the SBRM performance standard for a particular fishery, fishing mode, or combination of species and fishing mode(s). The intent of this provision is to provide an efficient means for a Council to change the performance standard in certain circumstances when a higher level of precision (i.e., reducing the CV to less than 30 percent) is desired for a particular fishery or management program (e.g., a Special Access Program (SAP) under the Northeast Multispecies FMP).

- The means by which discard data are collected/obtained in a fishery. This includes implementation of new data collection technologies or procedures and/or changing current data collection technologies or procedures. The intent of this provision is to provide an efficient means for a Council to implement new collection protocols, to the extent that such implementation would require changes to fishing regulations. Changes implemented through this provision could include electronic video monitoring or electronic catch reporting, in one or more fisheries when and if the technologies become sufficiently mature for such use and there is an appropriate need in the subject fishery.

- Fishery stratification for the SBRM. This includes adding to or removing from the list of fishing modes that comprise the analytical framework for the SBRM. The intent is to provide an efficient mechanism for a Council to modify the basis by which SBRM-related analyses are conducted and by which observer effort is allocated across all fisheries. These changes are necessary as management measures create, eliminate, or modify fishery programs identified as independent fishing modes for the purposes of applying the Northeast Region SBRM.

- SBRM reporting. This includes changes to the requirements for periodic reports of discards occurring in New England and/or Mid-Atlantic fisheries, as well as changes to the requirements for periodic reports on the effectiveness of the Northeast Region SBRM. The intent is to provide an efficient mechanism for a Council to change the frequency at which they receive SBRM-related reports, as well as to change the minimum required contents of all such SBRM-related reports.

- Industry-funded observers and/or observer set-aside programs. This change authorizes the establishment of an industry-funded observer program and observer set-aside provisions. For more information, see section 6.7.3.

6.5.3. Alternative 5.3 – Modify the Framework Adjustment and Annual Adjustment/Specification Procedures (*Preferred Alternative*)

Under this alternative, certain provisions of the SBRM implemented under this amendment could be changed by the Councils through a framework adjustment to an affected FMP or through the annual adjustment or annual or multi-year specification process established by an FMP. Subject to the appropriate framework adjustment, annual adjustment, annual specifications, and/or multi-year specifications provisions established in each FMP, the following management measures or provisions of the Northeast Region SBRM may be implemented and/or modified through one of these mechanisms of the applicable FMP:

- The CV-based performance standard. This includes changes to the CV level established as the SBRM performance standard for a particular fishery, fishing mode, or combination of species and fishing mode(s). The intent of this provision is to provide an efficient means for a Council to change the performance standard in certain circumstances when a higher level of precision (i.e., reducing the CV to less than 30 percent) is desired for a particular fishery or management program (e.g., a Special Access Program (SAP) under the Northeast Multispecies FMP).

- The means by which discard data are collected/obtained in a fishery. This includes implementation of new data collection technologies or procedures and/or changing current data collection technologies or procedures. The intent of this provision is to provide an efficient means for a Council to implement new collection protocols, to the extent that such implementation would require changes to fishing regulations. Changes implemented through this provision could include electronic video monitoring or electronic catch reporting, in one or more fisheries when and if the technologies become sufficiently mature for such use and there is an appropriate need in the subject fishery.

- Fishery stratification for the SBRM. This includes adding to or removing from the list of fishing modes that comprise the analytical framework for the SBRM. The intent is to provide an efficient mechanism for a Council to modify the basis by which SBRM-related analyses are conducted and by which observer effort is allocated across all fisheries. These changes are necessary as management measures create, eliminate, or modify fishery programs identified as independent fishing modes for the purposes of applying the Northeast Region SBRM.

- SBRM reporting. This includes changes to the requirements for periodic reports of discards occurring in New England and/or Mid-Atlantic fisheries, as well as changes to the requirements for periodic reports on the effectiveness of the Northeast Region SBRM. The intent is to provide an efficient mechanism for a Council to change the frequency at which they receive SBRM-related reports, as well as to change the minimum required contents of all such SBRM-related reports.

- Industry-funded observers and/or observer set-aside programs. This change would only be made to the framework adjustment provisions of relevant FMPs, and authorizes the establishment of an industry-funded observer program and observer set-aside provisions. For more information, see section 6.7.3.

6.6. Element 6: Prioritization Process for SBRM Observer Allocations

6.6.1. Alternative 6.1 – Status Quo

Currently, there is no specified process for prioritizing observer coverage allocations in years in which there are external operational constraints that would prevent NMFS from fully implementing the necessary observer coverage levels. As a result, the allocation can be made through any of several ad hoc mechanisms, but most frequently are the result of discussions between the Regional Administrator and the Science and Research Director. The Councils may or may not be consulted, and the proposed allocations may or may not be vetted through a public review process (most frequently they are not). Under the status quo alternative, this ad hoc process would continue following implementation of the SBRM Amendment.

6.6.2. Alternative 6.2 – Council Consultation of Proposed SBRM Observer Allocations (*Preferred Alternative*)

Under this alternative, the Regional Administrator and Science and Research Director would be required to develop a proposed prioritization of how the available resources should be allocated across the fisheries should any external operational constraint exist. The Regional Administer and Science and Research Director would provide the Councils, at the earliest practicable opportunity: (1) The at-sea observer coverage levels required to attain the SBRM performance standard in each applicable fishery; (2) the coverage levels that would be available if the resource shortfall were allocated proportionately across all applicable fisheries; (3) the coverage levels that incorporate the recommended prioritization; and (4) the rationale for the recommended prioritization. The recommendation of the Regional Administrator and Science and Research Director should be based on: Meeting the immediate and anticipated data needs for upcoming stock assessments; legal mandates of the agency under other applicable laws, such as the ESA or MMPA; meeting the data needs of upcoming fishery management actions, taking into account the status of each fishery resource; improving the quality of discard data across all fishing modes; and/or any other criteria identified by NMFS and/or the Councils. The Councils would consider the recommendations of the Regional Administrator and Science and Research Director at a public meeting, and may choose to recommend revisions or additional considerations to be considered by the Regional Administrator and Science and Research Director.

6.7. Element 7: Industry-Funded Observer Program Provisions

6.7.1. Alternative 7.1 – Status Quo

The only Northeast Region FMP currently with an industry-funded observer program is the Sea Scallop FMP. Beginning in 1999, a percentage of the TAC in scallop access areas has been set aside from the amount available to the fishery in order to generate funding for vessels required to carry an observer on a fishing trip. The scallop TAC set-aside was then allocated to scallop vessels in the form of increased trip limits on trips for which an observer is required. The increased trip limits are intended to offset the cost of carrying and paying for an observer. Amendment 10 to the Scallop FMP extended the set-aside program to include a DAS set-aside for fishing trips in the open areas. The scallop DAS set-aside was provided to scallop vessels in the form of a reduced DAS charge on fishing trips for which an observer is required. In either case, scallop vessels are required to carry and pay for observers when asked, regardless of the availability of either TAC set-aside or DAS set-aside; i.e., vessels are compensated for carrying an observer only to the extent that the set-asides are available, and once the set-asides are exhausted, fishing vessels required to carry observers bear the entire cost.

Under the status quo alternative, similar provisions would not be created for any other FMP under the Councils' jurisdiction. Should a Council decide, at any point in the future, to require permitted fishing vessels to pay for at-sea observers and to develop an observer set-aside program to offset the costs to the vessels of carrying and paying said observers, a full amendment to the subject FMP would be required.

Under the status quo alternative, no changes would be made to the sea scallop observer set-aside program, which would continue to operate as established under Framework Adjustments 16 and 18 and Amendments 10 and 13 to the FMP.

6.7.2. Alternative 7.2 – Authorize Observer Service Provider Approval and Certification (*Preferred Alternative*)

Under this alternative, the sea scallop industry-funded observer regulations at 50 CFR 648.11(h) and (i) implemented via emergency rule would be modified and broadened to apply to all Council FMPs. This action would authorize observer service provider approval and certification for all applicable fisheries, should a Council develop and implement a requirement or option for an industry-funded observer program in other fisheries besides sea scallops. It would not, in itself, implement or obligate the Councils to develop an industry-funded observer program, but would create the process by which observer service providers can be approved and certified. This alternative should be considered a parallel to developing a Vessel Monitoring System (VMS) type approval process that applies to all fisheries implementing a VMS provision. The VMS type approval process requirements at § 648.9 were established across all fisheries, but a separate action is required under each FMP to implement VMS provisions for each fishery. Similarly, only though a follow-on action for each FMP (either an amendment or framework adjustment, see alternative 7.3) could an industry-funded observer program, along with any observer set-aside provisions, be developed and implemented.

Amendment 13 to the Sea Scallop FMP proposes to make permanent the industry-funded observer regulations that were implemented on December 28, 2006, via emergency rule. While this action is modeled on Amendment 13, it is not contingent on either the continuation of the emergency regulations or the approval and implementation of Amendment 13. Should Amendment 13 be approved, this action would broaden the relevant regulations proposed in Amendment 13 to apply to all Council FMPs. Should Amendment 13 not be approved, this action would either replace or reestablish the emergency regulations at § 648.11(h) and (i) to stipulate the process and requirements for observer service provider approval and certification, and revise those regulations to apply more broadly. This action would not expand or modify the regulations at § 648(g), which include the specific requirements for sea scallop vessels to obtain, carry, and pay for observers.

The intent of the current regulations at § 648.11(h) that would be expanded through this action is to allow any entity to become an observer service provider, provided it meets the established approval process and all the responsibilities stipulated. An application would be required to contain detailed information such as contact information; description of past experience with placing individuals in remote field and/or marine environments; evidence of adequate insurance to cover injury, liability, and accidental death for observers during employment; and proof of compensation for observers while employed that meet or exceed U.S. Department of Labor guidelines. NMFS would review and evaluate each application and, if approved, the observer service provider’s name would be added to the list of approved observer service providers. An approved observer service provider would be required to maintain at least eight certified observers that have passed the NMFS NEFOP Fisheries Observer Training course. The observer service provider would be responsible for all necessary transportation, lodging expenses, and necessary equipment for the observer. An observer service provider would be required to be available for access by the fishing industry 24 hours per day, 7 days per week. Specific reporting requirements would apply, including the timing of reports to be provided to NMFS. Additional requirements are detailed in Appendix H to this amendment.

This action would include specific standards set by NMFS that an observer service provider would be required to meet in order to be certified, including that employees of observer service providers meet the NMFS National Minimum Eligibility

Standards;[50] and the observers would be required to pass the NMFS training course, be physically and mentally capable of carrying out the responsibilities of an observer, and hold a current CPR/first aid certification. NMFS would retain the authority to review observer certifications and issue observer certification probation and/or decertification if warranted. Additional requirements are detailed in Appendix H to this amendment.

6.7.3. Alternative 7.3 – Addition of Industry-Funded Observer and Observer Set-Aside Provisions as a Measure That Can Be Implemented Through Framework Adjustment to the FMPs (*Preferred Alternative*)

Under this alternative, the development of and/or modifications to an industry-funded observer program, including observer set-aside provisions, could be implemented through a framework adjustment to the relevant FMP. Absent this action, a full FMP amendment would be required for all fisheries, with the exception of the sea scallop fishery. This measure would include general language in the regulations of each FMP that would allow an industry-funded observer program and observer set-aside provisions to be implemented by framework adjustment.

Development of an industry-funded observer program, an observer set-aside program, or changes to either could be implemented by framework adjustment and could include measures such as the level of observer coverage required in the fishery, the basis for an observer set-aside program and the amount of the set-aside (e.g., quota, DAS, etc.), how the set-aside is allocated to vessels required to carry an observer (e.g., an increased trip limit, differential DAS counting, additional trips, an allocation of quota, etc.), the process for vessel notification, how funds are collected and administered from the industry to cover the costs of observer coverage, revisions to the observer service provider program (if adopted in this action), along with any other measures necessary to develop and implement either an industry-funded observer program or an observer set-aside program.

6.8. Alternatives Considered but Rejected

Alternatives that were considered initially or during the development of this amendment but were rejected from further analysis do not meet the purpose and need of the SBRM Amendment (section 1.4) for one or more reasons. The rationale for rejecting these alternatives is discussed in this section.

6.8.1. Incorporating Non-Managed Species into the SBRM

Much of the focus of the SBRM has been on two groups of species: Those subject to a Mid-Atlantic or New England Council FMP; and those afforded protection under the Marine Mammal Protection Act or the Endangered Species Act. During the

[50] Available at http://www.st.nmfs.gov/st4/nop/.

development of this amendment, there was consideration of whether the SBRM needed to explicitly account for non-managed species (those that are neither subject to an FMP nor protected as above). A review of discard observations from 2004 provided insight into this issue. In 2004, observers reported discards of 211 unique species.[51] Of these, 45 are managed under a Council FMP subject to this amendment. Another 14 species are subject to an FMP of the ASMFC. The remaining 152 species are either unmanaged or managed only at the level of the individual state.

An analysis of these data indicates that the 45 Council FMP species comprised 84.4 percent, by weight, of the observed discards in 2004. The addition of the ASMFC species, to total 59 species, equaled 86 percent of the observed discards (1.6 percent of total). Of the remaining 152 species that accounted for 14 percent of the observed discards, the top 16 non-managed species accounted for 13 percent of total discards, leaving 136 species that together comprised only 1 percent of the observed discards, by weight. Looking at the data another way, of the 211 recorded species, 57 species (roughly one-quarter of the reported species) accounted for 99 percent of the discards by weight. Of these 57 species, 34 are managed under a Council FMP and 5 are managed under an ASMFC FMP. Table 63 shows the top 16 non-managed discard species in the 2004 observer database.

Species	Percent of total observed discards
Starfish	2.8 %
Sand dollar	2.1 %
Spotted hake	2.0 %
Sponge	1.4 %
Northern sea robin	1.0 %
Jonah crab	1.0 %
Fourspot flounder	0.5 %
Sea raven	0.5 %
Longhorn sculpin	0.4 %
Rock crab	0.4 %
Striped sea robin	0.2 %
“True” crab	0.2 %
Smooth dogfish	0.2 %
Conch	0.1 %
Hermit crab	0.1 %
“Fish”	0.1 %

Table 63. Top non-FMP species, by weight, of observed discards in 2004, and the percent of each relative to the total observed discards of all species.

Together, the species identified in Table 63 and the species managed under an FMP account for 99 percent of all discards in 2004. This indicates that the majority of

[51] In this case, “unique” is meant to reflect the species codes reported by observers. There is some degree of overlap among the reported species. For example, while all relevant flounder species are recorded separately, there is also a “flounder, NK” category for flounders that cannot be clearly identified to the species. There are also several types of marine fauna that are not identified to the species level, such as starfish, sponges, and sea cucumbers, but are instead identified at this level.

discards (99 percent of observed discards) are comprised of relatively few species (27 percent of observed discard species).

More important than the relative proportion of discards of various species was that this analysis demonstrated that at-sea observers are currently recording information on all species encountered by the fishing vessel. Observers are trained and expected to record information regarding 611 species (this includes differentiating some species by market code), and observers do so for both discards and landed catch (NMFS 2005a). For the purposes of designing an SBRM from which data can be extracted to serve a variety of information and analytical needs, the most important factor is to ensure that as wide an array as possible of data are being collected. This analysis confirmed that all possible discard species are being reported by the at-sea observers. This information is available for use by NMFS, Council, ASMFC, and/or state fishery biologists and managers.

Because the explicit inclusion of additional, non-FMP managed species (other than those required under the law), is not necessary to ensure that data on the discards of these species is collected and available for review and/or use in stock assessments, and is beyond the scope required for the SBRM Amendment, the need to explicitly consider non-managed species in the design and development of the SBRM was eliminated from further consideration, other than to continue to ensure that all species (managed and non-managed) encountered by observed fishing vessels are reported either as landings or discards.

6.8.2. Use Additional Mechanisms to Collect Bycatch Information

Expanded use of Industry-Based Surveys for bycatch purposes.

Expanded use of industry-based surveys as a bycatch monitoring mechanism was considered but rejected from further analysis and consideration. Because of their focused design, compressed seasonality, and specialized fishing gears, industry-based surveys are poorly suited to formally replace or supplement current data sources for bycatch information in any fishery mode of the Northeast Region, except in an ad hoc or opportunistic way. The industry-based surveys are conducted in a manner that is different than commercial fishing practices, and so the data collected by these surveys cannot be used in a meaningful way to supplement, replace, or improve data collected from other sources. Industry-based surveys are not a means to directly collect bycatch and discard data, nor are industry-based surveys data suitable to use as imputed values for missing commercial fisheries bycatch data. The time series of industry-based surveys data may be susceptible to lapses or compression pending research priorities and funding availability within the Northeast Region.

Information from the industry-based surveys may be most valuable in providing insight to unique or unusual situations that may need further investigation though other means, similar to how fishery independent survey data may be used. For example, if an industry-based survey found that an unusually high concentration of a given species was seen in the survey area during a specified time but fishery dependent data from the same time and area did not, it may be desirable to increase observer coverage within that time and area. Alternatively, a pilot program for a new technology such as electronic monitoring could be used in fishing modes within the area to confirm the presence of the anomaly. Such a pilot program would need significant regulatory development as well as technological and personnel support from within the Northeast Region.

Using industry-based surveys as an indicator for areas of study for fishery dependent resources should be left to the discretion of groups that assess and monitor specific FMPs and need not be a formalized process laid out in this amendment. The groups that may choose to periodically review industry-based survey data for bycatch related information include the Plan Development Teams, Monitoring Committees, and assessment working groups. Otherwise, industry-based surveys have no specific utility as a bycatch monitoring mechanism for any of the Northeast Regions fishery modes.

Expanded use of Study Fleets for bycatch purposes.

Expanded use of study fleets to monitor bycatch information was considered but rejected from further analysis and consideration primarily because the study fleet program is not fully matured and the long-term design of the program has yet to be determined (John Hoey, pers. comm., NMFS). Many of the technical issues related to the study fleet have only recently been resolved (John Hoey, pers. comm., NMFS); the program has only just passed beyond the proof of concept phase and it is a data collection in its infancy. Additionally, the current study fleet participants are volunteers who are compensated for their participation in the program and these volunteers may not truly represent their fleet. A more representative fleet that is not potentially biased by compensation would be needed to ensure that the data are representative of the fleet as a whole. Only then could study fleet data be used for bycatch monitoring, in-season fisheries management, or as estimates to be expanded to an entire fishery mode.

Study fleet data are currently converted from tow-by-tow to trip level data for use in the various Northeast Regional data analyses. Thus, the study fleet information is the same as the data provided by the FVTR data collection. The increased resolution of tow data and improved location data may yield future utility, but for many of the reasons listed above, use of these data is currently limited.

The study fleet project is currently undergoing a detailed evaluation by NMFS and the Northeast Regional Research Steering Committee. It is, at this time, more appropriate that the Steering Committee make recommendations and changes to the study fleet program to further its utility as a regional data source, including bycatch and discard data, rather than implementing changes through this amendment. If revisions to the study fleet program yield usable data, they can be incorporated into updates of individual fishery mode SBRMs, as needed.

Expanded use of Alternative Platforms for bycatch purposes.

Expansion of the alternative platform program was considered but rejected from further analysis and consideration because no additional fisheries or fishery modes in the region were suitable for this type of data collection. Several alternative platform programs already exist in most of the fisheries or fishery modes for which they are suited in the Northeast Region. These include near-shore, fixed gear fisheries such as the Chesapeake Bay pound net and the internal waters gillnet fisheries in North Carolina and Virginia. These programs enable observers to obtain visual sampling data from small vessels or static gear that would otherwise be unobservable.

Because an independently operated vessel is needed to deploy an observer and the data collected are limited in most cases to what can be confirmed visually (i.e., presence/absence information), alternative platform programs would be suitable only for expansion to open ocean fishery modes if the desired data were observations of marine mammal and protected species interactions. It remains more effective to continue to monitor open ocean fisheries for these types of interactions through the placement of onboard observers and by requiring such interactions to be reported in FVTRs for unobserved vessels. Therefore, there are currently no additional fisheries or fishery modes where the alternative platform program could be expanded to provide additional bycatch data.

Implementation of Image Capture and Processing.

The implementation of image capture and processing or 'digital observer' systems was considered but rejected from further analysis and consideration because the technology has yet to be perfected in worldwide development and deployment (Mark Buckley, pers. comm., Digital Observer, Inc.). To date, successes in using this technology have been limited to trials in laboratory settings (Davis 2002). The systems are not yet capable of performing to an acceptable standard in the field, even when lighting is enhanced and catch and discards are handled in a prescribed manner at designated locations. It remains more effective for human observers to perform the data collection tasks these systems would provide or to use electronic image capture paired with human analysis of the raw image data. Given the current capabilities of these types of systems, they are not yet suitable for collecting bycatch or discard information in any Northeast Region fishery mode.

Implementation of trawl monitoring devices.

The use of trawl monitoring devices was considered but rejected from further analysis and consideration because other means are more effective at providing the limited bycatch-related data that such systems would supply. Trawl monitoring devices have no direct applicability to collecting bycatch information. Their potential as a tool that assists in monitoring or as a means to reduce potential bycatch is also limited. This technology is primarily designed to assist fishermen in ascertaining how their gear is performing and when their nets are full. Fishery researchers have also made use of the technology to monitor performance parameters of trawl gear. The technology is often costly, may require complex installations and continual maintenance to ensure proper monitoring, and may require substantial electronic support onboard the deploying vessel (e.g., personal computer, GPS, fathometer, third wire, etc.).

Such devices may be most applicable to large-volume trawl fisheries such as the herring, squid, and mackerel trawl fishing modes, but would not be appropriate for collecting information on discards. Vessel operators, in an effort to maximize their operating efficiency, may capture and bring onboard more fish in their last set than the vessel can hold. Though this ensures that the vessel's hold will be filled to capacity before returning to port, it may result in discards. The extent to which 'topping off' occurs within the Northeast Region is not well understood, but is well documented in such fisheries as the Alaska walleye pollock and west coast hake fisheries (Carrie Nordeen, pers. comm., NMFS). The deployment of devices that signal when a codend is filling or full may be of use in helping vessel operators reduce any guess work related with trying to fill vessel holds to capacity.

If a program were designed that required the use of trawl monitors as a means to reduce potential for topping off, the devices would have to be rigorously tested for durability, failure rates, recording capabilities, tamper resistance, and performance standards. A significant regulatory environment would also need to be in place to support such a program. At this time, other approaches to reducing topping off discards are more practical. These may include such things as trip limits, limited access privilege programs, or observer coverage sufficient to characterize discards that do occur. In the scup fishery, for example, a transfer-at-sea provision was implemented to allow vessels with more scup in their net than the trip limit would allow to transfer the surplus to another fishing vessel, reducing the amount of scup that are discarded.

Other potential uses of trawl monitoring devices are limited. Though the technology is capable of monitoring such parameters as bottom contact, headrope height, and net spread, bycatch-related performance measures are better monitored as a function of observed and retained catch. For example, the correct use of a haddock separator trawl could be monitored by trawl devices. A more cost effective, practical way of monitoring separator trawls could be achieved by monitoring the catch of species such as cod or benthic organisms through onboard observers, FVTRs, and landing data.

6.8.3. Quarterly Discard Reports

The Councils considered requiring quarterly bycatch reports instead of semi-annual or annual reports (described in section 6.4.3). This information, however, would only be useful if the Councils could take action on the same frequency to modify fishing regulations on a quarterly basis. Most Council FMPs provide for an annual or biennial adjustment or measures set on a 3-year basis. Although all Council FMPs allow for mid-season changes to management measures through a framework adjustment, frameworks require at least two meetings of a Council to be approved, which generally means that framework adjustments take 4-6 months (or longer) to develop. Thus, it is not possible for a Council to make changes to management measures on a quarterly basis. Because the Councils generally operates on an annual basis, or less frequently, the potential value of quarterly reports is extremely limited. Quarterly reports would, however, require a significant investment of staff time and resources. Given the high cost staff time and resources, and the limited utility for directing Council action, this option was rejected from full consideration.

6.8.4. Alternative CV Levels

The Councils considered alternatives to the proposed CV of 30 percent applied to all combinations of fishing modes and species. In particular, the Councils considered an approach that would have attempted to establish a separate and distinct CV level for each particular combination of fishing mode and species (e.g., one CV level established for monkfish in New England small-mesh gillnets, a different CV level established for bluefish in Mid-Atlantic large-mesh otter trawls, etc.). The Councils also considered the basis for selecting 30 percent as the most appropriate CV level, and whether an alternative percentage (15 percent, 20 percent, 40 percent, etc.) should be selected instead. There are several reasons why these approaches were not pursued.

The primary reason for not considering a wide range of CV values is the lack of scientific justification for CV values outside the range recommended by the National Working Group on Bycatch. In NMFS (2004), a range of 20-30 percent was recommended for use in developing SBRMs. Even within this range, there is little scientific justification for choosing one CV level (e.g., 28 percent) over any other specific CV level (e.g., 27 percent). Given the lack of a scientific basis to select any one specific level over any other, the Councils focused on the extremes of this range (i.e., 20 percent and 30 percent). The reasons for utilizing the 30 percent CV level instead of the 20 percent CV level are explained in section 6.3.2.

Although briefly considered by the Councils early in the process to develop this amendment, establishing separate and distinct CV levels for each particular combination of fishing mode and species was not pursued further. As mentioned above, there was no scientific justification for choosing a CV level outside the range of 20-30 percent recommended in NMFS (2004). In addition, this approach was not pursued further due to a lack of information necessary to make informed decisions regarding the cell-by-cell CVs. In other words, the information that would be necessary to determine, for example, that monkfish in New England small-mesh gillnets should have a different CV level than that for bluefish in Mid-Atlantic large-mesh otter trawls, and whether that CV level should be higher or lower, is not available at this time.

Recognizing that as this information becomes available, the Councils may wish to establish different CV levels for certain combinations of fishing mode and species, this amendment provides the flexibility to the Councils to enable such changes to the CV level (see section 6.5.3). The global CV of 30 percent functions, in this case, as a baseline level of precision expected for all relevant fishing modes and species in the SBRM. If new information, or new management measures, indicate a need for improved precision for certain fishing modes and/or species, the Councils may change the CV levels to address these needs.

6.9. Evaluation of Alternatives

This section will evaluate the alternatives presented in the above sections. This technical evaluation will focus solely on the ability of each alternative to effectively achieve the primary purpose and objectives of this amendment. Chapter 5 provides a technical assessment of the status quo process to allocate observer effort. An evaluation of the environmental consequences of the alternatives is presented in chapter 7 to comply with the requirements of the National Environmental Policy Act, the guidelines of the Council of Environmental Quality (CEQ), and NOAA Administrative Order 216-6.

6.9.1. Item 1: Bycatch Reporting and Monitoring Mechanisms

For this item, two alternatives are considered: (1) The status quo; and (2) implementing electronic monitoring to collect bycatch information. Although detailed information about the bycatch reporting and monitoring mechanisms currently utilized in the Northeast Region is available (see chapters 4 and 5, and Appendix A,), less is known about the implications of electronic monitoring as a potential bycatch reporting and monitoring tool for Northeast Region fisheries.

Currently, NMFS is reviewing available information to determine whether electronic monitoring applications may be best developed on a national basis rather than through various uncoordinated regional approaches (e.g., this SBRM). Electronic monitoring technology has been determined to be able to function reliably in the marine environment to identify fishing events (e.g., gear set and retrieval times and locations), obtain images of catch as it is brought aboard, and to determine when discards are occurring. Several programs world-wide have demonstrated some of the capabilities of electronic monitoring in hook and line fisheries (e.g., demersal longline) and trawl fisheries with relatively homogeneous catches, but the overall degree of success for electronic monitoring programs has been variable. Electronic monitoring technology is only moderately capable of providing data to estimate the species composition and number of fish retained and discarded in hook and line catch, quantify the amount of discards on trawl vessels, and detect and identify protected species and bird bycatch. Some highly specialized programs with complex regulatory requirements that stipulate how retained catch and discards must be handled have yielded more detailed bycatch and discard related data. In general, the larger the vessel, complexity of the fishing gear and its operation, diversity of the catch, and the level of detail in the data collection, the higher the degree of complexity to the type of electronic monitoring system that must be designed and deployed.

While electronic monitoring is a promising tool for bycatch monitoring, it remains very much a work in progress. The technology and systems available cannot currently perform the same complex data collection supplied by onboard human observers. Its utility as a tool to supplement existing data collection programs depends largely on designing a system within the constraints of the known electronic monitoring capabilities and ensuring the information collected is able to meet defined data needs. Smaller fishing vessels also present particular challenges to fitting and powering the required hardware, and to ensuring sufficient crew available to support the monitoring protocols.

To date, electronic monitoring has been demonstrated as most successful in providing presence/absence data or providing simple visual data (e.g., a marine mammal interacting with fishing gear). These types of data are of limited utility in the Northeast Region as most stock assessments require detailed biological data such as length-at-age develop estimates of total catch and discard. This does not mean that electronic monitoring could not be utilized effectively as a bycatch monitoring tool in the Northeast Region; however, it does mean that new ways of incorporating the type of data electronic monitoring could provide would first have to be designed and tested before an electronic monitoring program is implemented.

Some significant issues related to electronic monitoring program development have been very well characterized in a discussion paper on implementing electronic monitoring programs (Kinsolving 2006). In this paper, Kinsolving (2006) outlines the four primary regulatory scenarios that could be utilized in a large-scale electronic monitoring program:

- Full ownership by NMFS wherein the electronic monitoring equipment is purchased, owned, installed, maintained, and the data analyzed by the agency;
- Use of approved contractors that have been deemed to satisfy the regulatory requirements to administer some or all aspects of the electronic monitoring program;
- Type approval which would be similar to the current VMS operation model where certain types of electronic monitoring units are approved for installation and operation and /or contractors are approved to handle such things as installation and data analysis; and
- Performance standards where there are specifications of what an electronic monitoring system must do, but not how it must do it.

Within each of these scenarios, there are many additional issues that require consideration. Costs to all parties involved, data review and analysis, adaptation to technological advances, oversight on installation and operation, and enforceability could all be slightly different for each option and would require resolution before the development of an electronic monitoring program for the Northeast Region. Issues of data ownership, privacy, data error checking, and record storage are all equally significant and would also require detailed planning and solution for an electronic monitoring program. Interestingly, Kinsolving (2006) points out that the total costs of an electronic monitoring program currently may equal or surpass the cost of an onboard observer program—particularly in light of the start up costs associated with a new program.

6.9.2. Item 2: Analytical Techniques and Allocation of Observers

For this item, four alternatives are considered: The status quo; the integrated allocation approach; the integrated allocation approach with importance filters; and establishing a minimum percentage observer coverage level. The data sources, fishery stratification, and analytical techniques described in detail in chapter 5 and Appendix A apply to the status quo and the integrated allocation approach alternatives. The primary difference between the status quo method and the baseline integrated allocation approach is that the methodology described in chapter 5 is applied across all fisheries in a prescribed uniform manner under the integrated allocation approaches, while under the status quo it is applied consistently only to the trawl, gillnet, and longline gear types generally engaged in the Northeast multispecies, monkfish, and summer flounder, as described in Appendix A.

The benefits, concerns, and limitations associated with the status quo and two integrated allocation approach alternatives are well described in chapter 5 and Appendix A and so will not be repeated here. The sole difference between the two integrated allocation approaches is the addition of the "importance filter" described in section 6.2.3. As noted above, the importance filter functions to refine the observer sea days needed to achieve the SBRM performance standard by eliminating cases (cells) where the effect of the discards of a species in a fishing mode is likely to be minimal. Thus, the third alternative carries forward most of the same benefits, concerns, and limitations of the second alternative, with the additional benefit of being more selective as to the fishing mode-species combinations that drive the target level of observer sea days.

The primary benefit of the alternative with the importance filter is to ensure that the observer program can be applied to the subject fisheries in as cost effective a manner as possible. By eliminating combinations of fishing modes and species where (1) it is infeasible or exceedingly rare that the species would be encountered in the gear, (2) the CV-based performance standard has been achieved for fewer days than projected (Option A only), or (3) the likely impact of the discards of the species in the gear is negligible, observer sea days would be more efficiently allocated across all fisheries. There is an element of cost-benefit to this exercise, however, as by "eliminating" species as the basis for determining the observer coverage level, the result would be to accept that the performance standard may not be met for the species filtered out. It is important to understand that the importance filter is designed to function without reference to annual budgets or available observer resources. The importance filter would be used to establish meaningful observer coverage allocations for each fishing mode. Budgets can, and often do, shift as a result of national priorities, and in any given year, the available resources may not support full implementation of the established targets.

The threshold levels determine the degree of filtering that occurs for the discard ratio filter (filter 3) and the mortality ratio filter (filter 4). Higher thresholds (95 percent and up) reflect a more conservative approach that "accounts" for more of the total discards and mortality. Lower thresholds (less than 95 percent) reflect a less conservative approach. In order to most effectively utilize the SBRM proposed in this amendment, reasonable thresholds are necessary to focus observer resources in a meaningful way without sacrificing information on important fishery/discard interaction. The proposed thresholds of 95 percent of the discard ratio (filter 3) and 98 percent of the total mortality ratio (filter 4) provide a reasonable level of filtering that retains observer coverage for the fishing modes associated with nearly all of the discards and mortality of each species. This level of filtering is intended to eliminate the insignificant contributors of discards and mortality, while ensuring a robust and effective observer coverage allocation.

The fourth alternative considered for this item, establishing a minimum percentage observer coverage level of 20 percent of trips for common species and 50 percent of trips for rare species, is described in Babcock et al. (2003) and addressed in chapter 5 and Appendix A. This alternative is intended to address concerns regarding the potential for bias in the bycatch data and to ensure sufficient sampling levels to provide more precise and accurate bycatch data (Babcock et al. 2003). However, several concerns regarding this approach have been identified (Methot 2005; Rago et al. 2005). One specific criticism of the approach proposed in Babcock et al. (2003) is that the particular recommendation for a default level of coverage is not linked to any particular management need, performance evaluation, or set of funding or logistical constraints. The expectations for precision vary by the use of the data and realizations of precision vary by species.

Babcock et al. (2003) point to default observer coverage levels as a tool to address or minimize bias in the observer sampling. However, this presumes that there is a substantial bias in the data, and that the bias is not a direct result of the presence of the observer on the vessel but rather is of the type that may be mitigated by increases in sampling size. Analyses presented in chapter 5 and Appendix A discuss the potential for bias in the observer data and conclude that any such bias is minimal. Also, if any such bias is actually due to the presence of the observer on the vessel, then neither improved randomization nor increased sample size (higher observer coverage levels) would remove the bias. In the extreme, a very high level of observer coverage could simultaneously change the behavior of the entire fleet while providing a measurement of the bycatch of the fleet, but provide little insight into the level of bycatch prior to the increased sampling levels (or after, if they were to abate). There is a strong concern that the use of default minimum percent observer coverage levels may mask the great diversity of requirements and logistical constraints faced by fisheries observer programs, and fails to recognize the great cost of achieving high levels of coverage.

Regardless of the approach selected, the at-sea observer program implemented in this amendment is designed to optimize the accounting and estimation of discards occurring in fisheries managed under the Northeast Region FMPs. If observers assigned to fishing vessels under the SBRM are utilized for other purposes, such as real-time quota monitoring, monitoring of marine mammal interactions, monitoring fishing gear operations, etc., these activities and competing priorities may degrade the sampling design developed and implemented through this amendment.

6.9.3. Item 3: Establish an SBRM CV Standard

For this item, two alternatives are considered: The status quo and establishing a SBRM CV standard of 30 percent. While the status quo process for optimizing the observer sea day allocation across fisheries for several fishing gear types (otter trawl, gillnet, and longline) uses a CV of 30 percent as its target, this feature is neither explicitly specified nor considered a formal component of the SBRM. Under alternative 2, the CV standard would be explicitly specified for all relevant combinations of gear type and species or species group as a formal component of the SBRM. In evaluating these two alternatives, the primary consideration is the recognition by the Court, in *Oceana* v. *Evans I*, that Amendment 13 to the Northeast Multispecies FMP did not contain any standards as part of an SBRM. Therefore, only the second alternative would be consistent with the intent of the Court order in response to both *Oceana* v. *Evans I* and *II* and meet the purpose of this amendment.

6.9.4. Item 4: SBRM Review/Reporting Process

For this item, three alternatives were considered: (1) The status quo (no action); (2) establishing an SBRM review process; and (3) requiring periodic discard reports. Under the status quo scenario, there is no requirement to prepare formal reports that evaluate the effectiveness of the SBRM at achieving its goals and objectives, or to prepare periodic reports that provide information on discards occurring in the fisheries. This information would be available upon request by the Council or NMFS, but there would be no standards for the type or level of information to be provided in response to any such request. It would be difficult to plan for and budget resources in advance for the preparation of any report requested in an ad-hoc manner by the Council.

With the second alternative, the frequency of the preparation of an SBRM Review Report would be specified, allowing for adequate planning and resource allocation, and the minimum expected contents of the reports would be specified, providing for consistency of information and comparison across reports and across time. The second alternative would contribute to meeting the intent of the Court in *Oceana* v. *Evans I* and *II* in which the Court identified a "mandated" SBRM as a requirement of the Magnuson-Stevens Act. By mandating periodic reports evaluating the effectiveness of the SBRM implemented under this amendment, as well as the contents of such reports, a required element of the Northeast Region SBRM would become a reporting and evaluation feedback mechanism to determine whether modifications to the SBRM are required.

Within the second alternative to specify an SBRM review process, four options are presented for the periodicity of such reports: Annually; every 3 years; every 5 years; and as part of an existing required reporting schedule (e.g., SAFE reports). Under the first three options, a single comprehensive report would present the required information for all species and fishing modes to allow both Councils and NMFS to evaluate the overall effectiveness of the SBRM. The primary concern with this approach (a single, all-encompassing report) is the significant staff time and resources required in order to conduct such a review, which may prevent other important activities, such as stock assessments, from being completed. In particular, the option for an annual report does not reflect an effective use of available resources. In addition, there is concern that under any of the first three options, the SBRM report may be presented out of sync with either the stock assessments utilizing the information, such that the information in the report would not represent the current status of how the information is being used in stock assessments, or the consideration of management measures for which the information may be useful. Lastly, the first three options add an additional reporting requirement, which may be perceived as redundant with other reports prepared for Northeast Region fisheries (including stock assessment reports, SAFE reports, annual reports, etc.)

The fourth option attempts to address these concerns by linking the presentation of the SBRM information to the development of reports already prepared for the relevant fisheries. This distributes the reporting requirement so that the analytical burden in any one year would be limited and more manageable, and incorporates the reporting requirement into an existing reporting requirement that is in sync with schedules for anticipated management actions (for example, the preparation and presentation of a SAFE report to a Council typically includes recommendations for changes to management measures to address any noted issues related to stock status, rebuilding, or changes in the affected fisheries). However, because there are so many interrelationships and overlaps among fisheries, this option may result in redundant reporting. For example, the Mid-Atlantic large-mesh otter trawl fleet encompasses the Northeast large-mesh multispecies, monkfish, and summer flounder fisheries; evaluating the effectiveness of the SBRM relative to this fishing mode (as a single example from among many) separately for each of the controlling relevant FMPs (which may be on independent reporting schedules) would require the Northeast Fisheries Science Center staff to perform the same analysis three separate times.

Information collected through the NEFOP is the primary source of data for the Council's SBRM. As such, it is important that the Councils receive this information on a regular basis and in a consistent format, so that trends can be monitored, and potential problems and issues can be identified as they arise. A periodic report that provides detailed information for all observed trips in the Northeast Region, as proposed in alternative 4.3, would keep the Councils updated on the collection of discard information and may help to identify bycatch problems in a more timely manner. This should allow the Councils to respond more expeditiously and address problems before they worsen and potentially compromise stock rebuilding. Ultimately, reviewing these data regularly will improve fisheries management in the Region and help the Councils to better comply with the requirements of the Magnuson-Stevens Act.

It is possible, but not necessary, to adopt both alternative 4.2 and alternative 4.3, or to adopt either alone. Alternative 4.3 would provide for a periodic report of discards occurring in Council fisheries, while alternative 4.2 would provide for reporting on the efficacy of the SBRM. The most robust reporting procedures would include both, but neither alternative depends upon the other.

Alternative 4.3 includes two options: A semi-annual report or an annual report. There are several potential benefits of requiring either a semi-annual or annual discard report. The report would highlight the on-going data collection program of the NEFOP, and would formalize a process to provide an ongoing summary of observed discard rates by gear, area, and quarter. This information is not currently provided in one location at this level of detail across fisheries, although some stock assessment documents show discard rates by gear and quarter. A requirement for monitoring annual catch limits and attendant accountability measures may require more frequent discard estimates. The suggested format (see Appendix G) indicates the data that would be needed to track discards. Currently, discard estimates are officially provided only in stock assessments, although some PDTs and monitoring committees review discard and discard rate information more frequently on an ad hoc basis. This report may help to identify discard issues at a temporal scale that is shorter than the assessment cycle or to identify emerging discarding event/issues if reporting is sufficiently timely.

There are, however, also several limitations and concerns associated with the proposed report. As proposed, the strata in the report are not identical to the strata used in the SBRM Amendment and to assign observer coverage. This makes a direct comparison to the SBRM methodology difficult, if not impossible. The proposed report would present only a summary of observed discards in the fisheries, without expanding this information to an estimate of total discards. Without this expansion (which would require additional work and, therefore, further delay in presenting the information), the data in the report do not provide a complete picture of discards occurring in a fishery. There would be no context for the data presented in the report, which may lead to misinterpretation or incorrect responses to the data. For example, a high discard-to-kept ratio in one statistical area in one quarter cannot be interpreted without knowing the number of trips observed in the cell, total catch from that cell, etc. There is a risk that outliers (apparently high discard events) will attract undue attention because they stand out.

Under current data collection, processing, and reporting requirement time frames, the time between an observed fishing trip and the date when the data from that trip would be available for inclusion in a semi-annual report could exceed 9 months. Such a long time lag diminishes the usefulness of such a report if there is an expectation that the information presented would be more current than is possible. By the time the information is presented, any apparent discard problem or event may no longer be occurring. A report such as what has been proposed may invites attempts to micro-manage fisheries based on incomplete data. Requiring such a detailed report on a semi-annual basis would divert resources to prepare a report with limited utility from other tasks such as stock assessments and supporting the development of management actions. An annual reporting cycle mitigates some of the timing concerns associated with the proposed discard report, but cannot overcome the larger issues identified above.

6.9.5. Item 5: Changes to the Framework Adjustment and/or Annual Adjustment Provisions

For this item, three alternatives are considered: (1) The status quo (no action); (2) authorizing changes to certain provisions of the Northeast Region SBRM through framework adjustments to the FMPs; and (3) authorizing changes to certain provisions of the Northeast Region SBRM through framework adjustments, annual adjustments, and/or annual or multi-year specifications. None of these alternatives would affect the procedures already stipulated in each FMP regarding framework adjustments, annual adjustments, and/or annual or multi-year specifications. The only changes considered under this item relate to supplementing the lists of management measures that may be modified through one of these types of actions.

Under the status quo, any changes to the provisions of the Northeast Region SBRM would require another amendment to an affected FMP. Neither Council would be able to employ a more streamlined process, such as for framework adjustments, annual adjustments, or annual or multi-year specifications, to make changes to the provisions of the SBRM. This may create problems with the implementation and operation of future management programs that are developed and implemented through one of the more efficient processes, but which would rely upon concurrent changes to the SBRM to be effective.

With the second alternative, certain aspects of the SBRM could be modified via a framework adjustment to the affected FMP, including: (1) The CV-based performance standard; (2) the means by which discard data are collected/obtained in a fishery; (3) fishery stratification; (4) SBRM reporting; and (5) industry-funded observers and/or observer set-aside programs. The intent of this alternative is to ensure that as the Councils modify management measures through framework adjustments to adapt to changing conditions in the fisheries, that they retain the flexibility to make the needed changes to the SBRM to ensure adequate data on discards.

For example, under Amendment 13 to the Northeast Multispecies FMP, the New England Council may utilize the framework adjustment process to develop and implement new SAPs and/or new sector allocations. Under this alternative, the Council could use the framework developed for a new SAP to also modify the SBRM to ensure sufficient data are collected on the discards occurring in the SAP. Without this alternative, the Council could implement a new SAP through a framework, but would have to use the full amendment process to address the SBRM provisions associated with the SAP. This would create a substantial inconsistency in the process and a delay in the timeliness of implementing necessary management measures.

With the third alternative, all the changes proposed in the second alternative, with one notable exception, would also be authorized to be made through an annual adjustment or annual/multi-year specifications. This alternative would provide the Councils with the most flexibility to update and/or modify the provisions of the Northeast Region SBRM as conditions in the fisheries or management programs change. For FMPs that utilize an annual adjustment or specifications process (annual or multi-year), these actions may be a more appropriate vehicle to implement necessary changes to the SBRM. For example, the Mid-Atlantic Council often modifies the provisions of the scup gear restricted areas (GRAs) through the summer flounder, scup, and black sea bass specifications. This alternative would allow the Council to also incorporate appropriate changes to the SBRM to support the GRA modifications in the subject action, without the need for a separate framework adjustment or amendment to modify the SBRM. The exception noted above is the industry-funded observers and/or observer set-aside programs, which would require a framework adjustment regardless of the alternative selected.

6.9.6. Item 6: Prioritization Process for SBRM Observer Allocation

For this item, two alternatives were considered: (1) The status quo (no action); and (2) specifying a consultation process to provide the Councils the opportunity to review and comment on the priority observer sea day coverage allocations proposed by the Regional Administrator and Science and Research Director. The alternative selected under this item will be most important in years in which the available budget or other resources are insufficient to fully provide the observer coverage levels calculated through the Northeast Region SBRM.

While the SBRM clearly identifies the methodologies to be used to calculate observer coverage levels needed to achieve the CV-based SBRM performance standard on an annual basis, these coverage levels can only be implemented if all necessary resources (budget, trained observers, etc.) are sufficient for NMFS to allocate the necessary coverage. The methodologies were established and are intended to function independently from any decisions regarding available budgets or other resources; however, the SBRM Amendment would be remiss if it did not address the contingency of insufficient resources that impose external operational constraints on the Regional Office and Science Center.

Under the status quo, should the Federal budget allocation for at-sea fisheries observers (or other resources) be insufficient to fully provide the necessary observer sea days, the Regional Administrator and Science Center Director would allocate the available coverage levels on an ad hoc basis. This approach could be interpreted as insufficient under the Court orders resulting from *Oceana* v. *Evans I* and *II*, which expressed concern over leaving the setting of observer coverage levels to the discretion of the Regional Administrator.

With the second alternative, the SBRM Amendment would establish a formal consultation process to provide the Councils and the public with the opportunity to review, and provide comment on, the proposed prioritization recommended by the Regional Administrator and the Science and Research Director. This approach recognizes the need for the agency to develop an initial prioritization based on the needs of stock assessments and other legal mandates requiring fisheries monitoring and reporting, but includes the Councils in the process to develop the observer coverage allocations that adjust for any external operational constraints.

6.9.7. Item 7: Industry-Funded Observer Program

For this item, three alternatives are considered: (1) The status quo (no action); (2) authorizing an observer service provider approval and certification process; and (3) adding industry-funded observer and observer set-aside provisions as measures that can be implemented through framework adjustments. It is possible, but not necessary, to adopt both alternative 7.2 and alternative 7.3 under this item. Alternatives 7.2 and 7.3 are somewhat independent of one another, such that if alternative 7.2 were implemented, but alternative 7.3 was not, then the observer service provider approval and certification procedures and requirements would be established, but each FMP would continue to require an amendment to establish a requirement to utilize these procedures and requirements for an industry-funded observer program and/or observer set-aside program. This could be done to ensure consistent procedures and requirements across all fisheries for approving and certifying observer service providers, even if FMP-specific amendments would be required to establish the industry-funded observer program.

If, however, alternative 7.2 is not implemented, there is likely little benefit to alternative 7.3, as an amendment to each FMP would remain required to create the observer service provider approval and certification procedures and requirements necessary to implement an industry-funded observer requirement. This would be analogous to Amendment 13 to the Sea Scallop FMP: An amendment was required to establish the observer service provider approval and certification provisions even though the industry-funded observer requirements and observer set-aside provisions were adopted in earlier actions (Framework Adjustments 16 and 18 and Amendment 10 to the Sea Scallop FMP).

The most benefit would be derived if both alternatives 7.2 and 7.3 are adopted in this action. This would establish the observer service provider approval and certification procedures and requirements across all fisheries, and allow development and implementation of an industry-funded observer program, with or without observer set-aside provisions, through a framework adjustment for each fishery.

One example in particular of why it would be prudent to adopt alternatives 7.2 and 7.3 in this action is to facilitate the development of new sector programs or special access programs (SAPs) under the Northeast Multispecies FMP. Amendment 13 to the FMP authorized the development and implementation of both sectors and SAPs through the framework adjustment process. However, should the New England Council choose to require specialized levels of observer coverage, at industry expense (with or without an observer set-aside program to offset costs), as part of either the sector or the SAP, currently an amendment to the FMP would be required. Adoption of alternatives 7.2 and 7.3 would allow these provisions to be included in the framework adjustment to implement the sector or SAP. The New England Council's proposed Omnibus Sector Amendment would similarly allow new sectors to be established under other FMPs through a framework adjustment, but adoption of alternatives 7.2 and 7.3 would be necessary for the Council to include in such a framework the provisions for an industry-funded observer program and observer set-aside. For the Mid-Atlantic Council, recent attempts to include industry-funded observer requirements on vessels fishing for squid, in return for access to the scup Gear Restricted Areas (GRAs), provide an example where these measures would have simplified the process to develop and implement the GRA access program.

6.10. Rationale for Selecting the Preferred Alternatives

Fisheries management is a dynamic, responsive process, adapting to changing environmental, socio-economic, and legal conditions. The management measures implemented with the intention to rebuild an overfished stock may be completely inappropriate for that fishery once the stock is rebuilt. Similarly, as new information becomes available, management measures change to reflect this new information. Similarly, because fisheries management itself is so dynamic, the techniques and mechanisms used to collect information on and monitor fisheries and fishing activities cannot be static. Any SBRM established for the fisheries of the Northeast Region must be able to be modified as conditions in the fisheries and the management systems require. Thus, one cannot expect that the SBRM established through this amendment will be able to fulfill all *potential* information and monitoring needs into the future without some degree of adjustment.

The SBRM established through this amendment is intended to adequately and efficiently provide sufficient information collection and monitoring to comply with the *existing* requirements and management systems. The notion that this amendment should predict various possible future fisheries management systems and measures (e.g., species-specific hard TACs in the groundfish fishery or ITQs in the sea scallop fishery, etc.) and establish an SBRM that can reliably provide information and monitoring under these changed circumstances is neither realistic nor practicable. For one, because the Councils and NMFS cannot predict with any expected accuracy either how unforeseen future environmental changes may affect fish stocks (and how these changes may affect the relevant fisheries) or how future changes to fishery management law may affect our legal obligations, we cannot accurately predict what types of management actions may be necessary in the future. Second, the information collection and monitoring program should be tailored to the specific types of information collection and monitoring that are required, and these requirements cannot be known until the program needs are identified.

However, this does not mean that the SBRM necessarily needs to be changed every time there is a change in management. The SBRM established through this amendment is designed to be flexible and adapt to future changes as conditions in fisheries and fisheries management change. The most effective way to monitor discards in a fishery managed under a DAS system may not be the most effective way to monitor discards in a fishery with bycatch quotas. The SBRM implemented with this amendment will need to adapt as management strategies change in order to ensure that the appropriate information is being collected as effectively as possible.

As noted in chapter 5, statistical theory applicable to the estimation of fisheries bycatch is evolving and significant advances in techniques and methods are expected to improve the reliability of discard estimation. Much like stock assessments, which adapt to use the most effective and appropriate analytical techniques and models available at the time the assessment is conducted, the analytical underpinnings of the SBRM would change as more effective and appropriate methods are developed.

Thus, the preferred alternatives selected by the New England and Mid-Atlantic Councils would establish an SBRM that defines the primary data collection and monitoring mechanisms to be used for bycatch reporting, defines the analytical framework for estimating bycatch and allocating at-sea observer effort, establishes a performance standard for the SBRM program (a CV of no more than 30 percent), dictates a periodic review, evaluation, and reporting process, establishes framework adjustment provisions to enable changes to the SBRM to be made efficiently, establishes a prioritization process, and establishes provisions to support the development of industry-funded observer programs. Table 64 identifies, for each element of the SBRM, the alternatives under consideration and highlights the preferred alternatives of the Councils.

<table>
<tr><th>SBRM Element</th><th colspan="12">Alternatives Under Consideration</th></tr>
<tr><td>1. Bycatch Reporting and Monitoring Mechanisms</td><td colspan="6">Status quo</td><td colspan="6">Implement electronic video monitoring</td></tr>
<tr><td>2. Analytical Techniques and Allocation of Observers</td><td colspan="3">Status quo</td><td colspan="3">Integrated allocation approach</td><td colspan="3">Integrated allocation approach w/ importance filter</td><td colspan="3">Minimum percent observer coverage</td></tr>
<tr><td>3. SBRM Performance Standard</td><td colspan="6">Status quo</td><td colspan="6">Establish a CV standard</td></tr>
<tr><td>4. SBRM Review/ Reporting Process</td><td colspan="4">Status quo</td><td colspan="4">Specify an SBRM review process</td><td colspan="4">Require periodic discard reports</td></tr>
<tr><td>5. Framework Adjustment Provisions</td><td colspan="4">Status quo</td><td colspan="4">Framework adjustment</td><td colspan="4">Frameworks and annual adjustments</td></tr>
<tr><td>6. Prioritization Process</td><td colspan="6">Status quo</td><td colspan="6">Council consultation</td></tr>
<tr><td>7. Industry-Funded Observer Programs</td><td colspan="4">Status quo</td><td colspan="4">Observer provider approval</td><td colspan="4">Framework provisions</td></tr>
</table>

Table 64. Summary of alternatives under consideration for the Omnibus SBRM Amendment (Councils' preferred alternatives are shaded).

The specific rationale for the preferred alternatives can be summarized as follows:

- Bycatch Reporting and Monitoring Mechanisms – The Councils' preferred alternative is the status quo, which represents all bycatch reporting and monitoring mechanisms currently employed in the Northeast Region. These mechanisms have been used successfully for several years and together they form a comprehensive and mature data collection program. Although the Councils considered implementing electronic video monitoring to supplement at-sea observer coverage, this technology, while it appears promising, is not considered to be sufficiently mature for widespread implementation at this time.

- Analytical Techniques and Allocation of Observers – The Councils' preferred alternative is the integrated allocation approach with the addition of the importance filters. The status quo procedures have been utilized successfully in the Northeast Region for several years and are considered to provide an efficient and effective means to allocate observer effort. The integrated allocation approach represents an expansion and refinement of the status quo approach to address all applicable species groups and fishing gear modes. The addition of the importance filter incorporates the recommendation of the technical review by members of the two Council SSCs. Although the Councils initially considered a different approach to allocate observer coverage based on minimum percent levels, this approach is not considered to be sufficiently robust to effectively account for the many differences among the 39 Northeast Region fishing modes, nor does it directly employ the type of feedback mechanism that the preferred approach does. There is concern that the minimum percent observer coverage approach would lead to oversampling of some fishing modes, could lead to undersampling of other fishing modes, and would not ensure an efficient and effective allocation of resources. The Councils recommend that the importance filters be applied at the level of 95 percent of total discards and 98 percent of total mortality. These levels are considered sufficiently conservative to retain observer coverage over the fishing modes responsible for nearly all of the discards and mortality of each species while providing a meaningful filter to address the intent of the SSC review. This level of filtering is intended to eliminate the insignificant contributors of discards and mortality, while ensuring a robust and effective observer coverage allocation.

- SBRM Standard – The Councils' preferred alternative is to establish a performance standard for the SBRM based on the CV of the discard estimate for each appropriate combination of fishing mode and species or species group. Implementation of the SBRM established with this amendment would require allocation of at-sea observer effort such that the resulting CV equal no more than 30 percent. The Councils consider this alternative to be the only one under consideration that is consistent with the intent of the Court orders in the *Oceana* v. *Evans I* and *II* decisions.

- SBRM Review and Reporting Process – The Councils' preferred alternative is to specify a periodic SBRM review and reporting process in order to provide a means for the Councils to periodically evaluate the performance and effectiveness of the SBRM established with this amendment. This alternative is considered more appropriate than the status quo given the desire of the Councils to be able to ensure that the bycatch information being collected under this SBRM continues to meet the needs of the fishery scientists and managers. The Councils recommend that the proposed SBRM Review Report be required to be prepared by the Northeast Fisheries Science Center once every 3 years. This interval is considered to represent a reasonable balance of the workload required to prepare such a report and the value and timeliness of the information to be provided. In addition, the Councils recommend that a report on the discards occurring in all Northeast Region fisheries be prepared annually and provided to the Councils by the Northeast Fisheries Science Center. These are two separate reports intended to provide different information on the implementation of the Northeast Region SBRM.

- Changes to the Framework Adjustment and/or Annual Adjustment Provisions – The preferred alternative of the Councils is to add provisions to the framework adjustment and annual adjustment regulations, as appropriate, for each subject FMP in order to enable changes to the Northeast Region SBRM to be made on an FMP-by-FMP basis, as needed. This approach is considered preferable to the status quo alternative, which would require all future modifications to the SBRM to be done only through amendments to the FMPs. Using the framework adjustment and/or annual adjustment processes provides a timely, efficient, and effective tools to address future issues and management needs.

- Prioritization Process for SBRM Observer Allocation – The Councils' preferred alternative is to specify a consultation process to provide the Councils the opportunity to review and comment on the priority observer sea day coverage allocations proposed by the Regional Administrator and Science and Research Director. In contrast, under the non-preferred status quo alternative, there would be no documented process and all decisions regarding prioritization would be made on an ad hoc basis, with no requirement for the NMFS Regional Administrator and Science and Research Director to consult with the Councils. The alternative selected under this item will be most important in years in which the available budget or other resources are insufficient to fully provide the observer coverage levels calculated through the Northeast Region SBRM.

- Industry-Funded Observer Program – The preferred alternatives of the Councils would establish uniform observer service provider approval and certification procedures and requirements across all fisheries, and allow the development and implementation of an industry-funded observer program on an FMP-by-FMP basis, with or without observer set-aside provisions, through a framework adjustment for each fishery. Under the non-preferred status quo alternative for this element, a full FMP amendment would be required in each case in which a Council proposed either an industry-funded observer program or an observer set-aside program, with the exception of the sea scallop fishery. The preferred alternatives would streamline the development of such a program should a Council elect to proposed one, and provide a uniform mechanism to retain observer service providers to support all such new programs.

Chapter 7
Environmental Consequences
of the Alternatives Under Consideration

7.1. Description of the Affected Environment

This amendment examines the analytical procedures and information reporting and data collection mechanisms that are currently used to assess the types and quantities of bycatch occurring in the Northeast region. This amendment documents how those procedures and mechanisms apply to the variety of fisheries prosecuted by federally permitted fishing vessels operating under one or more of the FMPs developed by the Mid-Atlantic and/or New England Councils. The objective of this amendment is to ensure that the analytical procedures and information reporting and data collection mechanisms, which together comprise the current SBRM for the applicable fisheries, comply with the SBRM requirements of the Magnuson-Stevens Act. This amendment also considers alternatives to the current approach for collecting, monitoring, and analyzing information regarding bycatch to determine whether the current approach should be replaced, modified, and/or supplemented.

Earlier chapters of this document provide specific information on the FMPs subject to this amendment (see Chapter 2), on the fishing modes covered by the SBRM (see Chapter 3), and on the types of monitoring and information collections mechanisms addressed in this amendment (see chapter 4). This chapter will diverge from these previous discussions that examined each FMP or fishing mode on a case-by-case basis, and summarize the relevant environmental features at a broader scale that crosses all subject FMPs and their constituent fisheries.

Because this amendment is wholly concerned with the procedures and mechanisms by which data and information on the types and rates of bycatch are obtained and utilized by scientists and fishery managers, the scope of the "environment" affected by this amendment is atypical for an FMP amendment. Most FMP amendments (and related actions) focus on changes to fishing regulations, which have a direct impact on fishing vessel operations (by modifying where, when, and/or how fishing may take place). These impacts on fishing vessel operations almost always affect the ways in which these fishing activities directly or indirectly interact with living marine resources, marine habitat, and the socio-economic constructs of the human environment. Thus, generally, for a fishery management action or an amendment of this type, the "Affected Environment" section would include specific, detailed information on the particular fishery and non-fishery species, the habitats of these species, and the fishing businesses and communities expected to be directly or indirectly affected by the proposed action.

However, as the focus of this amendment is on the methodology by which bycatch information is obtained, analyzed, and utilized, the impacts of the preferred alternatives are wholly procedural in nature. Therefore, a detailed description of the environmental components including the biological resources, physical environment, and socio-economic structure that could be affected by the alternatives under consideration is not necessary. Instead, this section of the amendment will include a brief overview of the areas in which the fishing activities affected by the subject FMPs occur, a brief overview of the primary ports engaged in the subject fishing activities, and a brief overview of the fishery and non-fishery living marine resources most frequently encountered by the subject fishing activities. This section will also include references for more detailed information on these topics, should any reader wish to become more familiar with the features of the environment in which the subject fisheries occur.

7.1.1. Physical Environment

The fishing activities affected by the FMPs subject to this amendment occur off the Atlantic coast of the U.S., primarily from Cape Hatteras, NC, to the U.S./Canada border. This area of the Northwest Atlantic Ocean is also known as the Northeast U.S. Continental Shelf Large Marine Ecosystem (Sherman et al., 1996) and includes the subsystems known as the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight. For more information about the physical characteristics of the environment described below, reference NEFMC (2004a); NEFMC (2004b); Sherman et al. (1996); and Stevenson et al. (2004). See Figure 37 for a map of the Northeast Region with the three major subsystems identified.

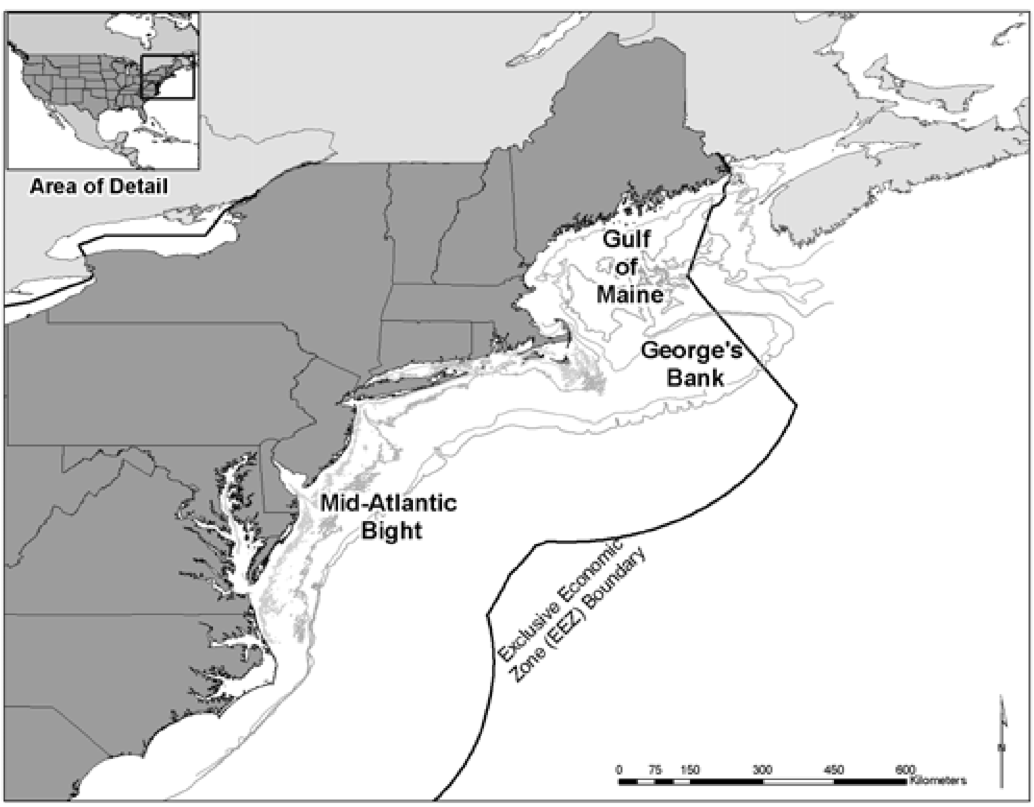

Figure 37. Map of the Gulf of Maine, Georges Bank, and Mid-Atlantic Bight.

7.1.1.1. Gulf of Maine

The Gulf of Maine is an enclosed coastal sea characterized by relatively cold waters and deep basins. The Gulf of Maine is bounded on the east by Browns Bank, on the north by Maine and Nova Scotia, on the west by Maine, New Hampshire, and Massachusetts, and on the south by Cape Cod and Georges Bank. Retreating glaciers (18,000-14,000 years ago) formed a complex system of deep basins, moraines, and rocky protrusions, leaving behind a variety of sediment types including silt, sand, clay, gravel, and boulders. These sediments are patchily distributed throughout the Gulf of Maine, and are largely related to the topography of the bottom.

Water patterns in the Gulf of Maine exhibit a general counterclockwise current, influenced primarily by cold water masses moving in from the Scotian Shelf and offshore. Although large-scale water patterns are generally counterclockwise around the Gulf, many small gyres and minor currents do occur. Freshwater runoff from the many rivers along the coast of the Gulf of Maine influences coastal circulation, as well. These water movements feed into and affect the circulation patterns on Georges Bank and in Southern New England, both of which are discussed below.

7.1.1.2. Georges Bank

Georges Bank is a shallow, elongate extension of the northeastern U.S. continental shelf, and it is characterized by a steep slope on its northern edge and a broad, flat, and gently sloping southern flank. The Gulf of Maine lies to the north of Georges Bank, the Northeast Channel (between Georges Bank and Browns Bank) is to the east, the continental slope lies to the south, and the Great South Channel separates Georges Bank and Southern New England to the west. Although the top of Georges Bank is predominantly sandy sediment, glacial retreat during the late Pleistocene era resulted in deposits of gravel along the northern edge of the Bank, and some patches of silt and clay can be found.

The most dominant oceanographic features of Georges Bank include a weak but persistent clockwise gyre that circulates over the whole of the Bank, strong tidal flows (predominantly northwest and southeast), and strong but intermittent storm-induced currents. The strong tidal currents result in waters over the Bank that are well-mixed vertically. The clockwise Georges Bank gyre is in part driven by the southwestern flow of shelf and slope water that forms a countervailing current to the Gulf Stream.

7.1.1.3. Mid-Atlantic Bight and Southern New England

The Mid-Atlantic Bight includes the continental shelf and slope waters from Georges Bank to Cape Hatteras, North Carolina. Occasionally discussed separately, most texts consider Southern New England a subregion within the Mid-Atlantic Bight.[52] The

[52] Southern New England is generally considered to be the area of the continental shelf off the coasts of Massachusetts, Rhode Island, and Long Island, New York, from the Great South Channel to Hudson Canyon.

basic morphology and sediments of the Mid-Atlantic Bight were shaped during the retreat of the last ice sheet. The continental shelf south of New England is broad and flat, dominated by fine grained sediments (sand and silt). Patches of gravel can be found in places, such as on the western flank of the Great South Channel.

The shelf slopes gently away from the shore out to 100-200 km offshore, where it transforms into the continental slope at the shelf break (at water depths of 100-200 m). Along the shelf break, numerous deep-water canyons incise the slope and into the shelf. The sediments and topography of the canyons are much more heterogeneous than the predominantly sandy top of the shelf, with steep walls and outcroppings of bedrock and deposits of clay.

The southwestern flow of cold shelf water feeding out of the Gulf of Maine and off Georges Bank dominates the circulatory patterns in this area. The countervailing Gulf Stream provides a source of warmer water along the coast as warm-core rings and meanders break off from the Gulf Stream and move shoreward, mixing with the colder shelf and slope water. As the shelf plain narrows to the south (the extent of the continental shelf is narrowest at Cape Hatteras), the warmer Gulf Stream waters run closer to shore.

7.1.2. Biological Resources

The biological resources of the Northeast Shelf Ecosystem can be categorized into three basic groups: Fishery resources; protected resources; and other non-fishery resources. Fishery resources are distinguished as those species both caught and landed for commercial sale or for recreational use; primarily the managed species identified in Table 1 and Table 65.[53] Protected resources include whales and other marine mammals afforded protection under the Marine Mammal Protection Act, as well as sea turtles and other species afforded protection under the Endangered Species Act. Other non-fishery resources include the vast majority of marine flora and fauna living in this environment, but which are neither landed for commercial or recreational purposes or afforded any special protections under law. This section will provide summary descriptions of these biological resources, but additional, more detailed, information may be found in a variety of sources, including: Collette and Klein-MacPhee (2002); Stevenson et al. (2004); and Sherman et al. (1996).

7.1.2.1. Fishery Resources

The fishery resources of the Northeast Region include a variety of managed and non-managed species that are caught and landed by commercial and recreational fishermen operating in the region (see Table 65). These fishery resources include many species of both demersal and pelagic finfish, several species of crustaceans, mollusks,

[53] Some fishery resources, such as hagfish, Atlantic wolffish, and cusk, are landed for sale commercially but are not the subject of an FMP. For some of these, such as hagfish, an FMP is expected within the next several years, but there are some fishery resources for which no FMP is planned.

and other invertebrates. These species occupy broad ranges within the Northeast Region (see Table 65) and a wide variety of habitats from the pelagic waters of the open ocean to sand, mud, gravel, and rock beds in coastal waters.

In 2004, over 200 species were recorded in FVTRs as being landed. Of the 41 species that comprised the top 99 percent, by weight, of the reported landings, all but 7 are the subject of an FMP by the Mid-Atlantic Council, the New England Council, or the ASMFC. Of the seven non-FMP species in this group, three are managed by at least one state (Northern kingfish, whelks, and blue crabs), one is likely to be subject to a forthcoming Council FMP (Atlantic hagfish), and two may be considered for future Council FMPs (smooth dogfish and Jonah crabs). Only rock crabs appear in the top 99 percent of landed species and are not subject to current or potential future management.

The 39 species managed under the FMPs subject to this amendment comprised 92 percent, by weight, of the species reported as landed in the 2004 FVTR data. Additional information regarding these species, and the management programs established under the subject FMPs, can be found in chapter 2 of this document. An additional 6.1 percent, by weight, of all landed species incorporates the 15 species managed solely under ASMFC FMPs, and the federally managed Atlantic highly migratory species represent another 0.1 percent of total reported landings by vessels submitting FVTRs. In sum, 98.2 percent, by weight, of all reported landings in 2004 were comprised by species subject to either Federal or ASMFC FMPs.[54]

7.1.2.2. Protected Resources

There are many types of protected species that live and migrate through the Northeast Continental Shelf Large Marine Ecosystem, including endangered finfish such as Atlantic salmon, several species of endangered and threatened sea turtles, and several species of whales, small cetaceans, and pinnipeds. Although there may be many species that occur in this area, this section will focus on those protected biological resources that may be caught in or otherwise interact with one or more of the fishing gears utilized in a fishery addressed in this amendment. For a more complete list of protected resources that occur in the Northeast Region, see Table 65. More detailed information on the range-wide status of marine mammal and sea turtle species that occur in the area can be found in a number of published documents. These include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Hirth 1997; USFWS 1997; Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans for Endangered Species Act-listed sea turtles and marine mammals (NMFS 1991; NMFS and USFWS 1991a; NMFS and USFWS 1991b; NMFS and USFWS 1992; NMFS 1998; USFWS and NMFS 1992; NMFS 2005b), the marine mammal stock assessment reports (e.g., Waring et al. 2006), and other publications (e.g., Clapham et al. 1999; Perry et al. 1999; Wynne and Schwartz 1999; Best et al. 2001; Perrin et al. 2002). Additional background information

[54] For additional information regarding species managed by the ASMFC, see the ASMFC's web page at www.asmfc.org/managedSpecies.htm. For additional information regarding species managed under the Atlantic highly migratory species FMPs, see the NMFS Highly Migratory Species Division web page at www.nmfs.noaa.gov/sfa/hms/.

on the Gulf of Maine Distinct Population Segment of Atlantic salmon can be found in the recovery plan (NMFS and USFWS 2005) as well as the status review for Atlantic salmon (NMFS and USFWS 1999).

The wild populations of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-Canada border are listed as endangered under the Endangered Species Act. Atlantic salmon of U.S. origin are highly migratory, undertaking long marine migrations from the mouths of U.S. rivers into the northwest Atlantic Ocean, where they are distributed seasonally over much of the region (Reddin 1985). Most of the salmon originating from the Gulf of Maine Distinct Population Segment spend two winters in the ocean before returning to streams for spawning (NMFS and USFWS 1999).

Loggerhead, leatherback, Kemp's ridley, and green sea turtles occur seasonally in southern New England and Mid-Atlantic continental shelf waters north of Cape Hatteras. In general, turtles move up the coast from southern wintering areas as water temperatures warm in the spring (James et al. 2005; Morreale and Standora 2005; Braun-McNeill and Epperly 2004; Morreale and Standora 1998; Musick and Limpus 1997; Shoop and Kenney 1992; Keinath et al. 1987). The trend is reversed in the fall as water temperatures cool. By December, turtles have passed Cape Hatteras, returning to more southern waters for the winter (James et al. 2005; Morreale and Standora 2005; Braun-McNeill and Epperly 2004; Morreale and Standora 1998; Musick and Limpus 1997; Shoop and Kenney 1992; Keinath et al. 1987). Hard-shelled species are typically observed as far north as Cape Cod whereas the more cold-tolerant leatherbacks are observed in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992; STSSN database).

The western North Atlantic baleen whale species (Northern right, humpback, fin, sei, and minke) follow a general annual pattern of migration from high latitude summer foraging grounds, including the Gulf and Maine and Georges Bank, and low latitude winter calving grounds (Perry et al. 1999; Kenney 2002). However, this is an oversimplification of species movements, and the complete winter distribution of most species is unclear (Perry et al. 1999; Waring et al. 2006). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle et al. 1993; Wiley et al. 1995; Perry et al. 1999; Brown et al. 2002).

Waring et al. (2006) report that, in comparison to the baleen whales, sperm whale distribution occurs more on the continental shelf edge, over the continental slope, and into mid-ocean regions. However, sperm whales distribution in EEZ waters also occurs in a distinct seasonal cycle. Typically, sperm whale distribution is concentrated east-northeast of Cape Hatteras in winter and shifts northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight.

Numerous small cetacean species (dolphins, pilot whales, harbor porpoise) occur within the area from Cape Hatteras through the Gulf of Maine. Seasonal abundance and distribution of each species in Mid-Atlantic, Georges Bank, and/or Gulf of Maine waters varies with respect to life history characteristics. Some species primarily occupy continental shelf waters (e.g., white sided dolphins, harbor porpoise), while others are found primarily in continental shelf edge and slope waters (e.g., Risso's dolphin), and still others occupy all three habitats (e.g., common dolphin, spotted dolphins, striped dolphins). Information on the western North Atlantic stocks of each species is summarized in Waring et al. (2005).

Of the four species of seals expected to occur in the area, harbor seals have the most extensive distribution with sightings occurring as far south as 30° N (Katona et al. 1993). Gray seals are the second most common seal species in EEZ waters, occurring primarily in New England (Katona et al. 1993; Waring et al. 2006). Pupping colonies for both species are also present in New England, although the majority of pupping occurs in Canada. Harp and hooded seals are less commonly observed in EEZ waters. Both species form aggregations for pupping and breeding off of eastern Canada in the late winter/early spring, and then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). However, individuals of both species are also known to travel south into EEZ waters and sightings as well as strandings of each species have been recorded for both New England and Mid-Atlantic waters (Waring et al. 2006).

There are no seabird species in the Northeast Region that would be subject to interactions with fishing gear from one or more of the relevant fisheries listed as either endangered or threatened under the Endangered Species Act.

7.1.2.3. Other Non-Fishery Resources

In addition to the fishery resources caught and landed by commercial and recreational fishermen, and the protected resources subject to various levels of interactions with commercial and recreational fishing activities, there are a wide variety of other non-fishery resources that may be subject to interactions with fishing gear or operations. Although there may be other non-fishery resources that occur in the Northeast Continental Shelf Large Marine Ecosystem, the focus of this review remains on those species or taxa most likely to be encountered by one or more fishing gears utilized in a fishery addressed in this amendment. Table 65 lists examples of non-fishery resources known to be subject to interactions with fishing gear or operations. These 26 species and species groups represent over 90 percent, by weight, of the observed fishery interactions with non-fishery resources during 2004. The non-fishery resources most likely subject to interactions with fishing activities represent many diverse taxa of invertebrates, finfish, and algae that occupy a broad range of habitats throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight.

Based on the results of extensive benthic studies by Theroux and Wigley (1981 and 1998), the biomass and density of non-fishery resources in the Northeast Region tends to be dominated by five groups: Amphipods; annelids; arthropods; echinoderms; and mollusks. In the Gulf of Maine and on Georges Bank, echinoderms and mollusks dominate the biomass, while mollusks dominate in the Mid-Atlantic Bight. In terms of density of individuals, annelids and mollusks dominate in the Gulf of Maine, while crustaceans and annelids dominate on Georges Bank and arthropods, mollusks, and annelids dominate in the Mid-Atlantic Bight. These groups vary by sediment type, as well, with amphipods dominating numerically in sand, gravel, and sand-gravel habitats in all three areas. Mollusks dominate the biomass in sand-shell, silty-sand, sand-gravel, silt, and, and clay habitats in the Mid-Atlantic Bight. Most of the mollusks in sand-gravel, sand-shell, and sand habitats are bivalves, although gastropods are important in silty sand, and annelids, hydroids, and bryozoans are important in sand-gravel habitats. Echinoderms (mostly sea cucumbers) dominate in silty-clay habitats of the Gulf of Maine and Georges Bank. In the Gulf of Maine and on Georges Bank, mollusks comprise 50 percent of the biomass in gravel habitats, but annelids, crustaceans, sea anemones, sponges, and tunicates are also important. In all areas, many of these groups, particularly the annelids and arthropods, serve as important prey items for fishery resources.

Seabirds with known fishing gear interactions in the Northeast Region include several species of gulls, shearwaters, Northern gannets, the common loon, cormorants, and brown pelicans. For more information on seabirds, see Endicott and Tipling (1997), Ward (1995), and Tove (2000).

	Species	Gulf of Maine	Georges Bank	Middle Atlantic Bight
Fishery Resources	American lobster	X	X	X
	American plaice	X		
	Atlantic bluefish	X		X
	Atlantic cod	X	X	
	Atlantic croaker			X
	Atlantic halibut	X		
	Atlantic herring	X	X	X
	Atlantic mackerel	X	X	X
	Atlantic sea scallop		X	X
	Atlantic surfclam	X	X	X
	Atlantic wolffish	X	X	
	Black sea bass		X	X
	Blue crab			X
	Butterfish		X	X
	Clearnose skate			X
	Cusk	X	X	X
	Deep-sea red crab	X	X	X
	Golden tilefish			X
	Haddock	X	X	
	Hagfish	X	X	X
	Horseshoe crab	X	X	X
	Jonah crab	X	X	
	King whiting			X
	Little skate		X	X
	Longfin squid		X	X
	Menhaden	X	X	X
	Monkfish	X	X	X
	Ocean pout	X	X	X
	Ocean quahog	X	X	X
	Offshore hake		X	X
	Pandalid shrimp	X		
	Pollock	X	X	
	Red hake	X	X	X
	Redfish	X		
	Rock crab	X	X	X
	Rosette skate			X
	Scup			X
	Shortfin squid	X	X	X
	Silver hake	X	X	X
	Smooth dogfish		X	X
	Spiny dogfish	X	X	X
	Spot			X
	Striped bass	X	X	X
	Summer flounder		X	X
	Whelks	X	X	X
	White hake	X	X	X
	Windowpane		X	X
	Winter flounder	X	X	X
	Winter skate	X	X	X
	Witch flounder	X		
	Yellowtail flounder	X	X	X

	Species	Gulf of Maine	Georges Bank	Middle Atlantic Bight
Protected Resources	Northern right whale	X	X	X
	Humpback whale	X	X	X
	Fin whale	X	X	X
	Blue whale[55]			
	Sei whale	X	X	
	Sperm whale		X	X
	Minke whale	X	X	X
	Risso's dolphin		X	X
	Short-finned pilot whale			X
	Long-finned pilot whale	X	X	X
	White sided dolphin	X	X	X
	Common dolphin	X	X	X
	Spotted dolphin		X	X
	Bottlenose dolphin		X	X
	Harbor seal	X		X
	Gray seal	X		
	Harp seal	X		
	Hooded seal	X		
	Leatherback sea turtle	X	X	X
	Kemp's ridley sea turtle	X		X
	Green sea turtle	X		X
	Loggerhead sea turtle		X	X
	Atlantic salmon	X		
Other Non-fishery Resources	Amphipods (spp.)	X	X	X
	Annelid worm (spp.)	X	X	X
	Barndoor skate		X	
	Brittle star (spp.)	X	X	X
	Coral (spp.)	X	X	X
	Greater shearwater	X		
	Grenadier (spp.)	X	X	X
	Hermit crab (spp.)	X	X	X
	Jellyfish (spp.)	X	X	X
	Kelp (spp.)	X	X	X
	Lumpfish	X	X	X
	Northern gannet	X	X	X
	Northern stone crab	X	X	X
	Sand dollar (spp.)	X	X	X
	Sand lance (spp.)	X	X	X
	Sculpin (spp.)	X	X	X
	Sea anemone (spp.)	X	X	X
	Sea cucumber (spp.)	X		X
	Sea raven	X	X	X
	Sea robin (spp.)	X	X	X
	Sea squirt (spp.)	X	X	X
	Snail (spp.)	X	X	X
	Spider crab (spp.)	X		X
	Sponge (spp.)	X	X	X
	Spotted hake		X	X
	Starfish (spp.)	X	X	X
	Thorny skate	X	X	
	Zooplankton (spp.)	X	X	X

Table 65. List of example biological resources and the geographic regions where the resources are most commonly found.

7.1.3. Socio-Economic Considerations

Analyses of socio-economic impacts are generally conducted at three levels: The level of the individual fishing vessel, the level of the fishing sector or fleet (typically defined as all permit holders of one type – e.g., all commercial moratorium summer flounder permit holders), and at the level of the fishing community. Individual impacts of fishing regulations (changes to the cost of operations, changes to expected revenues, profits, etc.) occur at the level of the fishing vessel or permit holder, while cumulative

[55] Blue whales are considered only an occasional "visitor" to this region.

impacts across the fishery occur at the level of the sector, fleet, fishing port and/or community. The relative impacts of any proposed regulatory change depend upon several factors: Whether a vessel holds a permit in the affected fishery; whether a vessel holds multiple permits (permits in addition to the affected fishery); the dependence on fishing, and on the affected fishery in particular, of the permit holder; the number of affected permit holders in a sector, fleet, or community; the number of permit holders in the affected fishery versus alternative fisheries; and the overall dependence on fishing, and on the affected fishery in particular, of the fishing community.

As described in chapter 2, most fisheries managed under FMPs subject to this amendment include both limited access permits as well as open access permits. Only the fisheries for Atlantic mackerel, Atlantic bluefish, and skates remain entirely open access.[56,57] In the Northeast Region, approximately 3,700 vessels hold at least one limited access permit. Of these, approximately 1,600 vessels hold only a limited access lobster permit and, therefore, are not subject to the regulations implemented under the FMPs affected by this amendment. This leaves approximately 2,100 vessels with at least one limited access permit issued under a subject FMP. In addition to these vessels, an additional 1,877 vessels hold at least one open access permit (but no limited access permits) in an FMP fishery.

In 2004, the dealer purchase report database includes 524 ports of record among the 12 states in the Northeast Region. Of these, the top 91 ports contribute 90 percent of the total ex-vessel value of all ports in the region, and 50 percent of the total ex-vessel value comes from only 14 ports. Nationally, 15 Northeast Region ports rank in the top 50 of all ports in the country for both quantity of fish landed and for total ex-vessel value of the fish landed (see Table 66).

New Bedford, MA, the top port nationally by value in recent years, is a primary port for Atlantic sea scallops, monkfish, and the large-mesh groundfish species (e.g., yellowtail flounder, winter flounder, haddock, and Atlantic cod). The Hampton, VA, area (including Newport News, VA) is also a primary port for Atlantic sea scallops, as well as summer flounder and blue crabs. Cape May, NJ, is another leading sea scallop port, and is also a primary port for squid (*Loligo* and *Illex*) and Atlantic mackerel. Gloucester, MA, and Portland, ME, are similarly important ports for American lobster, groundfish, monkfish, and Atlantic herring. Point Judith, RI, is a primary port for American lobster, squid (*Loligo* and *Illex*), summer flounder, monkfish, and silver hake. Reedville, VA, one of the top ports in the country by weight of landings, deals primarily in menhaden as well as blue crabs, but does not feature as a primary port for any Northeast Region FMP species.

[56] Amendment 1 to the Atlantic Herring FMP implemented a limited access permit system for this fishery so that, as of June 2007, only the mackerel, bluefish, and skate fisheries would remain entirely open access.
[57] The permit structure under the Skate FMP remains open access, as there is no limited access skate permit. However, effectively only the skate bait exemption fishery is completely open access. With the exception of the skate bait exemption fishery, possession of more than a low incidental catch level of skates requires the vessel to be operating on either a monkfish, sea scallop, or Northeast multispecies day-at-sea (DAS), which in turn requires the vessel to hold a limited access permit in at least one of these fisheries.

Port	Quantity (million pounds) 2004	2005	Port	Value (million dollars) 2004	2005
Reedville, VA	400.5	373.4	New Bedford, MA	207.7	282.5
New Bedford, MA	175.1	153.4	Hampton Roads Area, VA	100.8	85.2
Gloucester, MA	114.1	124.1	Cape May-Wildwood, NJ	60.2	68.4
Cape May-Wildwood, NJ	98.1	74.6	Gloucester, MA	42.8	45.9
Portland, ME	62.4	56.8	Point Judith, RI	36.0	38.3
Point Judith, RI	50.0	41.8	Portland, ME	34.6	34.6
Rockland, ME	36.7	34.6	Stonington, ME	22.4	32.3
Atlantic City, NJ	33.2	31.8	Reedville, VA	26.1	27.1
Wanchese-Stumpy Point, NC	31.4	27.2	Long Beach-Barnegat, NJ	20.6	26.7
Point Pleasant, NJ	33.4	24.8	Point Pleasant, NJ	19.2	21.6
Hampton Roads Area, VA	34.7	23.5	Provincetown-Chatham, MA	14.2	19.8
Beaufort-Morehead City, NC	63.5	19.3	Wanchese-Stumpy Point, NC	20.6	19.6
Stonington, ME	14.1	15.5	Atlantic City, NJ	17.7	18.5
Provincetown-Chatham, MA	13.8	12.5	Montauk, NY	13.1	16.5
Montauk, NY	12.3	12.4	Chincoteague, VA	7.1	14.7

Table 66. Commercial fishery landings and value at major Northeast Region ports, 2004-2005 (from NMFS 2007).

Figure 38 and Figure 39 display 2005 commercial fishing landings for major U.S. ports, both by weight and by value. These figures display the relative importance of Northeast Region ports compared to other major U.S. ports. Based on a classification scheme developed by Hall-Arber et al. (2001), the top-ranked ports in New England are: New Bedford, MA; Portland, ME; Gloucester, MA; Chatham, MA; Point Judith, RI; and Portsmouth, NH. This ranking account for overall fishery dependence and availability of fishing infrastructure. For a more detailed description of the fishing communities in the New England area, see Hall-Arber et al. (2001). This document provides profiles of many ports from Connecticut to Maine, and evaluates fishery dependence. For a more detailed description of the fishing communities of the Mid-Atlantic area, see McCay and Cieri (2000), for profiles of many ports from North Carolina to New York.

As noted earlier, economic impacts of a fishery management action are most directly seen at the level of the individual vessel, but larger scale economic impacts are also seen at the level of the fishing sector and fleet. Cumulative economic impacts are also often expected at the port or community level. Social impacts (as differing from purely economic impacts) can also be seen at the level of the individual vessel (sometimes differentiated based on position on the vessel – owner, captain, crew, etc.), the fishing sector, fleet, port, or community. Ports and communities with the highest degree of dependence on a fishery subject to a management action are the ones most likely to face social impacts as well as economic impacts resulting from a management action. The above mentioned references (Hall-Arber et al., 2001, and McCay and Cieri, 2000) provide detailed information of the social characteristics of New England and Mid-Atlantic ports and fishing communities.

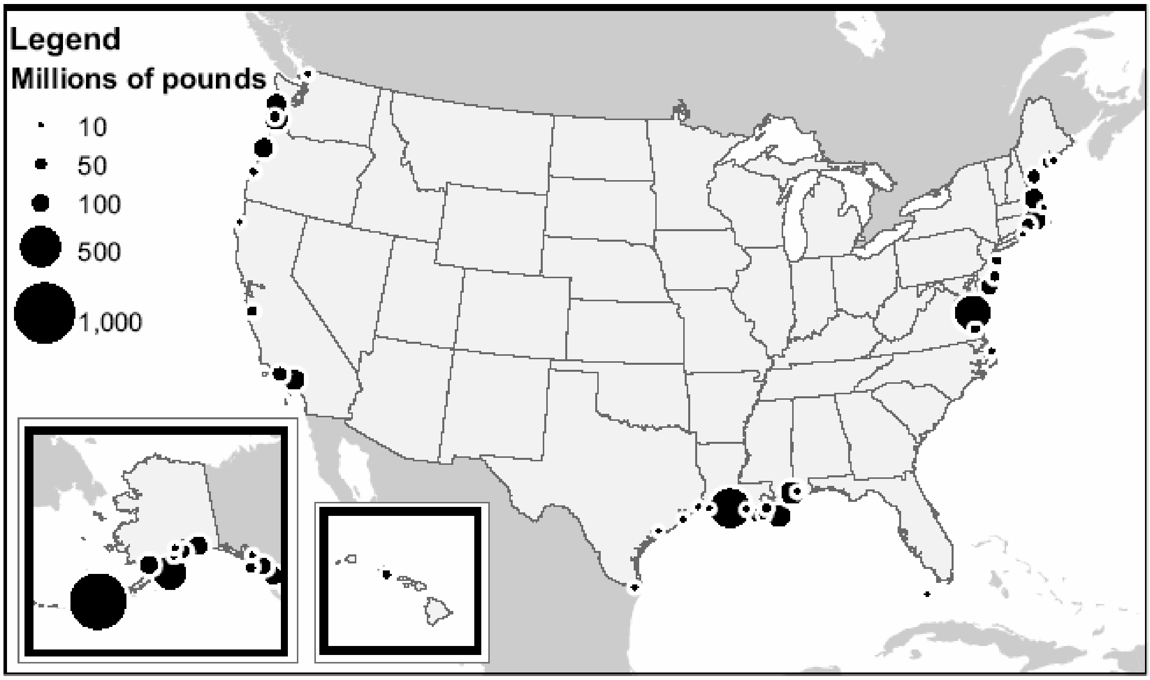

Figure 38. 2005 commercial fishery landings, by weight, at major U.S. ports (from NMFS 2007).

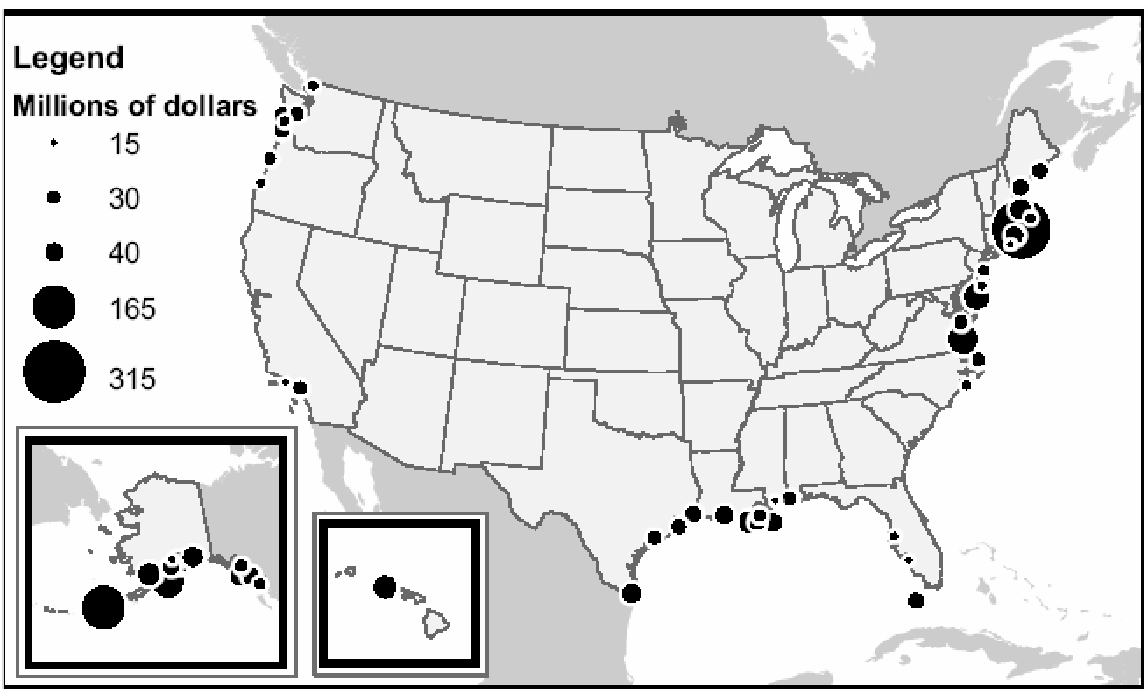

Figure 39. 2005 commercial fishery landings, by value, at major U.S. ports (from NMFS 2007).

7.2. Consequences of the Alternatives Under Consideration

The National Environmental Policy Act requires that an EA briefly describe the probable environmental impacts of the proposed action and alternatives to the proposed action considered by the action agency (NEPA, section 102(2)(E)). The following sections address the reasonably foreseeable direct, indirect, and cumulative effects of the alternatives being considered for the Northeast Region SBRM.

As noted above in the introduction to the affected environment (section 7.1), this amendment is wholly procedural in nature—focused on the methodology and mechanisms by which data and information on the types and rates of bycatch occurring in Northeast Region fisheries are obtained and utilized by scientists and fishery managers. Subsequently, there are no expected direct physical or biological impacts associated with the alternatives under consideration, particularly for the preferred alternatives. As described below, there are some potential economic effects associated with an alternative for bycatch reporting and monitoring, but, overall and due to the nature of the program to be implemented through this amendment, there very few functional differences (as far as environmental effects generally considered in an EA are concerned) between the status quo alternatives and the other alternatives under consideration.

The expected direct effects are generally well-defined for most fishery management actions, but indirect effects are often less so. While NEPA requires consideration of "reasonably foreseeable effects," it does not require consideration of remote and speculative impacts; these effects remain outside the scope of a NEPA analysis (Bass et al. 2001). During the development of this amendment, there have been occasions when discussions began to diverge from how bycatch data may best be collected into discussions about the likely management implications of an "improved" data collection program. These discussions generally focused on the potential for improvements in stock assessments and on the types of management measures that may be necessary to address bycatch concerns where they may exist.

There are three reasons why these types of potential downstream effects (e.g., subsequent management measures to address bycatch issues) of this action are considered too remote and speculative to be appropriate for consideration in this amendment. First, while this amendment is focused on structuring an SBRM to obtain the highest quality bycatch data possible, implementation of this amendment does not, by itself, guarantee that there would be an improvement in data quality over the status quo. In some, if not many, cases, the analyses conducted in support of this amendment have demonstrated that the data currently being collected are of sufficient quality (i.e., precision and accuracy) to meet the objectives of the SBRM (i.e., the CVs associated with many fishing mode-species combinations are already at or less than the target proposed to be established by this amendment). Also, while increases in target observer coverage levels for some fisheries may be expected to improve data quality in those fishing modes, realization of an improvement in data quality is contingent upon sufficient funding for the observer program to fully staff the target coverage level on a continuing basis.

The second reason these types of potential effects are too remote and speculative to be appropriate for consideration in this amendment is that there is no way to predict the effect that an improvement in data quality would have for managing the affected fisheries. While any improvements in data quality would give assessment scientists and fishery managers more confidence in the data, there is no way to predict whether the resulting data would indicate that future estimates of discards would be higher or lower than current estimates. Because any change in the direction of bycatch estimation cannot be predicted at this time, there is no way to predict whether changes in management would be required to address any potential issues that may arise.

The third reason is that the management measures that might be implemented, should action be determined to be necessary to address a bycatch concern, also cannot be predicted. Depending on the specific fishery, resource species, time, area, and manner of interaction leading to the bycatch concern, different types of management measures would be appropriate. Some types of bycatch concerns may best be addressed with a bycatch quota, others may best be addressed with an area or seasonal closure, and yet others may best be addressed through changes to the fishing gear used. As the actual environmental impacts of these potential management changes would vary with and depend upon the type of measure proposed, the management system to be changed, and the time, area, and species fished, there is no way to speculate as to what the most likely environmental impacts may be.

Therefore, because these types of potential management actions, which may eventually stem from implementation of the SBRM, are too remote and speculative to be adequately or meaningfully addressed in this amendment, this NEPA analysis focuses solely on the potential direct, indirect, and cumulative effects expected to be immediately associated with the proposed action and primary alternatives. Any future management actions that may result from the information collected under this SBRM would be subject to all the requirements of NEPA at the appropriate time.

The discussion of environmental effects that follows is organized to present separately the relevant biological, physical, and socio-economic considerations of the alternatives associated with each item described in chapter 6. Thus, for each item, the effects on biological resources of the alternatives are discussed, followed by the effects on the physical environment (habitat) of the alternatives, and then followed by the socio-economic effects of the alternatives. In this way, full consideration may be given to all the potential impacts associated with a single item before proceeding to the next item. Due to the administrative nature of this action, by which is meant that the action is focused on establishing a procedural methodology, including analytical techniques used to determine the effectiveness of a bycatch monitoring program and the allocation of at-sea fisheries observer coverage levels, rather than on implementing changes to fishing operations (e.g., gear, area, season, etc.), in many cases there are no environmental impacts associated with the elements of the SBRM under consideration. In these cases, an explanation for this conclusion is presented, but no separate discussion of the alternatives is provided. Separate discussion of the likely impacts of alternatives is only provided where there are measurable differences in impacts between the alternatives.

7.2.1. Environmental Consequences of Item 1: Bycatch Reporting and Monitoring Mechanisms

This item includes two alternatives addressing the mechanisms through which information on bycatch may be collected and reported. In addition to the status quo, an alternative is considered that would supplement the status quo bycatch reporting and monitoring mechanisms with an electronic video monitoring program. Due to concerns regarding the state of the technology required to implement electronic monitoring, the level of detail of the information that can be obtained through this technology, and the appropriateness of this type of system to Northeast Region fisheries, the status quo is the preferred alternative for this item.

7.2.1.1. Effects on Biological Resources

Because the alternatives considered under this item deal entirely with the procedural and administrative mechanisms by which data and information regarding fishery discards are collected (e.g., FVTRs, at-sea observers, seafood dealer purchase reports, MRFSS, etc.), neither of the alternatives would affect the level of fishing effort, fishing operations, the species targeted, or areas or times fished in the Northeast Region. The preferred alternative proposes maintaining the status quo bycatch collection mechanisms, which would impose no additional requirements or changes to current fishing practices. The electronic monitoring alternative, while it would introduce a new bycatch monitoring technology, would impose no regulatory changes or constraints to the how, where, what, or when of fishing operations, but would only require the purchase and installation of an additional piece of electronic equipment on fishing vessels. Therefore, there are no direct or indirect impacts on biological resources (including fishery resources, protected resources, and other non-fishery resources) associated with either alternative. As there are no biological impacts associated with either of these alternatives, there are no differences between them.

7.2.1.2. Effects on the Physical Environment (Habitat)

Because neither the preferred alternative nor the electronic monitoring alternative would impose or result in any changes in fishing effort or behavior, fishing gears used, or areas fished, there are no potential impacts to the physical environment (including EFH) associated with the alternatives under consideration for this item. Similar to impacts on biological impacts, due to the nature of the alternatives considered for this item, there are no differences between alternatives as far as potential impacts on the physical environment (including EFH) of the Northeast Region.

7.2.1.3. Socio-Economic Effects

The electronic monitoring alternative, because it would introduce an additional fishing vessel monitoring technology into the fisheries for which it was required, can be distinguished from the status quo alternative. There are financial costs associated with implementation of this new technology that would exceed those associated with the status quo. These potential socio-economic impacts are described below.

7.2.1.3.1. Alternative 1.1 –Status Quo (Preferred Alternative)

Because the preferred alternative would continue the status quo program for bycatch reporting and monitoring, there are no economic or social impacts associated with this alternative that could be distinguished from taking no action. This is not to say that there are no costs associated with the current information collection program, but rather that for purposes of analyzing the implications of this action, there would be no incremental changes to the costs currently imposed.

7.2.1.3.2. Alternative 1.2 – Implement Electronic Monitoring

The economic impacts associated with the alternative to implement an electronic video monitoring program for one or more fisheries in the Northeast Region are derived directly from the expected costs to purchase, install, and maintain the electronic monitoring systems. These costs could be borne in either of two ways: A requirement that all permitted vessels participating in the subject fishery purchase, install, and maintain the equipment themselves (industry pays); or NMFS purchases the equipment for the industry participants and provides it for their use (government pays). Based on the various VMS programs implemented in the Northeast Region in recent years, it appears likely that implementation of any type of electronic monitoring program for bycatch would follow the industry-pays model and all costs associated with purchasing, installing, and maintaining the equipment would be borne by the affected vessel permit holders.

Based on cost estimates as of May 2006, it is likely that the cost to purchase a complete electronic video monitoring system would be approximately $7,200 per vessel (Archipelago Marine Research, Ltd. 2006).[58, 59] Installation costs are highly variable and depend upon the size of the vessel, the number of cameras to be installed, and other complicating factors such as the need to retrofit the vessel to support the installation of the equipment. Kinsolving (2006) estimates installation costs as ranging from $650 to $4,225 per vessel, based on a service rate of $65 per hour and the installation time ranging from 10 hours to as many as 65 hours per vessel, depending on the aforementioned complexity. In addition to the cost to purchase and install a system, it is expected that an annual registration fee would be required by the contractor providing the equipment and this is estimated to be approximately $600 per year. Maintenance costs

[58] Archipelago Marine Research, Ltd. (2006), identifies the costs to purchase, install, and maintain a complete electronic monitoring system. While this fee schedule is focused on the British Columbia groundfish longline fisheries, the costs identified are presumed to be transferable to other fisheries. Published costs in Canadian dollars were converted to U.S. dollars based on the published exchange rate for September 7, 2006.

[59] Kinsolving (2006) also provides estimates of the cost to purchase a complete electronic monitoring system, ranging from $4,250, if off-the-shelf components are used, to $8,000 if a package system is purchased from an approved contractor. For the purposes of this analysis, the costs published by Archipelago Marine Research, Ltd. (2006), were used to simplify the analysis and to clearly identify the source of the costs used.

would be expected to vary, but for the purposes of analysis, Kinsolving's (2006) estimate of $975 per year is used. The total first year costs would be approximately $10,200 per vessel, with continuing costs of approximately $1,600 per vessel per year for the second year and beyond (see Table 67).

	Year 1 (per vessel)	Year 2+ (per vessel)
Equipment purchase	$7,194	N/A
Installation costs (average)	$2,438	N/A
Annual program registration fee	$608	$608
Annual maintenance	N/A	$975
Total	**$10,240**	**$1,583**

Table 67. Estimated costs per fishing vessel to purchase, install, and maintain an electronic video monitoring system (Archipelago Marine Research, Ltd. 2006; Kinsolving 2006).

The information presented above and in Table 67 provide an estimate of the per vessel costs of implementing the electronic monitoring alternative. The next step is to estimate the number of affected vessels within the fisheries for which this alternative would be considered. Table 68 below identifies the primary vessel permit categories established for each FMP, with the number of permit holders in 2005. By simply multiplying the cost information by the number of permit holders, an estimate of the overall cost to a fishery can be calculated.

Estimating total costs region-wide is more difficult if more than one fishery would be affected and required to implement electronic monitoring, because most fishing vessels hold permits in more than one fishery. Summing the totals presented in Table 68 for all affected fisheries would result in an over-estimation of the total costs (i.e., vessels with multiple permits would not have to obtain multiple systems). Also, imposition of this type of program in an open access fishery (such as bluefish) would most likely result in a decrease in permit holders, as it would not be cost effective for many participants to incur the expense in order to remain in the fishery. Table 68 does not include party/charter permits for any fisheries.

The costs discussed above address only the purchase, installation, and annual maintenance of the electronic video monitoring systems, but do not address the costs associated with extracting the data from the video recording systems, or storing, maintaining, editing, and reviewing the data. This would be a major component of the electronic monitoring program and must be addressed. For the purpose of this analysis, it is assumed that NMFS would bear these costs and perform all data-related tasks itself (or through a contractor). Thus, the individual vessel and fleet costs do not need to be adjusted to account for these aspects of implementing such a program. However, the costs to the government could be substantial (Kinsolving 2006).

Type of Permit	Number of Permits	Fleet-wide Cost	
		Year 1	Year 2+
Atlantic Bluefish Open Access	3,766	$38,563,840	$5,961,578
Red Crab Limited Access	5	$51,200	$7,915
Red Crab Open Access	1,592	$16,302,080	$2,520,136
Atlantic Herring Limited Access	N/A[60]	N/A	N/A
Atlantic Herring Open Access	2,754	$28,200,960	$4,359,582
Sea Scallop Limited Access	347	$3,553,280	$549,301
Sea Scallop Open Access	258	$2,641,920	$408,414
Black Sea Bass Limited Access	903	$9,246,720	$1,429,449
Dogfish Open Access	3,501	$35,850,240	$5,542,083
Monkfish Limited Access	1,495	$15,308,800	$2,366,585
Monkfish Open Access	2,355	$24,115,200	$3,727,965
NE Multispecies Limited Access	1,550	$15,872,000	$2,453,650
NE Multispecies Open Access	2,782	$28,487,680	$4,403,906
Scup Limited Access	851	$8,714,240	$1,347,133
Skate Open Access	2,741	$28,067,840	$4,339,003
Squid/Mackerel/Butterfish Limited Access	476	$4,874,240	$753,508
Squid/Mackerel/Butterfish Open Access	4,941	$50,595,840	$7,821,603
Summer Flounder Limited Access	988	$10,117,120	$1,564,004
Surfclam/Ocean Quahog Limited Access	61[61]	$624,640	$96,563
Surfclam/Ocean Quahog Open Access	3,849[62]	$39,413,760	$6,092,967
Tilefish Limited Access	28	$286,720	$44,324
Tilefish Open Access	2,289	$23,439,360	$3,623,487

Table 68. Number of permits by FMP permit category for 2005 calendar year, and the estimated total fleet costs associated with implementation of the electronic monitoring alternative.

Agency or contractor personnel would be required to obtain the video data from fishing vessels (either through dockside extraction or a mail-in hard drive exchange program), to review the video footage in order to document discard events, to oversee and perform quality control on the extracted data, and to archive and maintain the data. Video reviewing and data archiving equipment would also be required. Kinsolving (2006) estimates that data storage systems would be required to support approximately 20 terabytes of data per year, but this was an estimate solely for the Pacific rockfish pilot program, which has a fleet of approximately 25 vessels (consolidating to 18 active vessels) that make an average of seven fishing trips per year, with trips averaging 3 days each. Therefore, extrapolating to determine the data storage needs were this program implemented in the Northeast Region would most likely be orders of magnitude greater.

[60] Although limited access has been proposed for the Atlantic herring fishery as part of Amendment 1, this has not yet been implemented so the number of permit holders is not currently available.
[61] Maine Mahogany Quahog Permits.
[62] Individual Transferable Quota (ITQ) required.

Thus, the costs to the government to implement an electronic monitoring program would likely be substantial.

Comparatively, the costs associated with the electronic monitoring alternative appear much greater than the status quo alternative that is proposed as the preferred alternative at this time. Future consideration of electronic monitoring programs would need to weigh the benefits of such a program against the substantial costs to both the fishing industry and the Federal government, although as technologies improve, costs may decrease. Although the cost basis used in this analysis is representative of current costs (using 2006 data), these costs are driven somewhat by the limited number of vendors currently operating in the market. The costs associated with electronic video monitoring would be expected to decrease as more vendors enter the market.

7.2.2. Environmental Consequences of Item 2: Analytical Techniques and Allocation of Observers

This item includes three alternatives addressing the processes by which the appropriate target levels of at-sea observer effort would be determined and how that observer effort would be allocated across the Northeast Region fishing modes. In addition to the status quo, an alternative is considered that would supplement the status quo with an importance filtering process to refine the initial target observer coverage levels, and another alternative is considered that would establish baseline percent coverage levels based on the types of species (common or rare) expected to be encountered by participants in the fishing modes. The preferred alternative would continue the status quo allocation by fishing mode strata to achieve a target CV with the addition of the importance filter. While the coverage rate for fishery observers may change as a result of these alternatives, the requirement to carry an observer would not change. As is currently required, any fishing vessel holding one or more Federal permits that is asked to carry an observer must do so.

7.2.2.1. Effects on Biological Resources

Because the alternatives considered under this item deal entirely with the process by which target observer coverage levels are determined and allocated across fishing modes, none of the alternatives would affect the level of fishing activity, fishing operations, the species targeted, or areas or times fished in the Northeast Region. The differences between the alternatives would be in the target observer coverage levels set for each fishing mode, but the target observer coverage levels would be set prior to determining whether available resources could support such coverage so it is not possible to determine the degree to which realized coverage levels would vary among these three alternatives. Even so, the implications to biological resources of changes in observer coverage levels across the fishing modes that may be linked to differences in how observer effort is allocated is negligible. If some fishing vessels alter their behavior in the presence of a fishery observer (e.g., to avoid a bycatch “hot spot” when an observer is present), then there may be some tangential impacts to some species, but, as described in chapter 5 and Appendix A, evidence of such an “observer effect” is minimal for

Northeast Region fisheries. Therefore, there are no direct or indirect impacts on biological resources (including fishery resources, protected resources, and other non-fishery resources) associated with any of the alternatives. As there are no biological impacts associated with these alternatives, there are no differences among them.

7.2.2.2. Effects on the Physical Environment (Habitat)

Because neither the preferred alternative nor the other alternatives would directly impose or likely result in any changes in fishing effort or behavior, fishing gears used, or areas fished, there are no potential impacts to the physical environment (including EFH) associated with the alternatives under consideration for this item. There are also no differences among the alternatives.

7.2.2.3. Socio-Economic Effects

Because the alternatives considered under this item focus entirely on the process by which target observer coverage levels are determined and allocated across fishing modes, the only socio-economic impacts that could be associated with these alternatives would be for fisheries in which the fishing industry itself pays for the at-sea observers. In the Northeast Region, the fisheries observer program operates entirely through a contract service funded by NMFS, with the single exception of the sea scallop industry-funded program currently operating under emergency regulations (71 FR 69073, November 29, 2006). In this case, increases in target observer coverage levels would increase initial costs to the vessels carrying observers. However, under the provisions of the regulations establishing the sea scallop industry-funded observer program, any vessel required to carry an observer is authorized either to catch and retain additional sea scallops above the standard possession limit or to have their DAS charged at a reduced rate in order to offset the costs associated with carrying the observer. Both the increased possession limit and reduced DAS are subject to the continued availability of a set-aside from the annual total allowable catch and fleet DAS allocation. The intent of the observer set-aside is to offset all costs to the vessel of carrying an observer; however, should the set-aside be exhausted, fishing vessels carrying observers would bear the full costs.

Other than the sea scallop industry-funded observer program established through the emergency rule, no other industry-funded observer programs are authorized in the Northeast Region. Although the sea scallop program implemented under the emergency rule is temporary, expiring on June 11, 2007, it is planned to be implemented on a more permanent basis through Amendment 13 to the Sea Scallop FMP. Amendment 13 was implemented on June 13, 2007 (72 FR 32549), and it includes provisions to re-activate the industry-funded observer program, and provides a mechanism to enable future changes to the scallop observer program through framework adjustments rather than full FMP amendments.

This action may increase spending by the Federal Government to pay for increased levels of observer coverage and to pay for additional statistical analyses and reports to be prepared for use by fishery managers. Using 2004 as the case study, there were 8,429 observer sea days utilized in 2004. Under the preferred alternative for this element, 9,874 observer sea days would be required based on 2004 data. This represents an increase of 1,445 observer sea days. Given a per day total cost of $1,150 to pay the observer and cover the cost of all associated overhead for the contractor and the Government, that equates to an increase of $1,661,750 from the 2004 spending level (a 17 percent increase). However, any increase in Government spending is contingent upon receiving such an increase in the Federal budget allocated to this purpose.

As the three alternatives considered for determining appropriate observer coverage levels and allocating observer effort operate independent of the budget process used to determine the available resources for funding observer coverage in any given year, there are no effective differences among the three alternatives regarding the socio-economic impacts that may be associated with these alternatives.

7.2.3. Environmental Consequences of Item 3: SBRM Standard

This item includes two alternatives addressing whether an SBRM standard should be established as part of the SBRM. The status quo alternative would result in no SBRM standard, while the preferred alternative would establish a CV of 30 percent as the performance standard for the Northeast Region SBRM. The SBRM standard would be used as a gauge to determine whether observer coverage levels in a previous fishing year were sufficient to provide data of the desired precision (indicated by a CV of 30 percent). The SBRM standard would also be used as part of the process to determine target observer coverage levels for future fishing years (see Item 2).

7.2.3.1. Effects on Biological Resources

Due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a performance measure of a 30 percent CV standard for the Northeast Region SBRM, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for either alternative.

7.2.3.2. Effects on the Physical Environment (Habitat)

As above, due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a performance measure of a 30 percent CV standard for the Northeast Region SBRM, there are no direct or indirect effects on the physical environment (including EFH) anticipated for either alternative.

7.2.3.3. Socio-Economic Effects

Due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a performance measure of a 30 percent CV standard for the Northeast Region SBRM, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for either alternative.

7.2.4. Environmental Consequences of Item 4: SBRM Review/Reporting Process

This item includes three alternatives addressing whether the SBRM should include a reporting/evaluation process to present information on bycatch rates in the Northeast Region fisheries, and also to compare the effectiveness of the SBRM against the performance standard. The status quo alternative would result in no requirements for an SBRM reporting process, while the other alternatives (either alone or in combination) would establish a periodic reporting and evaluation process as a formal component of the Northeast Region SBRM. The requirement to provide periodic reporting would specify the types of information to be provided in the reports, and time intervals for which the reports must be prepared (semi-annually, annually, every 3 years, every 5 years, or as part of an existing required reporting process).

7.2.4.1. Effects on Biological Resources

Due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a requirement for a periodic reporting and evaluation process for the Northeast Region SBRM, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for any of the alternatives.

7.2.4.2. Effects on the Physical Environment

Due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a requirement for a periodic reporting and evaluation process for the Northeast Region SBRM, there are no direct or indirect effects on the physical environment (including EFH) anticipated for any of the alternatives.

7.2.4.3. Socio-Economic Effects

Due to the nature of the alternatives under consideration for this item, which are limited to a decision on whether or not to establish a requirement for a periodic reporting and evaluation process for the Northeast Region SBRM, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for any of the alternatives.

7.2.5. Environmental Consequences of Item 5: Changes to the Framework Adjustment and/or Annual Adjustment Provisions

This item includes three alternatives addressing whether to authorize changes to certain aspects of the Northeast Region SBRM through other than a full amendment to an

FMP. The status quo alternative would continue to require a full amendment to modify or update the provisions of the SBRM. The other alternatives would authorize changes to the SBRM through either a framework adjustment to an FMP, or through a framework adjustment, annual adjustment, and/or annual/multi-year specifications. The provisions of the SBRM subject to such changes include: (1) The CV-based performance standard; (2) the means by which discard data are collected/obtained in a fishery; (3) fishery stratification; (4) SBRM reporting; and (5) industry-funded observers and/or observer set-aside programs.

7.2.5.1. Effects on Biological Resources

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding the appropriate mechanisms that may be used to develop and implement potential changes to the Northeast Region SBRM, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for any of the alternatives. Any impacts that may be associated with actually implementing a change to the SBRM through one of these mechanisms (a full amendment, a framework adjustment, an annual adjustment, and/or an annual/multi-year specifications) would be fully analyzed in the documents supporting the action.

7.2.5.2. Effects on the Physical Environment

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding the appropriate mechanisms that may be used to develop and implement potential changes to the Northeast Region SBRM, there are no direct or indirect effects on any physical environment (including EFH) anticipated for any of the alternatives. Any impacts that may be associated with actually implementing a change to the SBRM through one of these mechanisms (a full amendment, a framework adjustment, an annual adjustment, and/or an annual/multi-year specifications) would be fully analyzed in the documents supporting the action.

7.2.5.3. Socio-Economic Effects

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding the appropriate mechanisms that may be used to develop and implement potential changes to the Northeast Region SBRM, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for any of the alternatives. Any impacts that may be associated with actually implementing a change to the SBRM through one of these mechanisms (a full amendment, a framework adjustment, an annual adjustment, and/or an annual/multi-year specifications) would be fully analyzed in the documents supporting the action.

7.2.6. Environmental Consequences of Item 6: Prioritization Process for SBRM Observer Allocations

This item includes two alternatives addressing how observer coverage allocations would be prioritized and determined to account for any operational constraints such as insufficient Federal budgets or other resources that would limit the agency's ability to fully provide the observer coverage levels calculated under the Northeast Region SBRM. The status quo would continue an ad hoc approach to allocate available resources across fisheries if there is a resource constraint. The alternative to the status quo would establish a consultation process, whereby the Regional Administrator and Science and Research Director would develop a prioritization based on stock assessment needs and other legal mandates, and consult with the Councils in order to provide an opportunity for the Councils to publicly review, and provide comments on, the recommendations of the Regional Administrator and Science and Research Director.

7.2.6.1. Effects on Biological Resources

Due to the nature of the alternatives under consideration for this item, which are limited to a decision regarding the appropriate process to follow in order to prioritize available funding for the purpose of allocating observer coverage levels, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for either of the alternatives.

7.2.6.2. Effects on the Physical Environment

Due to the nature of the alternatives under consideration for this item, which are limited to a decision regarding the appropriate process to follow in order to prioritize available funding for the purpose of allocating observer coverage levels, there are no direct or indirect effects on the physical environment (including EFH) anticipated for either of the alternatives.

7.2.6.3. Socio-Economic Effects

Due to the nature of the alternatives under consideration for this item, which are limited to a decision regarding the appropriate process to follow in order to prioritize available funding for the purpose of allocating observer coverage levels, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for either of the alternatives.

7.2.7. Environmental Consequences of Item 7: Industry-Funded Observer Programs

This item includes three alternatives addressing whether the SBRM Amendment should establish and authorize observer service provider approval and certification procedures and requirements, and/or add provisions allowing industry-funded observer programs and observer set-aside programs as measures that can be implemented through framework adjustments. The status quo alternative would result in no change to the regulations on observer service provider approval and certifications that currently apply to the sea scallop fishery. The other alternatives would not actually implement any industry-funded observer programs or observer set-aside programs, but would create the mechanisms needed to more quickly and easily develop and implement such provisions in any of the Councils' FMPs.

7.2.7.1. Effects on Biological Resources

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding creating the mechanisms needed to develop and implement industry-funded observer programs rather than actually implementing any such programs, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for any of the alternatives. Any impacts that may be associated with actually implementing an industry-funded observer program and/or an observer set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

7.2.7.2. Effects on the Physical Environment (Habitat)

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding creating the mechanisms needed to develop and implement industry-funded observer programs rather than actually implementing any such programs, there are no direct or indirect effects on any physical environment (including EFH) anticipated for any of the alternatives. Any impacts that may be associated with actually implementing an industry-funded observer program and/or an observer set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

7.2.7.3. Socio-Economic Effects

Due to the nature of the alternatives under consideration for this item, which are limited to decisions regarding creating the mechanisms needed to develop and implement industry-funded observer programs rather than actually implementing any such programs, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for any of the alternatives. Any impacts that may be associated with actually implementing an industry-funded observer program and/or an observer set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

7.3. Summary of Cumulative Effects Associated with the Preferred Alternative

According to CEQ NEPA regulations, cumulative effects are effects that result from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time.

In general, a cumulative effects assessment should address:

- The area in which the effects of the proposed action will occur;
- the impacts that are expected in that area from the proposed action;
- other past, present, and reasonably foreseeable actions that have or are expected to have impacts in the area;
- the impacts or expected impacts from these other action; and
- the overall impact that can be expected if the individual impacts are allowed to accumulate.

However, as established above, the actions being considered in this amendment focus solely on the administrative processes through which data and information on bycatch occurring in Northeast Region fisheries are collected, analyzed, and reported to fishery scientists and managers. Therefore, it is not possible to conduct what is generally considered a traditional cumulative effects assessment for this action. This amendment does not address bycatch reduction or other issues related to the management measures utilized in Northeast Region fisheries. Although aspects of the proposed SBRM have been implemented previously and utilized in many ways in recent years, the Court ruling that both Amendment 10 to the Sea Scallop FMP and Amendment 13 to the Northeast Multispecies FMP failed to fulfill the Magnuson-Stevens Act requirement to establish an SBRM is evidence that this action is unique in the Northeast Region as the first action to propose the establishment of a comprehensive SBRM for the region.

In many ways, this action simply formalizes the status quo mechanisms used in the Northeast Region to collect information and data on fisheries bycatch and to analyze bycatch data in order to effectively determine appropriate observer coverage levels and allocate observer effort across the many Northeast Region fisheries. This action would not result in any changes to fishing operations in areas covered by the subject FMPs. For these components of the SBRM, there are no incremental impacts to any fishing areas or living marine resources associated with the proposed action, relative to the no action baseline. The SBRM elements proposed in this amendment that diverge from the status quo—implementation of an importance filter to establish and allocated target observer coverage levels, establishment of an SBRM performance standard, the requirement to conduct periodic evaluations and prepare a periodic SBRM report, the prioritization process, and the framework adjustment provisions—are purely administrative features intended to improve the effectiveness and the transparency of the Northeast Region SBRM. None of these additional components are associated with impacts to any fishing areas or living marine resources within the Northeast Region that could be distinguished from the no action baseline.

Even absent contemporaneous direct or indirect impacts, a cumulative effects assessment must also consider potential impacts deferred in time or space. For these "downstream" impacts to be relevant to the cumulative effects assessment, however, they must be reasonably foreseeable and directly linked to the initial action. Because this action (implementation of the SBRM Amendment) is wholly administrative in nature, in that it is focused on establishing a procedural methodology rather than on implementing changes to fishing operations, any such potential downstream impacts are not relevant to this analysis. To conclude that there would be relevant species-level impacts resulting from this amendment, two assumptions would have to be met: (1) That this amendment will *improve* the quality of the bycatch-related information collected on a fishery; and (2) that improving data quality will point to bycatch levels that are *too high*. Table 69 displays these assumptions in the form of a two-by-two matrix. Only if both assumptions hold would an impact to a species be expected; otherwise, no species-level impacts would derive from implementation of this amendment. Even in this case, species-level impacts would only be expected if the improved data reveal a heretofore *unknown* bycatch concern.

		Quality of Discard Data?	
		No Change	**Improved**
Bycatch Levels?	**Acceptable**	No impact	No impact
	Too high	No impact	Impact to species

Table 69. Possible outcomes resulting from implementation of the SBRM Amendment. The first question to be addressed is whether or not, as a result of the SBRM Amendment, the quality of available discard data improves. The second question is whether new or higher quality information provides evidence that current bycatch levels are too high and need to be reduced.

In this context, implementation of the SBRM proposed in this amendment may result in an improvement in the quality of the data available for assessing discards of a species. This would be most likely to occur in situations where the observer coverage rates increase for certain fishing modes as a result of the SBRM Amendment, and those fishing modes contribute significantly towards the total discards of that species. However, it is also possible that the quality of the discard data collected will not improve. This is the most likely outcome for those species for which the primary fishing modes (in terms of contributions to total discards of that species) are already sufficiently sampled to achieve the CV-based performance standard. In addition to the question of data quality, implementation of this amendment may identify specific fishing modes where the discards of certain species are too high and action would be required (under National Standard 9 of the Magnuson-Stevens Act) to reduce these discards. However, it is also possible that the result of improving the quality of discard data for some species is to determine that the levels of discards occurring in certain fisheries are acceptable, or that it would be impracticable to reduce discards further.

As indicated in Table 69, only one of the four possible outcomes results in there being an impact to a species as a result of implementation of the SBRM Amendment (i.e., as a result of the SBRM Amendment, the quality of the bycatch data for a stock in a fishery is improved *and*, as a result of improved data, we obtain evidence that bycatch levels for that stock in a fishery are too high). But, evidence that bycatch levels need to be reduced are not, in and of themselves, an impact to a species. The actual impact to the species derives not from the simple existence of improved data or a finding that bycatch is too high, but from the specific management measures or actions taken to reduce that bycatch that, in turn, provide a benefit to the species. Thus, the only way for this amendment to lead to an impact to a species is for it to lead to a new management action implementing bycatch reduction measures. However, any such action (such as a framework adjustment or an FMP amendment) would *itself* be subject to a full NEPA analysis that is based on the specific management measures under consideration for the specific species and fishery(ies) for which the action has been deemed necessary. In this case, then, the potential management measures that may one day be proposed to address bycatch for some fisheries are so far removed from this action (i.e., not reasonably foreseeable; in terms of the assumptions that must be met even for management action to be deemed necessary, and then to establish the specific combinations of stocks and fisheries for which management actions would be developed—which is necessary to determine the types of management measures are appropriate and would be most effective) that it is not practicable to conduct a NEPA analysis on these potential impacts at this time.

As a result, there are no specific actions for any particular FMP or fishery that could be considered reasonably foreseeable at this time. Therefore, given the limited and procedural nature of this action and the preferred alternatives, this action is not related to any other actions with individually insignificant but cumulatively significant impacts.

Chapter 8
Relationship to Applicable Laws and Directives

8.1. Administrative Procedure Act (APA)

Section 553 of the APA establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Councils are not requesting any abridgement of the rulemaking process for this action.

8.2. Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. However, because this action deals solely with the procedural and administrative mechanisms by which data and information on bycatch in Northeast Region fisheries are collected and reported, the preferred alternatives associated with this action do not directly affect the coastal zone of any state. In addition, pursuant to the CZMA regulations at 15 CFR 930.33(a)(2) and 930.35, a negative determination is not required, and coordination with the state coastal zone management agencies under section 307 of the CZMA is not necessary.

8.3. Endangered Species Act (ESA)

Section 7 of the ESA requires Federal agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The impacts of the preferred alternatives on protected species are considered in chapter 7, section 7.2, and, based on the procedural nature of the action, the Councils have determined preliminarily that there would be no direct or indirect impacts on protected resources, including endangered or threatened species or their habitat.

8.4. E.O. 12866

A Regulatory Impact Review (RIR) is required by NMFS for all regulatory actions that either implement a new FMP or significantly amend an existing FMP. An RIR is required by NMFS for all regulatory actions that are part of the "public interest." The RIR is a required component of the process of preparing and reviewing FMPs or amendments and provides a comprehensive review of the economic impacts associated with proposed regulatory actions. The RIR addresses many concerns posed by the regulatory philosophy and principles of E.O. 12866. The RIR serves as the basis for assessing whether or not any proposed regulation is a "significant regulatory action" under criteria specified by E.O. 12866.

The RIR must provide the following information: (1) A comprehensive review of the level and incidence of economic impacts associated with a proposed regulatory action or actions; (2) a review of the problems and policy objectives prompting the regulatory proposals; and (3) an evaluation of the major alternatives that could be used to meet these objectives. In addition, an RIR must ensure that the regulatory agency systematically and comprehensively consider all available alternatives such that the public welfare can be enhanced in the most efficient and cost effective manner.

Under the Regulatory Flexibility Act (RFA) of 1980, as amended by Public Law 104-121, new FMPs or amendments also require an assessment of whether or not proposed regulations would have a significant economic impact on a substantial number of small business entities. The primary purposes of the RFA are to relieve small businesses, small organizations, and small Government agencies from burdensome regulations and record-keeping requirements, to the extent possible.

This section of the Omnibus SBRM Amendment provides an assessment and discussion of the potential economics impacts, as required of an RIR and the RFA, of various proposed actions consistent with the purpose of this action.

8.4.1. Statement of the Problem and Need for Action

The legal mandates addressed by this amendment are described in section 1.2. The specific issues driving the development of this amendment are described in sections 1.3 and 1.5. It is intended that the programs, procedures, and reporting requirements implemented through this amendment would ensure that the timeliness, accuracy, and precision of information collected on discards occurring in Northeast Region fisheries remains sufficient to support all relevant stock assessments and management decisions.

8.4.2. Management Objectives

The rationale for the Councils' proposed actions is found in section 6.10. The purpose and need for this amendment is found in section 1.4.

8.4.3. Description of the Affected Entities

As noted in earlier sections (see section 7.1 and 7.2), this amendment is wholly concerned with the procedures and mechanisms by which data and information on the types and rates of bycatch are obtained and utilized by scientists and fishery managers. Thus, the scope of the impacts associated with this amendment is atypical for an FMP amendment. Most FMP amendments focus on changes to fishing regulations in order to effect a direct change in either fishing effort or fishing practices, and these regulatory changes generally result in direct effect on fishing vessel operations (by modifying where, when, and/or how fishing may take place). These types of changes to fishing vessel operations almost always have socio-economic impacts on the participants of the subject fisheries.

However, as the focus of this amendment is on the methodology by which bycatch information is obtained, analyzed, and utilized, the impacts of the proposed actions are wholly administrative in nature. Therefore, although this amendment addresses all fisheries operating in the Northeast Region under a Council FMP, which encompasses Federal fishing vessel permit holders across 22 different permit categories (see Table 68), the actual economic impacts associated with this amendment are considered to be negligible. A further discussion of the vessels, ports, and communities subject to the FMPs amended through this action is provided in section 7.1.3, along with the general information provided in chapters 2 and 3. Specific information about the potential for economic impacts to result from this amendment, and the affected entities is provided in sections 7.2.1.3 and 7.2.2.3.

8.4.4. Description of the Alternatives

A complete description of the alternatives considered during the development of this amendment can be found in chapter 6.

8.4.5. Expected Economic Effects of the Alternatives

A complete evaluation of the expected economic effects of the various alternatives is presented throughout section 7.2. As noted in section 7.2, this action may increase spending by the Federal Government to pay for increased levels of observer coverage and to pay for additional statistical analyses and reports to be prepared for use by fishery managers. Using 2004 as the case study, there were 8,429 observer sea days utilized in 2004. Under the SBRM proposed in this amendment, 9,874 observer sea days would be required based on 2004 data. This represents an increase of 1,445 observer sea days. Given a per day total cost of $1,150 to pay the observer and cover the cost of all associated overhead for the contractor and the Government, that equates to an increase of $1,661,750 from the 2004 spending level.

8.4.6. Determination of Significance under E.O. 12866

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be significant. A “significant regulatory action” is one that is likely to: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, safety, or state, local, or tribal Governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described above. The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant."

NMFS has determined that, given the information presented above, there would be net benefits derived from the implementation of the proposed SBRM Amendment. Because none of the factors defining "significant regulatory action" are triggered by this proposed action, the action has been determined to be not significant for the purposes of E.O. 12866.

8.5. E.O. 13132

This E.O. established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures under consideration in the SBRM Amendment. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Councils (all affected states are represented as voting members of at least one Regional Fishery Management Council). Thus far, no comments were received from any state officials relative to any federalism implications that may be associated with this action.

8.6. Information Quality Act

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Information Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following section addresses these requirements.

<u>Utility</u>

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the preferred alternatives is included so that intended users may have a full understanding of the preferred alternatives and their implications.

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Councils to this point are the result of a multi-stage public process. Thus, the information contained in this document has been improved based on comments from the public, the fishing industry, members of the Councils, and NMFS.

This document is available in several formats, including printed publication and online through the Councils' and NMFS's web pages.

Integrity

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NMFS adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

Objectivity

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. Landing and revenue information is based on information collected through the FVTR and seafood dealer purchase report databases. Information on catch composition, is based on reports collected by the NMFS observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the SBRM Fishery Management Action Team. A formal peer review of the primary analytical components of the document was conducted by members of the Councils' Science and Statistical Committees.

The analyses conducted in support of the proposed action were conducted using information from the most recent complete calendar years, through 2004 or 2005, depending on the database. Complete FVTR and fishery observer program data for 2005 were not available at the time during which these analyses were conducted. The data used in the analyses provide the best available information on catch and landings by participants in Northeast Region fisheries subject to the amended FMPs, bycatch rates in these fisheries, and recent coverage rates by the fishery observer program. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the fisheries of the Northeast Region.

The policy choices are clearly articulated, in chapter 6 of this document, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in chapters 5, 6, and 7, and Appendix A, of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the responsible Councils, the Northeast Fisheries Science Center, the Northeast Regional Office, and NMFS Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations would be conducted by staff at NMFS Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

An earlier draft of this documents was made available to the public for review in November and December of 2006, during which time two public hearings were held on the draft amendment. Based on the comments received during this process, several changes were made to the draft amendment that are incorporated herein. There will be an additional opportunity for the public to review this document during the Magnuson-Stevens Act-mandated 60-day review period for the approval of the amendment.

8.7. Magnuson-Stevens Act

The preferred alternatives identified in this draft amendment do not propose to modify any of the management measures previously implemented under any of the FMPs to be amended through this action which were found to be fully in compliance with all national standards of the Magnuson-Stevens Act. The actions currently proposed to be implemented through this amendment are wholly administrative in nature and are focused solely on the procedures and mechanisms by which data and information on the types and rates of bycatch occurring in Northeast Region fisheries are obtained and utilized by scientists and fishery managers. All the actions identified in the preferred alternatives are intended to address the requirement in § 303(a)(11) of the Magnuson-Stevens Act to "establish a standardized bycatch reporting methodology to assess the amount and type of bycatch occurring in a fishery" to ensure that all Northeast Region FMPs are fully in compliance with this required provision. This action does not address any other required provision under the Magnuson-Stevens Act, and does not directly address any of the national standards. Due to the nature of the measures in the proposed action, there would be no direct impacts on any habitat or EFH; therefore, an EFH consultation is not required.

8.8. Marine Mammal Protection Act (MMPA)

The impacts of the preferred alternatives on protected species are considered in chapter 7, section 7.1, and, based on the procedural nature of the action, the Councils have concluded preliminarily that there would be no direct or indirect impacts on marine mammals, that the preferred alternatives appear consistent with the provisions of the MMPA, and that the preferred alternatives would not alter existing measures to protect the species likely to inhabit the management units of the subject fisheries.

8.9. National Environmental Policy Act (NEPA)

8.9.1. Environmental Assessment

An assessment of the expected impacts of the preferred alternatives, and other alternatives considered as part of this amendment, is presented in chapter 7. This environmental assessment was prepared according to the provisions of NOAA Administrative Order 216-6.

8.9.1.1. Need for the Action

The purpose and need for this action are described in section 1.4 of this document. Other sections in chapter 1 describe the specific problem to be addressed (section 1.3) and the issued to be resolved (section 1.5).

8.9.1.2. Management Alternatives

The alternatives to the proposed action are identified and described in chapter 6 of this document.

8.9.1.3. Environmental Impacts of the Proposed Action and Alternatives

A description of the affected environment (section 7.1), along with a description of the environmental impacts of the proposed action and the alternatives (sections 7.2 and 7.3) are provided in chapter 7.

8.9.1.4. Agencies and Persons Consulted

The development of this amendment was a joint effort between the Mid-Atlantic and New England Fishery Management Councils and NOAA's National Marine Fisheries Service. No other Federal agencies participated in the development of this action. For a list of persons that contributed to or were consulted during the development of this amendment, see chapter 10.

8.9.2. Finding of No Significant Impact for the SBRM Omnibus Amendment

NOAA Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria.

8.9.2.1. Criteria to Determine Significance of Action

8.9.2.1.1. Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

Response: The measures proposed in the Omnibus SBRM Amendment are not expected to jeopardize the sustainability of any target species that may be affected by the action. As described in chapters 1 (Introduction and Background) and 6 (Preferred and Other Alternatives Under Consideration), the focus of this amendment is on the methodology by which bycatch information is obtained, analyzed, and utilized. The measures would not impose or result in any changes to fishing operations, fishing behavior, fishing gears used, or areas fished. As such, the impacts of the preferred alternatives, described and analyzed in chapter 7 (Environmental Consequences), on any species that may be affected by the measures are wholly administrative in nature; there are no expected direct or indirect physical or biological impacts associated with the preferred alternatives.

8.9.2.1.2. Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

Response: The measures proposed in the SBRM Amendment are not expected to jeopardize the sustainability of any non-target species that may be affected by the action. As described in chapters 1 (Introduction and Background) and 6 (Preferred and Other Alternatives under Consideration), the focus of this amendment is on the methodology by which bycatch information is obtained, analyzed, and utilized. The measures would not impose or result in any changes to fishing operations, fishing behavior, fishing gears used, or areas fished. As such, the impacts of the preferred alternatives, described and analyzed in chapter 7 (Environmental Consequences), on any species that may be affected by the measures are wholly administrative in nature; there are no expected direct or indirect physical or biological impacts associated with the preferred alternatives.

8.9.2.1.3. Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?

Response: The unique characteristics of the geographic area impacted by the SBRM Amendment include the presence of Essential Fish Habitat (EFH) and an abundance of life forms of commercial and non-commercial value. The value of this area was described in the amendment (see section 7.1.1), and an analysis of the action on ocean and coastal habitats and EFH was conducted. The measures proposed in the SBRM Amendment are not expected to result in any direct physical or biological impacts to the affected environment and therefore would not cause substantial damage to ocean and coastal habitats or EFH. As described in chapters 1 (Introduction and Background) and 6 (Preferred and Other Alternatives under Consideration), the focus of this amendment is on the methodology by which bycatch information is obtained, analyzed, and utilized. As such, the impacts of the preferred alternatives, described and analyzed in chapter 7 (Environmental Consequences), are entirely administrative in nature with no associated direct impacts on the environment. Because this action would not result in direct adverse impacts to ocean and coastal habitats or EFH, an EFH consultation under the Magnuson-Stevens Act would neither be required nor conducted.

8.9.2.1.4. Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

Response: The preferred alternatives described in chapter 6 (Preferred and Other Alternatives Under Consideration) would not impose or result in any changes to fishing operations, fishing behavior, fishing gears used, or areas fished. The measures are entirely administrative in nature. Therefore, implementation of the SBRM Amendment would not have a direct impact on the public health or safety of either people directly involved in the fishing industry or the public at large.

8.9.2.1.5. Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

Response: The measures proposed in the SBRM Amendment are not expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species. As described in chapters 1 (Introduction and Background) and 6 (Preferred and Other Alternatives under Consideration), this amendment is solely concerned with establishing the methodology to be used to obtain, analyze, and report information regarding discards occurring in Northeast Region fisheries. The measures would not impose or result in any changes to fishing operations, fishing behavior, fishing gears used, or areas fished. As such, the impacts of the preferred alternatives, described and analyzed in chapter 7 (Environmental Consequences), are wholly administrative in nature; there are no expected direct or indirect adverse impacts on any endangered or threatened species, or their critical habitat, associated with the preferred alternatives.

8.9.2.1.6. Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: The preferred alternatives described in chapter 6 and analyzed in chapter 7 would not impose or result in any changes in fishing operations or behavior, fishing gears used, or areas fished. The impacts of establishing the methodology to be used to obtain, analyze, and report information regarding discards occurring in Northeast Region fisheries are administrative. Because the impacts of the SBRM would be procedural, with no direct or indirect impacts to the marine environment, there are no expected impacts to biodiversity or ecosystem function in the affected area.

8.9.2.1.7. Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: The preferred alternatives would continue the status quo program for bycatch reporting and monitoring for federally managed species managed by the New England and Mid-Atlantic Fishery Management Councils. There are no economic or social impacts associated with this alternative that could be distinguished from taking no action. This is not to say that there are no costs associated with the current information collection program, but rather that for purposes of analyzing the implications of this action, there would be no incremental changes to the costs currently imposed or any social or economic impacts interrelated with any natural or physical environmental effects.

8.9.2.1.8. Are the effects on the quality of the human environment likely to be highly controversial?

Response: The impacts on the quality of the human environment of the SBRM are not expected to be highly controversial. The SBRM Amendment endeavors to establish a rigorous methodology to ensure that the discard data obtained by NMFS is of the highest quality possible, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data. A group of external peer reviewers concluded that the technical components of the SBRM do "a commendable job of formulating a comprehensive approach to the problem of assessing bycatch rates in multiple fisheries." The overall consensus of the reviewers is that the document "provides a rigorous objective framework for addressing the problem of bycatch monitoring." The effects of these methodologies, including data collection, analysis and reporting to fisheries scientists and managers, on the human environment are described in chapter 7 and are found to be minimal, temporary, and/or indistinguishable from baseline conditions.

The SBRM Amendment does not address bycatch reduction or other issues related to the management measures utilized in Northeast Region fisheries. The data collected and analyzed under the SBRM may influence future fisheries management decisions, but each of those future management decisions would be the subject of its own environmental review under NEPA.

8.9.2.1.9. Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

Response: The SBRM Amendment would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places, nor is it expected to cause loss or destruction to significant scientific, cultural, or historical resources, because none of these features are present in the affected area. The SBRM Amendment is specific only to Federally-managed fisheries that operate in the Exclusive Economic Zone (EEZ), as described in chapters 1, 2 and 7, and the unique areas described herein do not occur in the action area.

8.9.2.1.10. Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: Implementation of the SBRM Amendment is not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The preferred data collection, analytic methodologies, and reporting alternatives presented in the document (chapter 6) were developed using the best available science and are consistent with currently employed tools and practices. The analyses provided in the document clearly demonstrate that none of the elements of the SBRM would result in direct or indirect impacts to the environment (chapter 7) that are distinguishable from current (baseline) conditions. Furthermore, the SBRM Amendment endeavors to establish a rigorous methodology to ensure that the discard data obtained by NMFS are of the highest quality possible, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data. A group of external peer reviewers concluded that the technical components of the SBRM do "a commendable job of formulating a comprehensive approach to the problem of assessing bycatch rates in multiple fisheries." The overall consensus of the reviewers is that the document "provides a rigorous objective framework for addressing the problem of bycatch monitoring."

8.9.2.1.11. Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: As described in chapter 7 of the document, the actions being considered as part of the SBRM solely address the administrative processes through which data and information on bycatch occurring in Northeast Region fisheries are collected, analyzed, and reported to fishery scientists and managers. The SBRM Amendment does not address bycatch reduction or other issues related to the management measures utilized in Northeast Region fisheries. Although elements of the SBRM have been implemented previously and utilized in many ways in recent years, the Court ruling that both Amendment 10 to the Sea Scallop FMP and Amendment 13 to the Northeast Multispecies FMP failed to fulfill the Magnuson-Stevens Act requirement to establish an SBRM (described in chapter 1) is evidence that this action is unique in the Northeast Region as the first action to propose the establishment of a comprehensive SBRM for the region.

Overall, the SBRM Amendment simply formalizes the status quo mechanisms used in the Northeast Region to collect information and data on fisheries bycatch and to analyze bycatch data in order to effectively determine appropriate observer coverage levels and allocate observer effort across the many Northeast Region fisheries. For these components of the SBRM, there are no incremental impacts to any fishing areas or living marine resources associated with the proposed action relative to the no action baseline. The three SBRM elements proposed in the amendment that diverge from the status quo—implementation of importance filters to establish and allocate target observer coverage levels, establishment of an SBRM performance standard, and the requirement to conduct periodic evaluations and prepare a periodic SBRM report—are purely administrative features intended to improve the effectiveness and the transparency of the Northeast Region SBRM. These additional components are not associated with impacts to any fishing areas or living marine resources within the Northeast Region that could be distinguished from the no action baseline (chapter 7). Therefore, given the limited and procedural nature of this action and the preferred alternatives, the SBRM Amendment is not related to any other actions with individually insignificant but cumulatively significant impacts.

8.9.2.1.12. Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register *of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?*

Response: There is no evidence that the implementation of the SBRM Amendment will adversely affect entities listed in or eligible for listing in the National Register of Historic Places or will cause loss or destruction of significant scientific, cultural, or historic resources. Compliance with the preferred measures will not result in the permanent loss or destruction of resources.

8.9.2.1.13. Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: The implementation of the SBRM Amendment would not result in any actions that would be expected to result in the introduction or spread of a nonindigenous species. The measures included in the SBRM Amendment are administrative in nature (chapter 7).

8.9.2.1.14. Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: The implementation of the SBRM Amendment does not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration. The data collection, data analysis, and reporting tools being implemented are required in order for the agency to meet objectives under the Magnuson-Stevens Act and two Court Orders (described in chapter 1). The measures included in the SBRM Amendment were designed and chosen to achieve specific objectives given local conditions and issues, and are therefore not expected to establish a precedent for future actions. In the future, NMFS would similarly evaluate bycatch related data reporting, collection and analysis needs in order to respond to specific issues, such as changes to environmental, regulatory, economic, and/or fishing industry conditions. Therefore, SBRM requirements for each FMP and/or administrative region would be evaluated separately based upon its own unique factual situation. Furthermore, while data collected under the SBRM may influence fisheries management decisions throughout the region for years to come, each of those future management decisions would be the subject of its own environmental review under NEPA. As such, this action would not establish a precedent for any forthcoming decision or analysis.

8.9.2.1.15. Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Response: There is no evidence that implementation of the SBRM Amendment would result in a violation of a Federal, state or local law for environmental protection. In fact, the SBRM Amendment is expected to support Federal laws because it was developed to address the requirements of the Magnuson-Stevens Act to include, in all FMPs, an SBRM (chapter 1). Furthermore, and analysis of the relationship of the SBRM with applicable Federal laws and Executive Orders was conducted (chapter 8) and it was determined that the measures included in the SBRM Amendment are consistent with all applicable Federal laws and Executive Orders.

8.9.2.1.16. Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: In part, the SBRM Amendment simply formalizes the status quo mechanisms used in the Northeast Region to collect information and data on fisheries bycatch and to analyze bycatch data in order to effectively determine appropriate observer coverage levels and allocate observer effort across the many Northeast Region fisheries (chapter 6). For these components of the SBRM, there are no incremental impacts to any fishing areas or living marine resources associated with the proposed action relative to the no action baseline. The three SBRM elements proposed in the amendment that diverge from the status quo—implementation of importance filters to establish and allocate target observer coverage levels, establishment of an SBRM performance standard, and the requirement to conduct periodic evaluations and prepare a periodic SBRM report—are purely administrative features intended to improve the effectiveness and the transparency of the Northeast Region SBRM. These additional components are not associated with impacts to any target or non-target species within the Northeast Region that could be distinguished from the no action baseline (chapter 7). Therefore, given the limited and administrative nature of this action and the preferred alternatives, the SBRM Amendment may not reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species.

8.9.2.2. Determination

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for the SBRM Omnibus Amendment, it is hereby determined that the SBRM Omnibus Amendment will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

________________________________ ________________

Administrator, NMFS Northeast Region Date

8.10. Paperwork Reduction Act (PRA)

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The preferred alternatives currently associated with this action do not propose to modify any existing collections, or to add any new collections; therefore, no review under the PRA is necessary.

8.11. Regulatory Flexibility Act (RFA)

The objective of the RFA is to require consideration of the capacity of those affected by regulations to bear the direct and indirect costs of regulation. If an action would have a significant impact on a substantial number of small entities, an Initial Regulatory Flexibility Analysis must be prepared to identify the need for action, alternatives, potential costs and benefits of the action, the distribution of these impacts, and a determination of net benefits. The RFA requires the Federal rulemaker to examine the impacts of proposed and existing rules on small businesses, small organizations, and small Governmental jurisdictions.

The Small Business Administration (SBA) has defined all fish-harvesting or hatchery businesses that are independently owned and operated, not dominant in their field of operation, and with annual receipts (gross revenues) not in excess of $4,000,000 as small businesses. In addition, seafood processors with 500 or fewer employees, wholesale industry members with 100 employees or fewer, party and charter vessels with annual receipts not in excess of $6,500,000, not-for-profit enterprises and Government jurisdictions with a population of 50,000 or less are also considered small entities.

If an action is determined to affect a substantial number of small entities, the analysis must include:

1. A description and estimate of the number of small entities and total number of entities in a particular affected sector, and the total number of small entities affected; and

2. Analysis of the economic impact on small entities, including the direct and indirect compliance costs of completing paperwork or recordkeeping requirements, effect on the competitive position of small entities, effect on the small entity's cash flow and liquidity, and ability of small entities to remain in the market.

If it is clear that an action would not have a significant economic impact on a substantial number of small entities, the RFA allows Federal agencies to certify the proposed action to that effect to the SBA. The decision on whether or not to certify is generally made after the final decision on the preferred alternatives for the action and may be documented at either the proposed rule or the final rule stage.

Based on the information and analyses provided in earlier sections of this amendment, it is clear that this action would not have a significant economic impact on a substantial number of small entities, and that certification under the RFA is warranted. The remainder of this section establishes the factual basis for this determination, as recommended by the Office of Advocacy at the SBA.

8.11.1. Basis and Purpose of the Action

The legal basis for this amendment can be found in section 303(a)(11) of the Magnuson-Stevens Act, which requires that each FMP "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery." This is described further in section 1.2. The action is needed to ensure that all FMPs of the Northeast Region, developed under the jurisdiction of the New England and Mid-Atlantic Councils, comply with the SBRM requirements of the Magnuson-Stevens Act. The purpose of the action is to: (1) Explain the methods and processes by which bycatch is currently monitored and assessed for Northeast Region fisheries; (2) determine whether these methods and processes need to be modified and/or supplemented; (3) establish standards of precision for bycatch estimation for all Northeast Region fisheries; and, thereby, (4) document the SBRMs established for all fisheries managed through the FMPs of the Northeast Region. The purpose, need, and objectives of the SBRM Amendment are described further in section 1.4.

8.11.2. Description and Estimate of the Number of Small Entities to Which the Action Applies

The implementation of this action will formally establish, as the Northeast Region SBRM, the methods and procedures by which data and information on discards occurring in Northeast Region fisheries are obtained, processed, and utilized. Because the primary mechanisms used to collect data and information on discards are the at-sea observers and the FVTRs, the small entities to which the SBRM applies include all federally permitted fishing vessels operating in the Northeast Region subject to one or more of the affected FMPs (see Table 1). Table 68 identifies the number of fishing vessels holding each category of Federal commercial fishing permit in the Northeast Region. Because of the transitory nature of open access permits, and due to the overlap associated with vessels holding multiple permits, it is difficult to determine the exact number of affected entities. As described in section 7.1, there are approximately 2,100 fishing vessels that hold at least one limited access permit (excluding the permits for American lobster, which are not subject to this amendment), and approximately 1,900 fishing vessels that hold at least one open access permit but no limited access permits. This indicates an approximate total of 4,000 fishing vessels subject to the provisions of the FMPs addressed by this amendment and, therefore, subject to the provisions of the Northeast Region SBRM.

8.11.3. Economic Impacts on Small Entities

The economic impacts associated with each alternative considered in the development of this amendment are evaluated throughout section 7.2. For the purposes of the RFA certification review, the following addresses the economic impacts associated with each element of the proposed action.

8.11.3.1. Bycatch Reporting and Monitoring Mechanisms

This element of the proposed action focuses on the specific mechanisms by which data and information on discards are obtained. The proposed action is to maintain the status quo for all fisheries subject to the SBRM Amendment, including FVTRs, at-sea observers, MRFSS (or its replacement), VMS, and industry-based surveys, among others. Because the proposed action is to maintain the status quo, with no change, there are no marginal changes to the economic impacts on small entities associated with this element. A non-preferred alternative to implement electronic video monitoring in one or more fisheries would have resulted in potentially significant economic costs to the participants of the affected fisheries; however, this alternative was not selected (see section 7.2.1.3.2).

8.11.3.2. Analytical Techniques and Allocation of Observers

This element of the proposed action establishes the procedures used to analyze data on discards occurring in Northeast Region fisheries and to determine the appropriate allocation of at-sea observers on fishing vessels in order to obtain sufficiently accurate and precise discard data. The proposed action is to expand upon and refine the current methodology to encompass 39 distinct fishing modes across 15 species and species groups. While this element of the proposed action has implications for the quality of the discard data obtained for all Northeast Region fisheries, this action is wholly centered on the analytical tools and methodologies used to determine appropriate levels and allocations of at-sea observers. There are no direct or indirect costs to fishing vessel permit holders associated with this element.

The only way for this element of the proposed action to have an economic impact on fishing vessel permit holders is if the participants of the fishery pay for the at-sea observers. In this case, an observer allocation methodology that resulted in increased levels of observer coverage could be said to impose additional costs to those participants. However, in the Northeast Region, the at-sea fisheries observer program operates entirely through a contract service funded by NMFS, with the single exception of the sea scallop industry-funded observer program. As described in section 7.2.2.3, the Sea Scallop FMP includes provisions to compensate scallop vessels required to carry and pay for an observer through either an increased trip limit, extra trips to an access area, or extra DAS. The intent of the compensation program is to offset the costs of carrying an observer such that the realized cost to the vessel is zero. Thus, within the bounds of the compensation program, an increase in the observer coverage level would not have an economic impact on the affected entities, as any increase in initial costs (paying for the observer) would be offset by the compensation.

This amendment proposes no additional industry-funded observer programs, although it does create a framework adjustment process should either Council wish to establish one in the future. However, any economic impacts associated with such a program would be identified and analyzed in the future management action that establishes the program.

8.11.3.3. SBRM Performance Standard

This element of the proposed action establishes that the intent of the previous element is to allocate an appropriate level of at-sea observers to each of the 39 subject fishing modes such that the data on discards occurring in each fishing mode achieve a CV of no more than 30 percent for each relevant bycatch species or species group. Under the proposed action, a CV of 30 percent becomes the performance standard against which the effectiveness of the SBRM may be judged. It also serves as the basis for determining the appropriate levels and allocation of at-sea observers across all 39 fishing modes.

Similar to the previous element, while this element of the proposed action has implications for the quality of the discard data obtained for all Northeast Region fisheries, this action is solely concerned with the performance standard used as the basis to determine appropriate levels and allocations of at-sea observers. There are no direct or indirect costs to fishing vessel permit holders associated with this element.

The only way that this element could be associated with costs to fishing vessels would be through the level of the CV selected as the performance standard. That is, a CV higher than 30 percent (e.g., 40 percent) would likely require lower levels of observer coverage in some fisheries to meet the performance standard, while a lower CV (e.g., 20 percent) may require higher levels of coverage in some fisheries. However, as noted for the previous element, all at-sea observers are paid for by NMFS with the exception of the sea scallop fishery. Thus, with the exception of the sea scallop fishery, which has an established compensation program to offset the costs of observers to vessels, all the costs of increased levels of observer coverage are borne by NMFS, not by the fishery participants.

8.11.3.4. SBRM Review/Reporting Process

This element of the proposed action establishes a formal review and reporting process for the Northeast Region SBRM. There are two components to this element of the amendment: The first would establish an annual report, to be prepared by the Northeast Fisheries Science Center, for the Councils that presents information on discards occurring in the managed fisheries, as documented by at-sea fisheries observers; and the second would establish a more comprehensive periodic report that presents information on and evaluates the effectiveness of the SBRM at achieving the performance standard (see section 6.4 for more detail on what would be included in these reports).

Although this element is considered a critical component of the SBRM, the impacts associated with this action are incurred solely by NMFS and the Councils, who must prepare the reports. The action proposed for this element has no potential direct or indirect economic impact on regulated entities.

8.11.3.5. Framework Adjustment Provisions

This element of the proposed action provides the Councils with a mechanism to more efficiently modify certain aspects of the Northeast Region SBRM as conditions in the fisheries or management needs evolve. Framework adjustments and annual specifications enable the Councils to develop fishery management actions through a process that is more timely and streamlined than the process to develop and submit a full FMP amendment. The impacts associated with this action are incurred solely by NMFS and the Councils, who must prepare, review, and implement the fishery management actions developed under the abbreviated procedures. The action proposed for this element has no potential direct or indirect economic impact on regulated entities.

8.11.3.6. Prioritization Process

This element of the proposed action establishes the steps to be followed by NMFS to engage the Councils and the public in a process intended to ensure a meaningful and responsive prioritization of the at-sea observer coverage levels and allocations determined through the analytical components of the Northeast Region SBRM. The proposed process requires that the Northeast Fisheries Science Center and the Northeast Regional Office present a proposed prioritization of the necessary observer coverage levels, based on any expected resource constraints, to the Councils in order to provide the Councils and the public an opportunity to consider and offer comments on the agency's proposal. The impacts associated with this action are incurred solely by NMFS and the Councils, who must prepare, review, and implement the fishery management actions developed under the abbreviated procedures. The action proposed for this element has no potential direct or indirect economic impact on regulated entities.

8.11.3.7. Industry-Funded Observer Programs

This element of the proposed action establishes and authorizes observer service provider approval and certification procedures and requirements, and adds provisions allowing industry-funded observer programs and observer set-aside programs as measures that can be implemented through framework adjustments. The proposed action would not actually implement any industry-funded observer programs or observer set-aside programs, but would create the mechanisms needed to more quickly and easily develop and implement such provisions in any of the Councils' FMPs. Although there may be economic impacts to fishing vessel permit holders associated with any future industry-funded observer programs, any such impacts that may be associated with actually implementing an industry-funded observer program and/or an observer set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

8.11.4. Criteria Used to Evaluate the Action

8.11.4.1. Significant Economic Impacts

The RFA requires Federal agencies to consider two criteria to determine the significance of regulatory impacts: Disproportionality and profitability. If either criterion is met for a substantial number of small entities, then the action should not be certified.

8.11.4.1.1. Disproportionality

In the Northeast Region, all fishing vessel permit holders are considered small entities. Therefore, because different classes of entities are not an issue, there are no small entities that are disproportionately affected (put at a disadvantage) relative to large entities, and the disproportionality criterion is not met.

8.11.4.1.2. Profitability

As noted above, none of the elements of this proposed action are associated with economic impacts on small entities. Therefore, no reductions in profit are expected for any small entities, and the profitability criterion is not met.

8.11.4.2. Substantial Number of Small Entities

Indirectly, the methodologies established by this action apply generally across all federally managed fisheries operating in the Northeast Region under the subject FMPs. However, although a substantial number of entities are involved in these fisheries, none of these entities are expected to incur any economic impacts as a result of this action.

8.11.5. Description of, and Explanation of, the Basis for All Assumptions Used

Because the actions proposed in this amendment all are focused on the administrative aspects of the methodology used to obtain and analyze data and information on discards occurring in Northeast Region fisheries, there are no direct or indirect economic impacts associated with this amendment. No assumptions are necessary to conduct the analyses in support of this conclusion.

Chapter 9
List of Public Meetings

List of public meetings at which the development of the Omnibus SBRM Amendment was discussed:

Joint SBRM Oversight Committee Meetings

1. April 3, 2006 – Mystic, CT
2. May 2, 2006 – Virginia Beach, VA
3. June 12, 2006 – Newport, RI
4. September 6, 2006 – Warwick, RI
5. September 25, 2006 – Peabody, MA
6. April 9, 2007 – Mystic, CT

Science and Statistical Committee Meeting

1. August 22, 2006 – Warwick, RI

Mid-Atlantic Fishery Management Council Meetings

1. January 17, 2006 – Annapolis, MD
2. May 4, 2006 – Virginia Beach, VA
3. August 3, 2006 – Philadelphia, PA
4. October 12, 2006 – Kitty Hawk, NC
5. February 15, 2007 – Claymont, DE
6. June 14, 2007 – Hampton, VA

New England Fishery Management Council Meetings

1. January 31, 2006 – Portland, ME
2. April 4, 2006 – Mystic, CT
3. June 13, 2006 – Newport, RI
4. September 27, 2006 – Peabody, MA
5. February 7, 2007 – Portsmouth, NH
6. April 10, 2007 – Mystic, CT
7. June 21, 2007 – Portland, ME

Public Hearings on the Draft Amendment

1. November 14, 2006 – Gloucester, MA
2. December 13, 2006 – New York, NY

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Chapter 10
Contributors and Acknowledgements

This document was prepared by the members of the SBRM Fishery Management Action Team:

Michael Pentony, NERO (Chair)
Susan Wigley, NEFSC
Jim Armstrong, MAFMC
Sarah Gurtman, NERO
Ted Hawes, NERO
Lynn Lankshear, NERO
Gene Martin, NOAA GC
Tom Nies, NEFMC
Debi Palka, NEFSC
Michael Ruccio, NERO

Special thanks also go to the following individuals who provided assistance and guidance during the development of this document:

Jessica Blaylock, NEFSC
Brian Hooker, NERO
Chris Kellogg, NEFMC
Sarah McLaughlin, NERO
Chris Moore, NMFS
Dan Morris, NERO
Jon O'Neil, NERO
Ken Ortiz, NERO
Doug Potts, NERO
Paul Rago, NEFSC
Bonnie Van Pelt, NERO

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Chapter 11
Glossary of Terms

Accuracy. The closeness of a measured or estimated value (e.g., population parameter) to its true value. Accuracy should not be confused with precision, which relates to the variability of the measured or estimated value (i.e., the closeness of repeated measurements of the same quantity).

Allocation. The practice of apportioning resources among various entities. Under the SBRM, allocation often regards the assignment of observer effort across the various sampling strata; i.e., geographical region (by port of departure), fishing modes (gear type and mesh size), access area, and trip category.

Bias. A systematic difference between the expected value of a statistical estimate and the quantity it estimates. Absent bias, precision will lead to accuracy; thus, bias and accuracy are used interchangeably, but bias is generally associated with the design of sampling program. Eliminating potential sources of bias improves the accuracy of the results.

Biomass (B). (1) The total weight of a group (or stock) of living organisms (e.g., fish, plankton) or of some defined fraction of it (e.g., spawners) in an area, at a particular time. (2) Measure of the quantity, usually by weight in pounds or metric tons (2,205 lb or 1 metric ton), of a stock at a given time.

Bycatch. According to the Magnuson-Stevens Act, bycatch includes all fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Fish released alive under a recreational catch and release fishery management program are not considered bycatch. The words bycatch and discard are used interchangeably in SBRM documents.

Catch. (1) To undertake any activity that results in taking fish out of its environment dead or alive. To bring fish on board a vessel dead or alive. (2) The total number (or weight) of fish caught by fishing operations, including retained catch (landings) and discarded catch (bycatch). (3) The component of fish encountering fishing gear that is retained by the gear.

Coefficient of variation (CV). A standard measure of precision, calculated as the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the bycatch estimate itself. The higher the CV, the larger the standard error is relative to the estimate. A lower CV reflects a smaller standard error relative to the estimate. A 0-percent CV means there is no variance in the sampling distribution. Alternatively, CVs of 100 percent or higher indicate that there is considerable variance in the estimate.

Discard. To release or return fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel. Fish (or parts of fish) can be discarded for a variety of reasons such as having physical damage, being a non-target species for the trip, and compliance with management regulations such as minimum size limits or quotas. The terms discard and bycatch are used interchangeably in SBRM documents.

Effort. The amount of time and fishing power used to harvest fish; includes gear size, boat size, and horsepower.

Environmental assessment (EA). As part of the National Environmental Policy Act (NEPA) process, an EA is a concise public document that provides evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI).

Finding of no significant impact (FONSI). As part of the National Environment Policy Act (NEPA) process, a FONSI is a document that explains why an action that is not otherwise excluded from the NEPA process, and for which an environmental impact statement (EIS) will not be prepared, will not have a significant effect on the human environment.

Fish. Means finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds.

Fishing mode. A way of grouping fishing activities according to the fishing gears used, port of departure, mesh size, and, in some cases, regulatory fishing program, rather than by FMP or species of fish landed. There are 39 fishing modes defined in the Northeast Region for the purpose of the SBRM Amendment.

Fishing vessel trip report (FVTR) or **Logbook.** A detailed, usually official, record of a vessel's fishing activity registered systematically onboard the fishing vessel, usually including information on catch and its species composition, the corresponding fishing effort, and location. Some form of trip report must be completed and submitted by every holder of a Federal fishing permit in the Northeast Region, except those who hold a Federal permit only for lobster.

Marine Recreational Fisheries Statistical Survey (MRFFS). An annual national survey conducted by NMFS, in cooperation with the coastal states, to estimate the number, catch, and effort of recreational fishermen. MRFSS is currently undergoing a major program-wide review by NMFS in response to a report by the National Research Council, and is likely to be updated, or even replaced, in the near future. The SBRM Amendment uses the term MRFSS as a placeholder representing the recreational fishery survey program that results from the agency review of and consequent changes to the program.

National Standard 9. A provision in the Magnuson-Stevens Act that requires that "conservation and management measures shall, to the extent practicable, (a) minimize bycatch; and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." NMFS has defined the term "to the extent practicable" to include a consideration of the effects of reducing bycatch and bycatch mortality on the overall benefit to the Nation.

Observer. At-sea fishery observers are generally biologists trained to collect information on board fishing vessels. They may be deployed for various reasons including monitoring interactions with protected species, measuring catch composition and disposition (including discards), validating or adjusting self-reported data, tracking in-season quotas (including bycatch quotas), or a variety of other reasons. The Northeast Region observer program is administered by the Northeast Fisheries Science Center.

Precision. The degree of agreement of repeated measurements of the same quantity or object.

Sampling design. The sampling design of a scientific survey refers to the statistical techniques and methods adopted for selecting a sample and obtaining estimates of the survey variables from the selected sample.

Standardized bycatch reporting methodology (SBRM). The combination of sampling design, data collection procedures, and analyses used to estimate bycatch in fisheries. An SBRM is required to be implemented for each fishery under section 303(a)(11) of the Magnuson-Stevens Act.

Stock assessment. The process of collecting and analyzing biological and statistical information to determine the changes in the abundance of fishery stocks in response to fishing, and, to the extent possible, to predict future trends of stock abundance. Stock assessments are based on resource surveys; knowledge of the habitat requirements, life history, and behavior of the species; the use of environmental indices to determine impacts on stocks; and catch statistics. Stock assessments are used as a basis to assess and specify the present and probable future condition of a fishery.

Stock Assessment and Fishery Evaluation (SAFE) report. A report that provides a summary of the most recent biological condition of a stock of fish and the economic and social condition of the recreational fishermen, commercial fishermen, and seafood processors who use the fish. The report provides information to the fishery management councils for determining harvest levels.

Total allowable catch (TAC). The annual recommended or specified regulated catch for a species or species group. The regional fishery management council sets the TAC from the range of acceptable biological catch (ABC).

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Chapter 12
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APPENDICES

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Appendix A
NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

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Northeast Fisheries Science Center Reference Document 05-09

NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

by

Paul J. Rago, Susan E. Wigley, and Michael J. Fogarty

August 2005

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NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy

by

Paul J. Rago[1,2], Susan E. Wigley[1,3], and Michael J. Fogarty[1,4]

Postal Address: [1]National Marine Fisheries Serv., 166 Water St., Woods Hole, MA 02543
E-Mail Addresses: [2]Paul.Rago@noaa.gov, [3]Susan.Wigley@noaa.gov, [4]Michael.Fogarty@noaa.gov

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Table of Contents

List of Tables

List of Figures

Executive Summary

This report describes the standardized methodology used to estimate bycatch rates of finfish by commercial fisheries in the Northeast. In this report, bycatch is defined as the observed discarded catch, summed over from eleven different groundfish species. Estimates of unobserved discards are not considered. All retained catches are included whether or not the catches were incidental to the target species. Emphasis is placed on the methods used to define the sampling frame (i.e., the population of commercial fishing trips to be sampled), appropriate stratification, and efficient allocation of sampling effort to these strata. Efficient allocation of sampling effort within a stratified survey design improves the precision of the estimate of overall discard rates. Accuracy of sample estimates is evaluated by comparing various performance measures (e.g., landings, trip duration) between vessels with and without observers present. Although formal statistical distinctions between accuracy and bias of estimators and estimates can be made, in this report we use the terms interchangeably and less formally. A biased estimator is inaccurate; an accurate estimator is unbiased.

This report focuses on bycatch estimates based on discard to kept ratios. Use of this ratio is appropriate for trawl, gillnet and longline fisheries in the Northeast US. A formal assessment of bycatch estimates based on the ratio of discards to fishing effort is not considered in this report. Estimators based on ratios of total discard to fishing effort are more appropriate for fisheries that do not target groundfish, such as the sea scallop and herring fisheries. Evaluations of groundfish bycatch in these fisheries are being conducted by technical committees for their respective fishery management plans.

The Northeast Fisheries Science Center allocates observer sea days to monitor bycatch in commercial fisheries along the Northeast coast. These fisheries are diverse and therefore it is necessary to stratify commercial trips into fleet sectors (strata) with similar characteristics. Data from Northeast Fisheries Observer Program and the Fishing Vessel Trip Report are used together to define the size of the sample and the size of the strata, respectively. We define a total of 227 fisheries for 2005 observer coverage, consisting of three major gear types, four mesh sizes, two levels of trip durations, six port areas, and four seasonal quarters. The total fishing effort for April 2003 to March 2004 in the defined strata comprises 43,703 trips. Our examination of efficacy of observer coverage included results from 1,103 trips and 2,704 sea days. Every effort has been made to make the sampling program synoptic (i.e., cover all the major fisheries that discard commercially important species) and robust to sources of uncertainty. In particular, we utilize discard information at the trip level as opposed to the tow level. Sampling selection relies on observable properties of the strata, rather than desired outcomes (e.g., a targeted “cod” trip). Trips within strata are also assigned a probability of obtaining useful information relative to the species group of interest. The “usefulness” of a trip is conditional on the likelihood that a trip will catch one or more of the species within a predefined group of species.

Our analysis of sea-day allocations and use of optimization methods to improve allocations rest on two primary assumptions. First, the extant data are sufficient to obtain consistent estimates of the underlying variance of the discard ratio per stratum. Consistency is ensured if the samples are representative. Second, the relative size of the strata, i.e., the total number of trips, remains constant from year to year. This is a more tenuous assumption, as the balance of fishing effort can change in response to changes in resource abundance or regulations. Both of these assumptions are inherent in the use of retrospective data to improve a future sampling program.

The observer sea-day allocation model developed here represents an extension of Neyman optimal allocation (Cochran 1977). Observer trips are allocated to strata as a function of their contribution to the total variance, the expected number of observer days per trip, and the probability that a trip will provide information on one or more of the species groups of interest. The essential features of the sampling design and allocation process are summarized below.

- Strata are defined on the basis of observable properties of the fleet sector
- The sample unit within a stratum is a trip
- The primary response variables are total discards and kept weights of groups of species. Eleven groundfish species constitute one group, monkfish another group, and summer flounder-scup-sea bass, a third group
- The probability of obtaining information on one or more of the species groups from a future trip in a stratum is estimated from analysis of observer data
- An estimate of the probability of not obtaining any information about one of the three species groups is incorporated to allow appropriate increases in sample sizes commensurate with this risk
- Expected average trip durations are defined for each stratum
- Total observer days at sea serve as a constraint on the allocation process
- Additional constraints can be imposed on the minimum and maximum numbers of samples per stratum
- Unsampled strata use imputed (or borrowed) values from adjacent strata to ensure that some information is used for sample selection
- Imputation also identifies gaps in coverage and allows for updates of the population frame as new data are acquired
- Discard ratios and standard errors incorporate the approximate covariance of the ratio
- The precision of the overall discard/kept ratio is the primary performance measure in the allocation process.
- Total variance can be minimized subject to a total observer day constraint, or the number of observer days can be minimized subject to a desired level of precision

Results from the optimization model are used as a tool to improve observer coverage. Some post-processing of the optimized sea days is needed to fine-tune coverage across fleet sectors. Where feasible, the fine-tuning of sea-day allocation capitalizes on the multi-purpose attributes of observer coverage oriented toward assessment of non-finfish species (e.g., acquire data in the sea scallop fishery from trips designed to evaluate turtle bycatch rates.)

Presently the model is based on aggregate Discard/Kept (D/K) ratios. These ratios are relevant to most fisheries but, of course, the Discard/Effort (D/E) ratio is important in others. D/E ratio data have been prepared but not yet implemented in the model. D/E ratios are relevant for fisheries such as sea scallops, northern shrimp, and herring. It should be noted that one of the primary difficulties of implementing the D/E methodology is the selection of an appropriate unit of effort.

The “trip” level of effort may be the most useful but additional work will be necessary before extending the methodology to optimally allocate observer coverage to these fisheries.

The optimization methodology addresses the precision of the overall D/K ratio in the context of multiple objectives and limited resources. The issue of accuracy/bias is addressed by comparing various properties of vessels with and without observers onboard. Bias -- the systematic difference between the estimated and true value -- is addressed by first ensuring that the vessel trips are representative, and that a variety of quality assurance/control procedures are employed to accurately monitor vessel performance. Refusals to take an observer and other forms of non-response by industry are possible sources of bias. These sources are addressed via increased use of Enforcement personnel. For these concerns, the NEFSC observer program is consistent with the recommendations of the NMFS National Working Group on Bycatch (NMFS 2004).

Babcock et al. (2003) assert that increases in sampling effort are sufficient to reduce bias. If the presence of observers onboard alters the vessels fishing patterns, then it can be argued that all observed trips yield potentially biased results. If the unobserved vessel fishes with different methods in different areas and so forth, then the increases in sample size can only reduce but not eliminate the scope for bias. A variety of statistical techniques for inferring bias can be applied, but a review of the literature suggests that these techniques have been only moderately successful. Independent measures of vessel behavior may be possible from Vessel Monitoring System data, but such analyses can only detect gross changes from observed trips. Where possible, verification by independent data sources is encouraged, but one should be careful to avoid the problems of incorrectly assuming that a particular methodology is completely unbiased.

Several tests were conducted to address the potential sources of bias by comparing measures of performance for vessels with and without observers present. Bias can arise if the vessels with observers on board consistently catch more or less than other vessels, if the average trip durations change, or if vessels fish in different areas. Each of these hypotheses was tested by comparing observable properties in strata having vessels with and without observers.
Average catches (pounds landed) for observed and total trips compare favorably, following an expected linear relationship. The expected difference of the stratum specific means and standard deviations for both kept weight of groundfish and total trip duration was near zero. The frequency distribution of these differences provided no evidence of systematic bias. The mean difference between average catch rates of 238 pounds was not significantly different from zero ($p=0.59$, $df=84$). A paired t-test of the stratum specific standard deviations of pounds kept suggested no significant difference from zero ($p=0.08$). A similar analysis of average trip duration revealed a strong correlation between observed and unobserved trips (Figure 7) and a suggestion that the observed trips were about a half-day longer when the observer was on board ($p = 0.01$). A paired t-test of the difference in stratum specific standard deviations of trip length was not significantly different from zero ($p = 0.60$) (Figure 8B). Some skewing of the differences in mean trip durations was observed, with observed trips being slightly longer.

Two measures of spatial coherence suggest that the spatial distribution of fishing effort for trips having observers closely matches the spatial distribution of all trips. The null hypothesis of observer proportions equal to the VTR proportions was rejected ($P<0.05$) in 20 of 65 comparisons. Of these 20 cases, 10 involved ports in Southern New England and the Mid-Atlantic region where landings of New England groundfish are expected to be low. Of the remaining ten cases, five involved the large and extra-large gill net fisheries that mainly target monkfish. Thus, the null hypothesis of equivalent spatial distribution of sampling was rejected in only 5 of 50 fleet sectors, a rejection rate only slightly higher than due to chance alone.

A paper by Murawski et al. (2005 in press) presents information on the spatial distribution of otter trawl fishing effort for vessels with Vessel Monitoring Systems (VMS) with the distribution of tows on observed trips. Qualitatively, the spatial distributions match very well with high concentrations of effort near the boundaries of the existing closed areas on Georges Bank and within the Gulf of Maine. Moreover, the effort concentration profiles deduced from VMS data coincided almost exactly with the profiles derived from observed trips. Overall, these comparisons suggest strong coherency between the two independent measures of fishing locations.

An assessment of the sources of uncertainty in the design and data collected in the Northeast Fisheries Observer program indicates that the level of precision in the discard ratios (d/k) for the New England Groundfish fisheries as a whole is high and there is little evidence of bias. However, at finer temporal and spatial scales, precision of the discard ratios will generally be lower than the aggregate. Precision of the discards estimates will also be lower for individual species, age groups and size classes.

Introduction

Estimation of bycatch in any commercial fishery is a difficult task. At the level of an individual trip, bycatch occurs sporadically over wide geographical ranges. Proper quantification typically requires presence of trained observers. The commercial marine fisheries of the Northeastern US comprise many vessels of widely different sizes, targeting multiple species in a variety of habitats. Overlaying the complexity of the fleet and target species is a complex regulatory environment that constrains fleet behaviors. Since many stocks are in rebuilding phases, the effects of restrictions on landings per trip, and therefore revenue per trip, are difficult to predict. The Northeast Fisheries Observer Program (NEFOP) addresses this complexity by first ensuring that the data obtained from any trip are of the highest quality. This is achieved through a rigorous training program, standardized on-board data collection protocols, and thorough auditing of data. To allow for extrapolation from the sample data to the fleet as a whole, these procedures must be embedded in a statistical sampling design. This report provides a summary of the issues relevant to the design and analysis of the observer sampling program particularly with respect to the allocation of observer days to achieve desired levels of precision.

The NEFOP program incorporates the following important features:

1. Definition of a sampling frame across all relevant fisheries
2. Identification of strata based on observable properties
3. Development of rules for imputing variance estimates in unsampled strata (i.e., "borrowing" estimates from appropriate strata)
4. Use of a trip as the sample unit (rather than individual tow)
5. Definition of discards by species groups, corresponding to the major finfish species within the Northeast US.
6. Use of discard to kept ratios (d/k) for species groups as the primary response variable.
7. Estimation of approximate variances for d/k for groups of species, rather than individual species
8. Allocation of sampling effort based on reduction in total variance of the d/k estimate, subject to total cost constraints.
9. Allowance for observer coverage in remaining fisheries not included in the sampling frame, owing to other priorities (e.g., protected species concerns).
10. Where feasible, capitalize on the multi-purpose attributes of observer coverage oriented toward assessment of non-finfish species (e.g., acquire data in sea scallop fishery from trips designed to evaluate turtle bycatch rates.)

In this report we describe the foundations of our standardized approach for bycatch reporting methodologies and the primary sources of uncertainty.

Background

The Northeast Fisheries Science Center (NEFSC) routinely allocates observer coverage to monitor bycatch (fish, invertebrates, and protected species) in the commercial fisheries in the Mid-Atlantic and New England regions. The observer coverage is administered in units of 'sea days'.   Based on the daily cost of an observer at sea, the available funds determine the number of potential sea days. However, for the New England groundfish fishery, the number of sea days is presently mandated to be 5% coverage of the fishery. The projected fishing activity (in days) for the year is estimated by the available days-at-sea allowed under the Northeast Multispecies Fishery Management Plan. Thus, in a given year, the NEFSC has a mixture of mandated sea days and non-mandated sea days to monitor bycatch in the Northeast region (North Carolina to Maine) for various fisheries.

Allocation of sea days is guided by an optimization algorithm that is based on generalization of the well-known Neyman allocation principle in survey sampling. Precision of the overall estimate of the discard ratio is improved by allocating samples to strata with the greatest contribution to the total variance, subject to an overall constraint on available resources. In this application, "resources" refers to the total number of observer days available. Improvement of the allocation process requires an evaluation of the current sampling design and precision of estimators. The ability to improve the design is contingent on the reliability of the stratum-specific variances and the persistence of these estimates in the future (or at least the next sampling period).

The optimization algorithm can be used to (1) minimize the variance of the discard estimate subject to a given number of sea days, or (2) minimize the number of sea days subject to a desired level of precision. Results from the optimization model are used as a tool to improve the coverage. However, the model does not incorporate information regarding sampling for protected species, nor does it include information for fisheries where the discard ratio may be more appropriately measured by a discard to effort ratio (d/e). Thus the model predictions are conditioned to exploit the multipurpose utility of the protected species sampling, and coverage in important fisheries (like sea scallops) is ensured by reserving some additional days to "level out" sampling that may be required for either protected species or closed area trips.

This report will describe: 1) the fishery identification and data sources used; 2) imputation rules for unobserved fisheries; 3) sampling theory and optimization methods; 4) application of the model to observer coverage; and 5) address accuracy issues discussed by Babcock et al. (2003)

Definition of Strata -- Fishery Identification

Diverse commercial fisheries are prosecuted off the Northeastern coast of the USA. These fisheries vary in size (number of trips) and have varying bycatch rates.   To monitor these fisheries with at-sea observers, it is necessary to stratify the trips into fleet sectors with similar characteristics. For this report, fleet sectors are defined as strata within a survey design.

Commercial fishing trips are partitioned into fleet sectors using five classification variables: calendar quarter, gear type, mesh size, geographical region, and trip length.   These classification variables are selected because they are generally known *before* a trip occurs. Using these criteria it is possible to generate a list of candidate vessels for each stratum, which simultaneously enables a random selection process and reduces the number of repeat trips on vessels. This is a critical aspect for both strata definition and sample selection. One cannot base a sampling design on the outcome of a sample observation. In this exercise, it is not possible to select a sampling design that specifically improves the precision of cod discards, since that objective is dependent on the realization of the actual sample. However, it is possible to select samples that will improve the probability of obtaining improved discard estimates by estimating the expected proportion of trips that catch species groups of interest.

Calendar quarter was considered the most feasible temporal unit to capture seasonal variations in fishing activity and bycatch rates over the full range of fisheries. Although some management regulations operate at a finer scale (e.g. weekly), quarterly data can be further subdivided if finer resolution is needed. Otter trawl, gillnet and longline gear were defined as the three major gear types for finfish. Otter trawl and gillnet trips were classified into four mesh size groups: Small (less than 3.99 inch mesh); Medium (between 3.99 and 5.49 inch mesh); Large (between 5.5 and 7.99 inch mesh) and XLarge (8.0 inch mesh or greater). Additionally, trips are classified into six geographical regions based upon the port of departure: ports located within Maine and New Hampshire (ME_NH); Massachusetts (N_MA, excluding Bristol county); Connecticut, RI, and Bristol county, MA (SNE); New Jersey - New York (NJ/NY); Maryland and Delaware (MD/DE); Virginia and North Carolina (VA/NC). Trip length serves as a surrogate for spatial resolution (inshore vs. offshore). Otter trawl trips are further classified into two trip length categories: day trips and multi-day trips. Longline and gillnet gears are not partitioned by trip length.

Due to the mixture of species caught during a trip, it is not sufficient to classify trips with regard to target species because discard of target and non-target species may occur. To account for target and non-target discard, trips in each fleet sector are classified into one or more of three species groups: New England groundfish (NEGF); summer flounder, scup and black sea bass (FSB); and monkfish (MONK). There is often overlap between trips which catch NEGF, FSB and MONK. The estimated number of trips and sea days needed to cover these fleet sectors may be overestimated when the trips are assumed to be independent, therefore the overlapping nature of the fishing fleets are taken into account. Sampling fractions, and how the overlap is accounted for, are described in a later section.

Eleven species constitute the New England groundfish species group: cod, haddock, yellowtail flounder, American plaice, witch flounder, winter flounder, redfish, pollock, white hake, windowpane, and halibut. If a trip catches (retains or discards) at least 1 of the 11 large-mesh regulated species, the trip is categorized as NEGF trip and the hail weights of the 11 species are summed to form an aggregate species total for NEGF. Similarly, if a trip catches (retains or discards) either summer flounder, black sea bass or scup, the trip is categorized as a FSB trip and the hail weights of these species are summed to form an aggregate species total for FSB. If a trip catches (retains or discards) monkfish, then the trip is categorized as a MONK trip. A trip may be categorized to one or more of the three species groups.

Data Sources

Trip characteristics are recorded in both the NEFOP and Fishing Vessel Trip Reports (VTR) data sets. Together, these databases are used to define the size of the sample and the size of the strata, respectively. Data from each source are retrieved and prepared separately before the two sets are combined (Figure 1).

Fishing Vessel Trip Report Data

Beginning in June 1994, the Northeast Region's data collection system was changed from a voluntary to a mandatory reporting system for USA fishermen and dealers who catch and buy/sell groundfish species regulated by the Northeast Multi-species Fishery Management Plan. The mandatory reporting system consists of two components: 1) dealer reporting and 2) vessel trip reporting. Each component contains information needed for fishery management and stock assessment analyses: the dealer reports contain total landings by market category, while the vessel trip reports contain information on area fished, kept and discarded portions of the catch, and fishing effort. The VTR data has been routinely used in management analyses and peer reviewed stock assessments. Details on example applications of the VTR to stock assessments may be found in a large number of reports of the Stock Assessment Review Committee (SARC). Reports prepared since 2000 may be found at http://www.nefsc.noaa.gov/nefsc/saw/. Earlier reports are available by contacting saw_reports@noaa.gov.

In this report, the VTR data are used to: 1) define the sampling frame of the commercial fishing trips, and 2) evaluate the accuracy of the observer data with respect to area fished, kept pounds, and trip length. The VTR data are the only synoptic data source for vessel activity, area fished and fishing effort for commercial fisheries. The Vessel Monitoring System data and the Days-At-Sea data systems cover only portions of the fisheries and therefore are limited in use.

The VTR data can be used as a basis for defining the sampling frame, because all federally permitted vessels are required to file a VTR for each fishing trip (see NMFS-NERO *http://www.nero.noaa.gov/ro/fso/vtr_inst.pdf*). These self-reported data constitute the basis of the fishing activity of the commercial fleets. The VTR trip data are collapsed into fleet sectors and species groups as defined above. For each species group within a fleet sector, the number of trips that caught the species group, the average number of days absent, and the weight of the species in the species group are calculated.

The limitations of self-reported catch data are well known (e.g., Walsh et al. 2002, NMFS 2004). Limitations of the initial data VTR data sets were described by the SARC in 1996 (NMFS 1996). Since then, many of these limitations have been addressed. In particular, subsequent peer-reviews through numerous SARCs and a review by the National Research Council (1998) have identified the strengths, weaknesses, and appropriate uses of the VTR data from the Northeast.

The validity of VTR data as a basis for a sampling frame is supported by comparisons with total landings data from dealer records. All dealers which buy and sell groundfish regulated by federal

FMPs are required to report 100% of the landings. These data are generally thought to constitute a near census of landings of groundfish. The NRC (1998) noted that misreporting of landings is "usually a significant issue only when fisheries are managed by setting a total allowable catch." On this basis, the magnitude of misreporting by dealers would be low as Northeast groundfish stocks have been managed primarily through effort controls. A comparison of total groundfish landings from VTR and Dealer records for calendar year 2003 reveals close agreement between the two sources:

Species	VTR Landings (mt)	Dealer Landings (mt)	Difference (mt)	Pecent Difference
Cod	8240	8692	452	5.2%
Winter flounder	5321	5714	393	6.9%
Witch flounder	2971	3108	137	4.4%
Yellowtail flounder	5208	5530	322	5.8%
American Plaice	2204	2415	211	8.7%
Windowpane flounder	102	60	-42	-70%
Haddock	5778	5874	96	1.6%
White Hake	2268	3305	1037	31.4%
Halibut	11	13	2	15.4%
Redfish	338	360	22	6.1%
Pollock	3839	4188	349	8.3%
Total	36281	39258	2977	7.6%

For the three major species, cod, haddock and yellowtail flounder, the percentage differences range from 1.6% to 5.8%. Only windowpane flounder, white hake and halibut exhibit large percentage differences. Total landings of windowpane flounder and halibut represent small fractions of the total (0.3% of VTR and 0.2% Dealer) landings and these percentage differences are considered negligible. Large percentage differences for white hake may be attributable to confusion between white hake and red hake. White hake can be difficult to distinguish from red hake (sp) and may be identified simply as "hake" by both dealers and fishermen. The overall difference of 7.6% is dominated by large differences in the landings of white hake. Excluding white hake from the comparison reduces the overall percentage difference to 5.4%.

Other measures to ensure the validity of the VTR database include routine auditing procedures, standardized data entry protocols and compliance reviews (pers. comm. Greg Power, Chief, Fisheries Information Section, Northeast Regional Office, NMFS).

Northeast Fisheries Observer Program Data

The NEFOP employs trained, sea-going observers to collect catch data by species and disposition (retained and discarded). Biological samples, gear characteristics data, and economic information are also collected. For the optimization data set, only observed hauls from trips classified as 'standard sea sampling trips' are used. Observed trips that were aborted or which used a ‘limited’ fish sampling protocol (no discard data collected) are excluded.   Hail weight can be reported in round or dressed weights; if kept hail weights are reported as ‘dressed’, then the hail weight is converted to round (live) weight using Commercial Fisheries Database System (CFDBS) conversion factors for the species.   All discard hail weights are assumed to be round (live) weight.

The NEFOP data are collapsed into strata as defined above. For each stratum, the number of observed trips that caught one or more of the three species groups is calculated. For each fleet sector and species group, the number of observed trips, number of observed hauls, average trip length (in days), kept weight of all species in the species group, discarded weight of all species in species group, and the number of observed days are calculated. A discard ratio and the variance of the ratio are calculated for each stratum (fleet sector and species group).

Optimization Data Set

The VTR and NEFOP data sets are concatenated by fleet sector and species group. A list of variables and their definitions are presented in Table 1. Not all VTR fleet activity may have NEFOP coverage (Table 2). When fleet sectors do not have observer coverage, imputed values are used (Table 3). The imputed values are derived from NEFOP data from similar fleet sectors, thus providing an estimate for the non-observed fleets. Details of the imputation process are provided in the following section.

The optimization tool is flexible and allows the user to select the entire input data set, or a subset. To allocate sea days for an entire year, four calendar quarters of data are used. Using the most recent available data, given the time needed for data entry and auditing, the year consists of calendar quarter 3 and 4 from year -1 and calendar quarter 1 and 2 from the current year.

The three gear types (otter trawl, gillnet, and longline) used in the optimization data set are gear types for which fishing regulations allow finfish to be retained, thus a discard to kept ratio estimator (d/k) is used. Fisheries using other gear types where regulations may prohibit groundfish possession are excluded from the current optimization process because a d/k ratio is not appropriate for these cases.

Imputation rules for unobserved fisheries

Not all of the fishery strata had observed trips between April 2003 and March 2004. To account for the expected variance of the estimates in the missing cells, it was necessary to develop a standardized procedure to handle both missing and minimal levels (e.g., a single trip) of observer coverage. This procedure is referred to hereafter as ‘imputation’ and the estimates derived by the imputation are referred to ‘imputed values’. Imputed values are derived by sequentially relaxing the fleet sector classification. The fleet sectors for each species group (NEGF, FSB, and MONK) are imputed separately. The imputed values fill in missing values for the unobserved strata. Fishery strata are defined with respect to rigid definitions of categorical variables such as region or quarter. A stratum with missing data must be filled with data from similar strata. To identify suitable candidate strata as “donor” or “parent” cells, it is necessary to “relax” the definitions of the strata. For example, if no trips occur in the Jan.-Mar. quarter, one might relax the definition to include data from the Jan-Jun. half year. The objective process of relaxing strata definitions to impute data is described below.

A fleet sector was not imputed if:

> 1) VTR number of trips = 0 (no imputation needed when there is no fleet activity for the species group);
>
> 2) VTR number of trips > 0 and standard error was not missing (no imputation needed when there is fleet activity for the species group and there is a standard error of the observer d/k ratio); and
>
> 3) VTR number of trips > 0 and total observed kept pounds = 0 (no imputation needed when there is fleet activity for the species group and the standard error cannot be calculated); otherwise, the fleet sector was imputed.

The imputation uses three increasing levels of aggregated NEFOP data (using the same data and calculation methods as the original calculations of observed d/k ratio and associated statistics). Three of the five stratification factors are relaxed (region, mesh size and calendar quarter).   Gear type and trip length are used, but their stratification is not relaxed. Trip length is not relaxed because the average trip length is used to determine the number of sea days needed to obtain the desired precision level. Gear type is not relaxed because of fundamental differences in catches (retained and discarded) occur using these gear types.

> Level 1: Calendar quarter is relaxed to half year and the six geographic regions are relaxed to two regions (NE region = ME/NH, N_MA, SNE; MA region = NY/NJ, DE/MD, NC/VA); gear, mesh size and trip length categories are maintained.
>
> Level 2: Calendar quarter is relaxed to an entire year, the six geographic regions are relaxed to two regions (as in Level 1), and the four mesh groups are relaxed to two mesh groups (SMALL = small and medium mesh groups; LARGE = none, large, and Xlarge mesh groups); gear and trip length categories are maintained.
>
> Level 3: Calendar quarter is relaxed to an entire year (as in Level 2), the six regions are relaxed to one region (all six regions combined), and the four mesh groups are relaxed into one mesh group. This level served as a ‘catch-all’ for all remaining fleets sectors that required imputation.

The VTR-NEFOP data set is merged with Level 1 NEFOP data; if a fleet sector needs imputed values, based on the criteria list above, then the imputed values from the observed trips in Level 1 are transferred to the corresponding VTR-NEFOP fleet sector and species group only if the trips in the Level 1 data set are greater than 1. Data from Level 2 and Level 3 are subsequently merged with the VTR-NEFOP.   When imputed values are used in the VTR-NEFOP data set, the fleet sector and species group is 'flagged' with the imputation level used. All fleet sectors that need imputation obtain values at one of the three levels.

Below is a summary of the number of fleet sectors, by imputation level and species group used in the 2005 sea day allocation.

	Species group		
Imputation Level	NEGF	FSB	MONK
Level 0 (no imputation)	150	116	111
Level 1	30	51	44
Level 2	27	41	35
Level 3	20	19	37
Total	227	227	227

To include all fisheries using otter trawl, gillnet and longline gear in the optimization, approximately 33% to 50% of the mean discard rates and variances are imputed or 'borrowed'.

When a fleet sector and species group is imputed, five variables (number of observed trips, observed d/k ratio, total observed kept pounds, standard error of the d/k ratio, and number of observed days) are estimated with imputed values. Because the aggregated NEFOP data at each level have more observations than the original VTR-NEFOP fleet sector, the imputed values need to be rescaled before they are used. Except for the imputed d/k ratio, the imputed values for the number of observed trips, the total observed kept pounds, the standard error and the number of observed days are re-scaled using a sampling fraction represented by the ratio of the total NEFOP trips for that level, fleet sector and species group to the total VTR trips for that level, fleet sector and species group. Equations used to re-scale imputed values within stratum h are:

T_{vtr} = total VTR trips of $Level_i$
T_{obs} = total NEFOP trips for $Level_i$
$T_{imp,h} = (T_{obs} / T_{vtr}) * Trips_{vtr,h}$;
$Kept_{imp} = (T_{imp,h} / T_{obs}) *$ NEFOP kept pounds sum in $Level_i$
$SE_{imp} = (T_{obs} / T_{imp,h})^{1/2} *$ NEFOP standard error in $Level_i$
$Days_{imp} = (T_{imp,h} / T_{obs}) *$ total number of NEFOP days in $Level_i$
$T_{imp,h}$ is rounded to a whole number, if $T_{imp,h} < 1$, then $T_{imp,h} = 1$;

where $Level_i$ denotes Imputation Level 1, Level 2 or Level 3.

Sampling Theory and Optimization Methods

Fishing trips are considered the primary sample unit in estimating d/k ratios. Fishing trips generally catch multiple species, some of which are not landed owing to various regulations or market conditions. We defined three major groups of species: (1) New England groundfish, (2) summer flounder, scup and sea bass, and (3) monkfish. Fishing trips in a given stratum may catch species from one or more of these groups. The degree of overlap among species groups has important implications for the efficacy of sampling within strata, i.e., the number of samples necessary to achieve a desired level of precision. Because some fraction of trips provide information on more than one species group, estimates of sample size based on the assumption of independence, will overestimate the number of required trips. Developing estimators that explicitly account for the magnitude of overlap can circumvent this potential inefficiency. There are two ways to approach this estimation. One is based on the pattern of overall trips from the vessel trip reports. The second is based on the pattern in observer sampled trips. In theory, if the observed trips are a representative sample, the proportions in the vessel trip reports and observer trips should be the same. In practice, the proportions in the observed trips will deviate from those in the VTRs due to sampling variability and other factors. The selection of observed trips reflects a practical mix of vessel availability, knowledge of vessel operations, familiarity, and safety considerations. These are, of course, important factors for program management, but it must be recognized that these factors introduce bias into estimates.

Both approaches follow the algorithm described below. Let I_{hij} be an indicator variable denoting the presence or absence of species group j within trip i in stratum h. Then $I_{hij}=1$ if species group j is present, else 0. A design matrix can be used to describe each unique trip within a stratum. The design matrix appends to each trip record a set of indicator variables that identify the presence/absence of species groups caught. The following table illustrates a hypothetical case with 7 trips in stratum h.

Example 1

	I_{h_1}	I_{h_2}	I_{h_3}
	j=1	j=2	j=3
Trip ID	NEGF	Monk	FSB
1	1	0	0
2	1	1	0
3	1	1	1
4	1	0	1
5	0	1	1
6	0	1	0
7	0	0	1
Sum	4	4	4
$n_h=7$	n_{h1}	n_{h2}	n_{h3}

In this simple example, four of the seven trips caught New England groundfish, four trips caught monkfish, and four caught summer flounder, scup or sea bass. If all of these trips (or trip types) are equally likely, then the probability of obtaining a sample that yields information on NEGF is 4/7 and so forth. The probability of obtaining information on species j is the sum of the species group specific trips within the stratum (i.e., n_{hj}) divided by the total number of unique trips within the stratum (n_h). Note that

$$n_h \neq \sum_{j=1}^{3} n_{hj}$$

owing to the overlap in coverage for some trips. The probability that a random trip provides information on species group j is defined as

$$\hat{p}_{hj} = \frac{n_{hj}}{n_h} \qquad (1)$$

For each stratum, the probabilities can be computed that a random sample will contain information about species group j. The basis for the probability estimator can either be the observed set of trips within a stratum <u>or</u> the total set of trips represented in the VTRs. Applying the same set of indicator variables to the VTR data, one can obtain the population estimates of these quantities as

$$\hat{P}_{hj} = \frac{N_{hj}}{N_h} \qquad (2)$$

Eq. 1 establishes the basis for a random sample from the set of observed trips. Eq. 2 establishes the same basis from the VTR. On first principles, Eq. 2 is a better estimator if a representative sample can be taken in a stratum. Eq. 1 is more appropriate if the set of observed trips within a stratum is representative of those trips available for observation.

Using Eq. 1 or 2, it is now possible to examine the effects of altered sample sizes. Let n'_h represent the new total number of trips to be taken in stratum h. For the purpose of evaluating the expected change in variance in the component species groups, the n'_{hj} for each species group need to be redefined. This is accomplished using the equation

$$n'_{hj} = \hat{p}_{hj} n'_h \qquad (3)$$

if Eq. 1 is used , or

$$n'_{hj} = \hat{P}_{hj} n'_h \qquad (4)$$

if Eq. 2 (based on VTR) is used to estimate the expected probabilities that a trip in stratum h will capture fish from species group j.

Another worked example will reinforce the basic concept of the expected proportions of samples likely to sample species group j. Consider a stratum with 10 observed trips with Eq.1 used to estimate p'_{hj}.

Example 2

Trip ID	I_{h_1} j=1 NEGF	I_{h_2} j=2 Monk	I_{h_3} j=3 FSB
1	1	1	0
2	1	0	0
3	1	0	1
4	1	1	0
5	1	1	1
6	0	0	1
7	0	0	1
8	1	0	1
9	0	1	0
10	0	1	0
Sum	7	4	5
n_h=10	n_{h1}	n_{h2}	n_{h3}
p_{hj}	7/10	4/10	5/10

If the n_h were increased to n'_h=30 then the revised estimates of n'_{hj} would be

$$\hat{n}'_{h1} = \left(\frac{7}{10}\right)30 = 21$$

$$\hat{n}'_{h2} = \left(\frac{4}{10}\right)30 = 12$$

$$\hat{n}'_{h1} = \left(\frac{5}{10}\right)30 = 15$$

Thus, adding 20 trips to stratum h would translate into an expected increase of 14 trips for NEGF (i.e., 21-7), 8 trips for monkfish (i.e., 12-8) and 10 trips for FSB (i.e., 15-5). The increase in the total number of trips for a stratum differs with respect to the pattern of information in the sample. The allowance for non-integer numbers of trips is considered to have a negligible effect. In practice, the actual implementation of a sampling strategy would be based on rounding to the nearest integer, and subject to a lower bound constraint, say n_{hj}= 2.

Example 2 could be repeated for estimates derived from the VTR data. For such an example, the universe of trips would be much larger.

Measures of Overlap

Venn diagrams of the number of trips in the VTR and NEFOP depict the degree of overlap between the three species groups in the two data sets. In the April 2003-March 2004 VTR database, half of the trips (22,274 trips out of 43,703 trips) are unique to the species groups (Figure 2), while in the NEFOP database, a third of the trips (286 trips out of 1,103 trips) are unique to the species groups (Figure 3). The sampling fractions (NEFOP trips divided by VTR trips) are given in Figure 4. The numbers of trips (and days) in the Venn diagrams are based on whole trips, and therefore slight differences occur in the number of trips between the Venn diagram and d/k ratio analyses (e.g. there are trips in d/k ratio analysis which used two different mesh sizes during a trip).

Observers Days at Sea Constraints

While trips constitute the sampling unit, the total number of sampling units is constrained by the total number of days available during any interval. To consider this component of the sampling design, it is necessary to consider the average trip duration in stratum h. Let t_{hi} be the trip duration (days) for the i-th trip in stratum h. The total number of observed trips in stratum h is n_h and the total number of observed days is Σt_{hi} The average trip duration is estimated as

$$\bar{t}_h = \frac{\sum_{i=1}^{n_h} t_{hi}}{n_h} \qquad (5)$$

The actual number of future observer days that will be required under some new sampling intensity (n'_h) is proportional to n'_h / n_h . Eq. 5 can also be defined in terms of the durations of the trips in the VTR database. The expected total number of days allocated to stratum h is defined as

$$T_h = \bar{t}_h n_h = \sum_{i=1}^{n_h} t_{hi} \qquad (6)$$

regardless of whether observer or VTR data are used. The average trip duration in stratum h is not influenced by the number of trips allocated, as long as the trips selected are representative of the basis used to define the species composition of the trips. Recall that either the observer database or the VTR database can be used. Thus the total number of observer days allocated to stratum h under some new allocation is

$$T_h^{'} = \bar{t}_h n_h^{'} \qquad (7)$$

The grand total number of days at sea that would be allocated given some new set $\{n'_h\}$ would be

$$T^{'} = \sum_{h=1}^{H} \bar{t}_h n_h^{'} \qquad (8)$$

Some key points in this derivation are:

- It is not possible to derive any real-world sampling program without considering the key uncertainties related to the probability that the trip will be "successful" and that the cost of sea days may vary.
- The number of successful trips, relative to the objective of reducing the variance of the estimate, is a random variable, based on a probability estimate. The expected number of actual trips may not actually result in information necessary to improve the precision of the estimate.
- The "cost" per trip is expressed as the expected duration. Actual duration may also vary within strata, although the stratification is designed reduce the variation in this component.

Optimization is a technique for maximizing (or minimizing) some quantity of interest subject to one or more constraints. Constraints are the key concept. In this application, we consider upper and lower bounds on the size of the sample within a strata, a total constraint on the number of available days, and a constraints related to acceptable levels of precision. For problems that do not explicitly consider dynamic (i.e., time dependent) processes, a variety of optimization methods can be used including linear and nonlinear programming. For this project, the optimization program, Premium Solver Platform (Version 5.5) developed by Frontline Systems, Inc. (2003) was used.

To address the optimization problem, the overall variance of the discard to kept ratio must first be estimated. The discard ratio for species group j in stratum h is the sum of discard weight over all trips divided by sum of kept weights over all trips:

$$\hat{R}_{jh} = \frac{\sum_{i=1}^{n_h} d_{ijh}}{\sum_{i=1}^{n_h} k_{ijh}} \qquad (9)$$

where d_{ijh} is the discards for species group j within trip i in stratum h and k_{ijh} is the kept portion of the catch. R_{jh} is the discard rate for species group j in stratum h. The stratum weighted discard to kept ratio for species group j is obtained by weighted sum of discard ratios over all strata:

$$\hat{R}_j = \sum_{h=1}^{H} \left(\frac{N_h}{\sum_{h=1}^{H} N_h} \right) \hat{R}_{jh} I_h \qquad (10)$$

The variable I_h is a zero/one indicator of whether or not a stratum is included in the computation. The indicator variable can be considered as a composite measure of the suitability of stratum h in the estimator. The indicator variable allows a stratum to be filtered on the basis of one or more metrics. A more complete description of the various types of filtering is described in the next section.

The approximate variance of the estimate of R_{jh} is obtained from a first order Taylor series expansion about the mean:

$$V\left(\hat{R}_{jh}\right)=\frac{1}{(n_{jh}-1)n_{jh}\bar{k}_{jh}^{2}}\left[\left(\sum_{i=1}^{n_{jh}}d_{ijh}\right)^{2}+\hat{R}_{jh}^{2}\left(\sum_{i=1}^{n_{jh}}k_{ijh}\right)^{2}-2\hat{R}_{jh}\left(\sum_{i=1}^{n_{jh}}d_{ijh}\right)\left(\sum_{i=1}^{n_{jh}}k_{ijh}\right)\right] \tag{11}$$

where d_{ijh} is the total discard weight of species group j in trip i within stratum h, k_{ijh} is the total kept weight of species group j in trip i within stratum h, nj_h is the sample size (number of trips) that caught species group j in stratum h, and k_{jh} bar is the mean kept landing of species group j within stratum h. Note that in this formulation of the variance, the finite population correction factor (fpc), i.e., one minus the sampling fraction within the stratum, has been omitted. This has been done to improve readability. The fpc is included however, in Eq. 11 for the total variance of the d/k ratio.

The variance of the d/k ratio for species group j over the entire set of strata is estimated using standard sampling theory methodology for a stratified random design as

$$V\left(\hat{R}_{j}\right)=\sum_{h=1}^{H}\left(\frac{N_h-n_{jh}}{N_h}\right)\left(\frac{N_h}{\sum_{h=1}^{H}N_h}\right)^{2}V\left(\hat{R}_{jh}\right)I_h \tag{12}$$

The overall coefficient of variation for the discard/kept ratio is defined as

$$CV_j=\frac{\sqrt{V(\hat{R}_j)}}{\hat{R}_j} \tag{13}$$

It is now possible to define an overall estimate of the relative precision of the d/k ratio across all species groups as

$$CV = \sum_{j=1}^{3} \lambda_j CV_j \qquad (14)$$

where λ_j is an arbitrary weighting factor for species group j. In this formulation, the λ_j can be used as binary factors (0,1) to examine the allocations individually for species groups.

The optimization tool evaluates the potential improvements in the precision of the discard ratio through reallocation of the number of trips to individual strata. Equation 11 illustrates that the variance of the ratio decreases as the number of trips (n_h) increases. Assuming that the data yield representative estimates of the stratum specific variances, then the reduction in total variance can be examined as a function of alternative allocation schemes for each stratum. If n^*_h is defined as the optimal number of trips taken in stratum h, then the variance of the overall ratio is estimated as

$$V\left(\hat{R}_j^*\right) = \sum_{h=1}^{H} \left(\frac{N_h - n_{jh}}{N_h}\right) \left(\frac{N_h}{\sum_{h=1}^{H} N_h}\right)^2 \left(\frac{n_{jh}}{n_{jh}^*}\right) V\left(\hat{R}_{jh}\right) I_h \qquad (15)$$

The optimization problem can now be posed as the minimization of the CV of the composite ratio estimate, subject to a total days at sea constraint (T_C) and constraints on the number of trips per stratum.

$$\begin{aligned} &\min \sum_{j=1}^{3} \lambda_j CV_j \\ &\textit{subject to} \\ &2 \le n_{jh}^* \le N_h \qquad , \forall_h \\ &T_C^* \ge \sum_{h=1}^{H} \bar{t}_h n_h^* \end{aligned} \qquad (16)$$

Alternatively, the optimization problem can be defined with the objective of minimizing the total number of days at sea, subject to an acceptable coefficient of variation (CV_{CRIT}). This version of the model can be written as:

$$
\begin{aligned}
&\min \sum_{h=1}^{H} \bar{t}_h n_h^* \\
&\textit{subject to} \\
&2 \le n_{jh}^* \le N_h \qquad , \forall_h \\
&CV_{CRIT} \ge \sum_{j=1}^{3} \lambda_j CV_j
\end{aligned}
\tag{17}
$$

Another relevant consideration is that a trip may not yield information on any of the target species groups. In some strata, for example, a number of trips fail to capture groundfish, monkfish or the summer flounder, scup and sea bass mixture. To protect against this possibility, it is desirable to inflate the optimal number of trip estimates by the ratio of N_h to N'_h where N_h is the total number of trips in stratum h and N'_h is the number of trips that obtained information on one or more of the species groups.

Application of the Model

Using the optimization algorithm to minimize the variance of the discard estimates subject to a given number of sea days, the allocation of observer sea days for the Mid-Atlantic (M-A) and New England (NE) regions was optimized separately and the resulting allocated sea days combined. Separate analyses were conducted because of differential sea days constraints (mandated sea days for New England groundfish versus non-mandated sea days for the Mid-Atlantic region). Before the optimization began, a portion of the available sea days were set aside to cover fisheries which do not enter the optimization process (e.g. scallop dredge fishery). For these fisheries, sea days are allocated proportional to fishing effort (number of trips or number of days fished).

The Mid-Atlantic optimization used data from the SNE, NJ/NY, DE/MD and VA/NC regions with the species weighting coefficients set to 1 for both FSB and MONK and to 0 for NEGF. The NE optimization used data from the SNE, N_MA, and ME-NH regions, with the species weighting coefficients set to 1 for NEGF and to 0 for both FSB and MONK. Data from the SNE region were included in both optimizations due to the intersection of the NE and M-A regions. Stratum indexes were applied to reduce the data set to contain only the relevant fisheries.

Below is a summary of the indexes and thresholds used in the NE and M-A sea day optimizations.

NE region trip and landings setting and thresholds

Switch	***Setting***	***Threshold (fraction)***	***Description of Filters that Operate on Entire Strata***
I(L_negf%)	1	0.0025	Landings of NEGF<Threshold=>0, else 1
I(L_fsb%)	(All)	0.0001	Landings of FSB<Threshold=>0, else 1
I(L_monk%)	(All)	0.0001	Landings of Monk<Threshold=>0, else 1
sum(I(L_all%))	(All)	NA	If any of Landings indices for NEGF,FSB or Monk=1 then =>1, else 0
I(Nh_negf%)	1	0.0001	Trips of NEGF<Threshold=>0, else 1
I(Nh_fsb%)	(All)	0.0001	Trips of FSB<Threshold=>0, else 1
I(Nh_monk%)	(All)	0.0001	Trips of Monk<Threshold=>0, else 1
I(%TotVTR_3sp)	1	0.00005	Filter on % of total landings of 3 species groups
Filter on All Trips	0	NA	Excludes entire Strata if value=0

M-A region trip and landings settings and thresholds

Switch	***Setting***	***Threshold (fraction)***	***Description of Filters that Operate on Entire Strata***
I(L_negf%)	(All)	0.0025	Landings of NEGF<Threshold=>0, else 1
I(L_fsb%)	1	0.0001	Landings of FSB<Threshold=>0, else 1
I(L_monk%)	1	0.0001	Landings of Monk<Threshold=>0, else 1
sum(I(L_all%))	(All)	NA	If any of Landings indices for NEGF,FSB or Monk=1 then =>1, else 0
I(Nh_negf%)	(All)	0.0001	Trips of NEGF<Threshold=>0, else 1
I(Nh_fsb%)	1	0.0001	Trips of FSB<Threshold=>0, else 1
I(Nh_monk%)	1	0.0001	Trips of Monk<Threshold=>0, else 1
I(%TotVTR_3sp)	1	0.00005	Filter on % of total landings of 3 species groups
Filter on All Trips	0	NA	Excludes entire Strata if value=0

NE and M-A regions d/k ratio thresholds

	Threshold (d/k ratio)	***Description of Filters that Operate on Individual Cells (Species within Strata)***	***Number of Cells Included***	***Number of Cells Excluded***
Max d/k_NEGF	1	Maximum d/k ratio used for NEGF. Values>Threshold excluded	25	11
Max d/k_FSB	2	Maximum d/k ratio used for FSB. Values>Threshold excluded	32	4
Max d/k_Monk	2	Maximum d/k ratio used for Monkfish. Values>Threshold excluded	33	3

Some ‘post-processing’ of the allocation of optimized sea days was necessary. Even though one or more indicator variables (i.e., filters) were applied during optimization, it was necessary to fine-tune the sea day allocations by applying a minimum and maximum amount of coverage, and to maintain coverage of fishing activity throughout the year. The optimized sea days were multiplied by the average trip duration for each stratum to estimate the projected number of observed trips. If the projected number of observed trips was less than 3 trips per strata, then the sea days were redistributed to other strata representing more relevant fisheries. If the number of potential observed trips in a stratum exceeded 15% of the VTR trips, then the sea days in that stratum were reduced to the number of sea days representing 15% (potential observer trips/VTR trips) coverage. The sea days from strata exceeding the 15% coverage cap were reassigned to other strata.

The number of unique vessels and the vessel selection protocols in a stratum limit the number of trips that can be observed in that stratum. The number of unique vessels varies among strata; in the 2005 sea day optimization, the number of unique vessels in a stratum ranged between 1 and 146 vessels, with 85% of the strata having 50 vessels or less. The vessel selection protocols state a vessel is not to be observed more than twice during a month. As an approximate guide for balancing between the potential number of observed trips and the number of unique vessels in a stratum, a 15% trip coverage cap was selected to prevent assigning more sea days to a stratum than the number of vessels could support. The 15% cap prevented clustering of sampling effort, particularly in instances where the estimate of the variance of d/k might be imprecise. In these instances, the optimization model will tend to allocate large number of trips to such strata to reduce the standard error of the estimate. When the analysis was restricted to the relevant strata for the New England groundfish fisheries, the 15% cap was binding in only 4 of 33 strata for the observer coverage allocation scheme based on 2,708 observer days.

The diagnostics within the optimization tool were used to evaluate the imputation process. The optimization algorithm calculates the d/k ratios and the variance estimates for 'all data' and for 'data without imputed values'. Generally, the d/k ratios and variance estimates were similar between the 'all data' and 'data without imputed values' for each species groups. This indicates that the imputation generally provided consistent values across the three levels of aggregation.

Precision, Bias and Sampling Intensity: A Rebuttal to E.A Babcock et al. (2003)

Understanding the sampling properties of estimates of bycatch derived from observer programs and other sources with respect to accuracy and bias is critical. This section reviews issues related to bycatch estimation in observer programs with an emphasis on potential biases that may exist. The NMFS national bycatch report (NMFS 2004) emphasizes that wherever possible, attempts to detect and guard against bias should be made in observer programs. The report strongly advocates the development of rigorous randomization procedures in sample selection to help ensure representative sampling. All can agree that with unlimited resources, the more observer coverage the better. The real issue however is how to allocate finite resources to meet multiple requirements for stock assessment and protected species evaluation. The cases that Babcock et al. (2003) point to as success stories typically have relative few boats involved compared to many other fisheries. These cases are not representative overall of the issues facing program managers.

Babcock et al. (2003) insufficiently distinguish between two very different types of bias. The first type arises when non-representative sampling occurs. The second type is related to the statistical properties of the consistency of the estimators. These two types of bias are very different and it is important to be clear which type of bias is under consideration. The second type of bias is typically reduced with sufficiently large sample size. However, this may not be addressed by increases in sample size if fishermen refuse to take observers, if certain classes of boats cannot accommodate observers, etc. Babcock et al. (2003) take as an article of faith that increasing the number of trips will reduce bias. Some of the solutions identified by Babcock et al. (2003) for correcting bias (e.g. the use of bootstrap estimators) apply to correcting bias of the second type. However, no amount of bootstrapping will overcome non-representative sampling.

The mean square error (MSE) of an estimate is composed of two elements, the variance of the estimate and the square of the bias (defined as the difference between the mean of the sample and the true population value). The MSE therefore comprises two additive elements. Cochran (1977) notes that if bias is less than 10% of the standard deviation of the estimate, the effect of this bias on the accuracy of the estimate is negligible. As noted by Babcock et al. (2003), most work on the properties of estimates derived from observer programs have focused on the variance component, with far fewer studies examining bias. For reasons described in detail below, we believe that estimating the bias of the first type is more difficult than intimated by Babcock et al. (2003). It is nonetheless important to try to estimate this quantity. Focusing on the precision part of the MSE in certain analyses does not imply that bias is unimportant, or that it should be dismissed as insolvable as suggested by Babcock et al. (2003)

A critical element of the arguments developed by Babcock et al. (2003) appears to be that increasing the number of trips sampled will, by itself, reduce bias of the first type. This assertion, if true, is important. However, no corroborative evidence is provided. The argument is that fishermen will change behavior if they are subjected to a higher probability of being included in a sample, or of being sampled more frequently by observers. In essence, fishermen will be less likely to fish in a non-typical manner when an observer is on board if the probability of selection is higher. This may not be true if say a particular fishing trip has a 20% chance of being selected vs. a 10% chance and if the fishermen do not know in advance how many trips they may have to accommodate within a specified time period. In any event, we doubt that this can be calculated unless a model of human behavior is part of the estimation procedure.

Babcock et al. (2003) report that Sampson (2002) detected statistically significant differences between a multivariate indicator of landings composition by participants in the Enhanced Data Collection Project (EDCP) of the Oregon Department of Fish and Wildlife and the composition of landings by the entire groundfish trawl fleet. This analysis is used to indicate that biases exist in voluntary programs such as the EDCP and that it is possible to use similar approaches to identify bias in observer programs in general. What Babcock et al. do not report is that Sampson indicated that the multivariate analysis employed (Principal Components Analysis) was only “moderately successful” in capturing the properties of the data. The first three principal components accounted for 15.4, 12.0, and 8.0 % of the variance `respectively for trips landing more than 10,000 lbs in which hake comprised less than 50% of the total (designated “Big” trips by Sampson). For trips less than 10,000 lbs in which hake comprised less than 50% of the total (“Small” trips), the first three principal components accounted for 13.7, 10.4, and 9.0% of the variance. Sampson (2002) reported significant differences between the participants in the EDCP and the total fleet in the 1st and 3rd principal components for both Big and Small trips and concluded that the EDCP fleet may not be representative of the entire fleet. However, because the first three PCs captured only a moderate fraction of the variance, these analyses should be viewed with caution. It is worth noting that Sampson provided canonical variable plots of PCA 1 against PCA 2 (Figure 6a and 6b of his report) in which both the information from the EDCP and the whole fleet are superimposed and these show that the data from the EDCP do not appear to be markedly different from the total fleet. A truly important bias should show up clearly in these plots, which take into account more of the variance of the samples than the individual t-tests actually used in the report.

The general issue of testing for bias in observer data using landings data raises some important questions concerning the inferences that can be drawn. In particular, if no significant differences are detected between observer and landings data, this does not guarantee that there is no bias in the estimates of discards.

The other major source of information that could be used to test the representativeness of observer data is to test against self-reported estimates by fishermen. Sampson (2002) made such an analysis for the EDCP data and detected differences. In this case, it was inferred that the self-reported estimates were not accurate. In contrast, Liggens (1997) found no differences between observer data for catch and discards against fleet wide estimates. In general, self-reported estimates are rightly viewed with caution and this is the most commonly available type of discard information against which to compare observer data.

To deal with logistical constraints and their effect on observer programs, Babcock et al. (2003) cite the work of Cotter et al. (2002) using a probability proportional to size (PPS) sampling allocation procedure. However, Cotter et al. (2002) concluded that this approach did not markedly improve the performance of the estimators.

Babcock et al. (2003) refer to the method of collapsing strata as an *ad hoc* procedure when, in fact, it is a very well established method (see Cochran 1977). Bias can occur using this method if an investigator deliberately chooses similar strata to combine. However, methods in which objective rules for combining strata are employed are much less likely to cause bias.

Babcock et al. (2003) assert that Fogarty and Gabriel (2002) assumed that the sampling fraction did not matter. In fact, Fogarty and Gabriel (2002) noted that the sampling fraction does affect the precision of the estimate through the finite population correction factor. The effect indicated by Babcock et al. (2003) is a very well established property of the statistical estimators employed. Fogarty and Gabriel (2002) noted in their analysis that "Ignoring the finite population correction factor results in an overestimate of the standard error…" Fogarty and Gabriel (2002) did not include the FPC in their estimates so as to provide a conservative estimate of the variance (e.g. biased on the high side). This is very different than assuming that the sampling fraction does not matter.

Recommendations made by the NMFS National Working Group on Bycatch (NMFS 2004) largely address the issues of major concern – the importance of obtaining representative sampling, careful consideration of stratification, etc. We recommend that information from observer trips (catch, trip duration, number of hauls/tows, fishing location etc.) also be checked against independent sources of information to see if differences can be detected. The only solution that Babcock et al. (2003) provide when such a bias is detected is to increase the number of trips covered by observers. As noted above, this may or may not be effective. Other solutions to the problem need to be explored, as well as increasing observer coverage when analyses indicate it is cost-effective to do so given finite resources and competing programmatic needs.

An Evaluation of Bias in the Northeast Fisheries Observer (Sea Sampling) Program

Several tests were conducted to address the potential sources of bias. We compared several measures of performance for vessels with and without observers present. Bias can arise if the observed trips within a stratum are not representative of the other vessels within the stratum. Such bias could arise if the vessels with observers on board consistently catch more or less than other vessels, if the average trip durations change, or if vessels fish in different areas. Each of these hypotheses was tested by comparing observable properties in strata having data from vessels with and without observers.

All vessels are required to report the total trip landings, the number of days absent from port, and the primary statistical area fished. Average catches (pounds landed) for observed and total trips compare favorably (Figure 5), and follow an expected linear relationship. If the observed and unobserved trips within a stratum measure the same underlying process, one would expect no statistical difference in the average catches (and the standard deviations) between the VTR and observer data sets. An examination of the distribution of these differences (Figures 6A and 6B) indicates no evidence of systematic bias. The mean difference of 238 pounds in average catch rates between the two data sets is not significantly different from zero ($p=0.59$, $df=84$). As well, a paired t-test of the stratum specific standard deviations of pounds kept showed no significant difference from zero ($p=0.08$). A strong correlation was detected in trip duration between observed and unobserved trips (Figure 7), with observed trips averaging about a half-day longer ($p = 0.01$) (Figure 8A). However, the difference in stratum specific standard deviations of trip length was not significantly different from zero ($p = 0.60$) (Figure 8B). Some skewing of the differences in mean trip durations is evident, with observed trips being slightly longer.

Two measures of spatial coherence were also examined. Within stratum $\mathbf{h}$ the expected number of observer trips by statistical area $\mathbf{j}$ as the product of the proportion of VTR trips in Statistical Area $\mathbf{j}$ and stratum $\mathbf{h}$ ($\mathbf{V_{jh}}$) and the number of observed trips in stratum $\mathbf{n_h}$. Thus, $\mathbf{E_{jh} = V_{jh} * n_h}$. These expectations can then be compared to the actual frequencies ($\mathbf{O_{jh}}$) of observed trips by statistical area. Results of these analyses indicate that the spatial distribution of fishing effort for trips with observers on board closely matches the spatial distribution of trips for the stratum as a whole (Table 4). It was possible to compute chi-square statistics for 65 strata. The null hypothesis of observer proportions equal to VTR proportions was rejected ($P<0.05$) in 20 of the 65 comparisons. Of these 20 cases, 11 were from ports in Southern New England and Mid-Atlantic states. Of the remaining nine cases, five involved the large and extra-large gill net fisheries that land both groundfish and monkfish. Thus, the null hypothesis of equivalent spatial distribution of sampling was rejected in only 4 of 50 cases, a rejection rate only slightly higher than expected from chance alone.

As a final measure of the potential spatial bias, a paper by Murawski et al. (2005 in press) is instructive. In this paper, information is presented on the spatial distribution of otter trawl fishing effort for vessels with Vessel Monitoring Systems (VMS) and compared with the distribution of fishing effort from observed trips (Figure 9). Qualitatively, the spatial distributions match very well with high concentrations of effort near the boundaries of existing closed areas on Georges Bank and within the Gulf of Maine. Moreover, the effort concentration profiles deduced from VMS data coincide almost exactly with the profiles derived from the observed trips. Overall, these comparisons suggest strong coherency between these two independent measures of fishing locations.

Sources of Uncertainty

In the Northeast, every effort is made to ensure representative observer coverage. This is accomplished by stratifying the fleet into homogeneous spatial, temporal and gear groups and by randomly selecting vessels from these strata. Stratification and randomization of sampling units are basic principles of survey design (e. g. Cochran 1977; Thompson 2002) and have been used in previous studies of bycatch to improve both "knowledge of the fleet" (Cotter et al. 2002) and precision of estimates (Allen et al. 2002; Borges et al. 2004). VTR data are used to produce a list of fishing vessels, by quarter and fleet sector. The vessel list contains a randomly ordered list of all vessels that participated in each fleet sector. To obtain a representative sample of the fleet, the NEFOP Area Coordinators use this vessel list, in addition to their local knowledge of fleet activity, to identify vessels on which to place observers. Vessels are required to take an observer if requested to do so. The NEFOP has standard protocols regarding vessel selection. A vessel, using the same gear, is not observed more than twice in the same month— this prevents repeated observations from the same vessel. The NEFOP Area Coordinators have protocols for documenting refusals; a refusal occurs when a vessel owner/captain is asked to take an observer and the owner/captain declines — or agrees but does not follow through (i.e. the vessel leaves the dock without the observer on board). Refusals are forwarded to Law Enforcement. A vessel owner can be prosecuted for failing to take an observer.

An objective process is used for imputation of missing values in unsampled strata. The imputation methodology helps identify gaps in sampling strategy and is an important component for ongoing improvements of the survey design. Stratoudakis et al. (1999) employed a post-stratification technique of "collapsing strata" as a way of dealing with unsampled strata. Our method of imputing means and variances for unsampled strata builds on this approach by utilizing information in comparable strata as a basis for initial sample allocation. Imputation represents a tradeoff between a realistic survey consistent with known fishing patterns and a less realistic pooled survey. Excessive imputation, however, can be indicative of an overly ambitious stratification approach; utilizing the observer data at an unrealistically fine temporal or spatial scale (say daily estimates in a small area) not only leads to an excessive extrapolation, but also violates the premise that observations in the current year are sufficient to predict patterns in the following year.

Persistence of annual patterns is critical to the estimation of an 'optimal' scheme. As regulations change and fishing patterns shift, using data based on fleet activity in the preceding year may be problematic. Using the current year's fishing activity pattern to predict future fishing patterns within strata cannot account for changes induced by variations in resource abundance, revenues, or management regimens. In a study of discards in the North Sea, Statoudakis et al. (1998)

reported immediate increases in discarding rates following increases in minimum size limits, but noted consistent patterns over time and among gears for higher value species such as cod and haddock. Without a predictive model of human behavior, it is not possible to anticipate fine-scale changes in fishing patterns. Rochet et al. (2002) were unable to find reliable predictor variables for prediction of bycatch but it should be noted that their study examined only 26 trips, about two orders of magnitude less than the number of trips considered in this report.

A related source of uncertainty is the ability to make inferences about specific species, stocks or age groups. Our evaluation of the Northeast Observer Program considers discard to kept ratios at the level of species groups. This approach is consistent with recent literature (Allen et al. 2001, Borges et al. 2004). An optimal strategy for New England Groundfish as a group however, will not necessarily be optimal for age 2 haddock on Georges Bank. The precision of discard information required at this level will typically exceed the nominal levels predicted as a result of optimal sampling. Figure 10 illustrates the relationship between the coefficient of variation for the overall New England groundfish discard ratio estimate as a function of total observer days allotted to this fishery. Assuming that 2,708 sea days can be allocated in an optimal manner in 2005, the predicted CV of the d/k ratio is well below 4%. The predicted CV drops to 2.5% at about 4,000 days and drops to about 1% at 20,000 days (about 50% coverage). The continuously decreasing slope of the relationship between CV and observer sea days reflects the reduced effectiveness of additional days as a way of improving overall precision.

Several important points are relevant to the interpretation of Figure 10. First, any non-optimal allocation of sampling effort will tend to increase the overall CV of the d/k ratio. Non-optimal allocations occur when the desired sampling plan cannot be followed, or when the pattern of landings among the strata in the current year differs from the pattern used as a basis for the optimal allocation scheme. Second, the CV of the overall d/k ratio is smaller than the precision of the individual components. Thus, the CV of the d/k ratio for a particular gear type or for a d/k ratio based on a finer temporal or spatial scale will generally be greater than the composite estimate. This property is illustrated in Figures 11 and 12 for quarterly estimates in the New England groundfish otter trawl and gillnet fisheries, respectively. Note that the number of observed otter trawl trips would need to be tripled to reduce the CV of the d/k ratio from 20% to 10%.

The coefficient of variation (CV) of the d/k ratios for New England groundfish are well below the 20% - 30% CV range established by the Atlantic Coastal Cooperative Statistics Program (ACCSP) for high priority commercial fisheries (ACCSP 2001) and by NMFS's National Working Group on Bycatch (NWGB) (NMFS 2004). The NWGB recommends: "For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30% CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch then the recommended goal for estimates of total catch is a CV of 20-30% (NMFS 2004). Assuming that landings are known without error, the precision of estimated total discard for New England groundfish equals the precision of the d/k ratio for this fishery.

A decrease in precision of the d/k ratio is also expected for any single species analysis. For example, the CV of the d/k ratio for haddock alone will probably be much greater than the CV of the d/k ratio for the overall groundfish complex. Once again, it is important to remember that the sampling program must be based on observable properties of the strata, not on the outcome of the experiment. Any efforts to improve the precision of the d/k ratio for a single species will come at the expense of reduced precision for other species. Moreover, oversampling of a particular group of vessels may introduce undesirable properties (e.g., repeat trips on a single vessel) that can make the sampling less representative.

An exact definition of an acceptable level of bias and precision depends on the objectives of the analyses and the levels of acceptable risk to the fishery resource and the fishery. The acceptable level of risk must be defined externally by managers but should, at a minimum, consider the risk of stock collapse if management actions are compromised by imprecise information on discards. From the analyses presented in this report, it would appear that the level of precision is high for the groundfish resource as a whole and that there little evidence of bias in the discard rates.

Presently the optimization model uses aggregate d/k ratios, which are appropriate for most fisheries; however, for other fisheries, d/e ratios are more appropriate. The optimization algorithm can handle datasets containing either type of ratio, but not both in the same set (without external weighting). Input data sets with d/e ratios have been developed, but have not yet been incorporated into the overall process. A comparison of the precision of alternative estimators of discard ratios is the subject of ongoing research.

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Table 1. The variables, their description, their associated species group, data source, and units of the input data set of the optimization algorithm.

Variable Name	***Definition***	***Species Group***	***Data Source***	***Units***
year	Year			categories
negear	gear type			categories
qtr	quarter of year			number
mesh	mesh size			categories
region	state grouping, port of departure			categories
trp	Trip Duration (days)			categories
alltrips	Total number of trips, all species	ALL	VTR	trip
allmnda	Ave number of days absent, all species	ALL	VTR	days
vcount	Total number of VTR trips for 3 sp. Groups	3 Sp Grp	VTR	trip
ocount	Total number of observed trips that caught one or more of the 3 sp groups	3 Sp Grp	VTR	trip
vnegfntrips	Number of VTR trips that caught NEGF	NEGF	VTR	trip
vgfda	Total VTR days absent for trips that caught Groundfish	NEGF	VTR	days
vgftotal	Total VTR pounds(all sp) landed for trips landing groundfish	NEGF	VTR	pounds
vgflb	VTR pounds landed—groundfish	NEGF	VTR	pounds
vgfmnda	VTR average days absent—groundfish	NEGF	VTR	days
onegf	Sum of the "0/1 flags" for observed trips that caught NEGF	NEGF	OBS	trip
ogfntrips	Number of observed trips that caught NEGF	NEGF	OBS	trip
ogfparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	NEGF	OBS	flag
ogfnewcv	Desired CV closest to 0.30--intermediate value	NEGF	OBS	number
ogfnewntrips	Number of Observed trips necessary to achieve CV=ogfxnewcv	NEGF	OBS	trip
ogfxnewcv	Desired CV=0.30 --exact value	NEGF	OBS	number
ogfavgtriplen	Ave Trip Length in days for observed trips	NEGF	OBS	days
ogfntows	Number of observed Tows	NEGF	OBS	tows
ogfksums	Kept—observed	NEGF	OBS	pounds
ogfdsums	Discarded—observed	NEGF	OBS	pounds
ogfdkratio	d/k ratio	NEGF	OBS	number
ogfse	SE of d/k ratio	NEGF	OBS	number
ogfcv	CV of mean d/k ratio	NEGF	OBS	number
ogfseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	NEGF	OBS	days
ogfndays	Number of observed days	NEGF	OBS	days
vfsbntrips	Number of VTR Trips that caught FSB	FSB	VTR	trip
vfsbda	Total VTR days absent for trips that caught FSB	FSB	VTR	days
vfsbtotal	Total VTR pounds (all sp) landed for trips landing FSB	FSB	VTR	pounds
vfsblb	VTR pounds landed—FSB	FSB	VTR	pounds
vfsbmnda	VTR average days absent—FSB	FSB	VTR	days
ofsb	Sum of the "0/1 flags" for observed trips that caught FSB	FSB	OBS	trip
ofsbntrips	Number of observed trips that caught FSB	FSB	OBS	trip
ofsbparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	FSB	OBS	flag
ofsbnewcv	Desired CV closest to 0.30--intermediate value	FSB	OBS	number
ofsbnewntrips	Number of Observed trips necessary to achieve CV=ofsbxnewcv	FSB	OBS	trip
ofsbxnewcv	Desired CV=0.30 --exact value	FSB	OBS	number

ofsbavgtriplen	Ave Trip Length in days for observed trips	FSB	OBS	days
ofsbntows	Number of observed Tows	FSB	OBS	Tows
ofsbksums	Kept—observed	FSB	OBS	pounds
ofsbdsums	Discarded—observed	FSB	OBS	pounds
ofsbdkratio	d/k ratio	FSB	OBS	number
ofsbse	SE of d/k ratio	FSB	OBS	number
ofsbcv	CV of mean d/k ratio	FSB	OBS	number
ofsbseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	FSB	OBS	days
ofsbndays	Number of observed days	FSB	OBS	days
vmonkntrips	Number of VTR Trips that caught Monk	Monk	VTR	trip
vmonkda	Total VTR days absent for trips that caught monk	Monk	VTR	days
vmonktotal	Total VTR pounds (all sp) landed for trips landing Monkfish	Monk	VTR	pounds
vmonklb	VTR pounds landed---Monk	Monk	VTR	pounds
vmonkmnda	VTR average days absent—Monk	Monk	VTR	days
omonk	Sum of the "0/1 flags" for observed trips that caught Monkfish	Monk	OBS	trip
omkntrips	Number of observed trips that caught Monk	Monk	OBS	trip
omkparent	Flag indicating if values of d/k are observed (=1) or imputed (=0)	Monk	OBS	flag
omknewcv	Desired CV closest to 0.30--intermediate value	Monk	OBS	number
omknewntrips	Number of Observed trips necessary to achieve CV=omkxnewcv	Monk	OBS	trip
omkxnewcv	Desired CV=0.30 --exact value	Monk	OBS	number
omkavgtriplen	Ave Trip Length in days for observed trips	Monk	OBS	days
omkntows	Number of observed Tows	Monk	OBS	Tows
omkksums	Kept—observed	Monk	OBS	pounds
omkdsums	Discarded—observed	Monk	OBS	pounds
omkdkratio	d/k ratio	Monk	OBS	number
omkse	SE of d/k ratio	Monk	OBS	number
omkcv	CV of mean d/k ratio	Monk	OBS	number
omkseadays	Number of sea days needed to achieve CV=0.3 (=avg triplen x newntrips)	Monk	OBS	days
omkndays	Number of observed days	Monk	OBS	days
onegfcpue	Observer Catch(kept) per unit effort (lbs/day) for NEGF	NEGF	OBS	lbs/day
ofsbcpue	Observer Catch (kept) per unit effort (lbs/day) for FSB	FSB	OBS	lbs/day
omkcpue	Observer Catch (kept) per unit effort (lbs/day) for Monk	Monk	OBS	lbs/day
alltotal	Total number of pounds of all species landed in this cell	ALL	VTR	pounds
vnegfcpue	VTR Landings per unit effort (lbs/day) for NEGF	NEGF	VTR	lbs/day
vfsbcpue	VTR Landings per unit effort (lbs/day) for FSB	FSB	VTR	lbs/day
vmkcpue	VTR Landings per unit effort (lbs/day) for Monk	Monk	VTR	lbs/day
L_negf%	Fraction of NEGF landings in stratum h	NEGF	VTR	unitless
L_fsb%	Fraction of FSB landings in stratum h	FSB	VTR	unitless
L_monk%	Fraction of Monk landings in stratum h	Monk	VTR	unitless
Nh_negh%	Fraction of NEGF trips in stratum h	NEGF	VTR	unitless
Nh_fsb%	Fraction of FSB trips in stratum h	FSB	VTR	unitless
Nh_monk%	Fraction of Monk trips in stratum h	Monk	VTR	unitless
I(L_negf%)	Indicator {0,1} for Fraction of NEGF landings in stratum h	NEGF	VTR	switch
I(L_fsb%)	Indicator {0,1} for Fraction of FSB landings in stratum h	FSB	VTR	switch
I(L_monk%)	Indicator {0,1} for Fraction of Monk landings in stratum h	Monk	VTR	switch
sum(I(L_all%))	Indicator {0,1} for composite landings. =0 if all species specific indicators=0,else 1	3 Sp Grp	VTR	switch
I(Nh_negf%)	Indicator {0,1} for Fraction of NEGF trips in stratum h	NEGF	VTR	switch
I(Nh_fsb%)	Indicator {0,1} for Fraction of FSB trips in stratum h	FSB	VTR	switch

I(Nh_monk%)	Indicator {0,1} for Fraction of Monk trips in stratum h	Monk	VTR	switch
sum(I(Nh_all%)	Indicator {0,1} for composite TRIPS. =0 if all species specific indicators=0,else 1	3 Sp Grp	VTR	switch
I(onegfcpue)	Indicator {0,1} for observer CPUE in stratum h for NEGF. 1=> exceeds threshold, else 0	NEGF	OBS	switch
I(ofsbcpue)	Indicator {0,1} for observer CPUE in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	OBS	switch
I(omkcpue)	Indicator {0,1} for observer CPUE in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	OBS	switch
I(vnegfcpue)	Indicator {0,1} for VTR CPUE in stratum h for NEGF. 1=> exceeds threshold, else 0	NEGF	VTR	switch
I(vfsbcpue)	Indicator {0,1} for VTR CPUE in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	VTR	switch
I(vmkcpue)	Indicator {0,1} for VTR CPUE in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	VTR	switch
I(d/k_negf)	Indicator {0,1} for Obsvr d/k ratio in stratum h for NEGF. 1=> exceeds threshold,else 0	NEGF	OBS	switch
I(d/k_fsb)	Indicator {0,1} for Obsvr d/k in stratum h for FSB. 1=> exceeds threshold, else 0	FSB	OBS	switch
I(d/k_monk)	Indicator {0,1} for Obsvr d/k in stratum h for Monk. 1=> exceeds threshold, else 0	Monk	OBS	switch
Total VTR 3spgroup	Sum of landings by strata for each species group	3 Sp Grp	VTR	switch
%Total VTR 3 group	Percent of landings of sum of 3 sp groups in strata	3 Sp Grp	VTR	switch
I(%TotVTR_3sp)	flag for total landings of 3 species groups	3 Sp Grp	VTR	switch
ogfimp_level	Indicator {0,1,2,3} of imputation level	NEGF	OBS	category
ofsbimp_level	Indicator {0,1,2,3} of imputation level	FSB	OBS	category
omonkimp_level	Indicator {0,1,2,3} of imputation level	Monk	OBS	category

Table 2. Number of trips, by strata, in the Fishing Vessel Trip Reports (VTR) and Northeast Fisheries Observer Program (NEFOP) data sets used in the 2005 sea day optimization.

				QUARTER							
				1		2		3		4	
Region	**Gear**	**Mesh**	**Trip length**	VTR	NEFOP	VTR	NEFOP	VTR	NEFOP	VTR	NEFOP
DE/MD	Otter Trawl	Large	day			95	0	188	0	52	0
			multi-day	17	0	31	0	8	1	21	0
		Medium	day							1	0
			multi-day	8	2	5	0			5	0
		Small	day	3	0	14	0	3	0	24	0
			multi-day			1	0				
	Gillnet	Medium		1	0	1	0				
		Small		4	0	1	0	1	0		
		XLarge		12	0	19	0	2	0	8	0
ME_NH	Longline	None		20	0	68	0	6	0	5	0
	Otter Trawl	Large	day	187	0	102	2	512	6	568	1
			multi-day	315	9	279	5	479	9	439	15
		Medium	day							1	0
			multi-day			1	0				
		Small	day					1	1	1	0
			multi-day							1	0
		XLarge	day			3	0	1	0	10	0
			multi-day	1	0						
	Gillnet	Large		75	0	242	0	823	10	375	3
		Medium								1	0
		None				1	0	10	0	1	0
		Small						3	0		
		XLarge		19	0	77	0	573	14	247	0
N_MA	Longline	None		407	6	28	1	186	0	243	0
	Otter Trawl	Large	day	789	20	739	21	2015	54	1232	34
			multi-day	501	7	382	13	551	10	613	9
		Medium	day			11	1	1	0		
			multi-day			2	4	3	0	2	1
		Small	day	13	0	119	2	3	1	15	2
			multi-day	12	2	57	2	3	3	15	2
		XLarge	day			1	0				
			multi-day					2	0	1	0
	Gillnet	Large		1061	81	367	83	1481	94	1024	64
		Medium		1	0					2	0
		None		2	0	1	0	22	0	1	0
		Small		4	0	1	0	3	0	8	0
		XLarge		191	11	174	37	694	33	540	35
NC/VA	Otter Trawl	Large	day	2	0	5	0			3	0
			multi-day	542	17	117	0			226	3
		Medium	day	4	0	3	0				
			multi-day	35	7	20	0			15	2
		Small	multi-day	12	4	4	0	2	0	13	0
		XLarge	multi-day	4	0	4	0				
	Gillnet	Large		9	0	46	0	11	0	43	0
		Medium		19	0	5	0			10	0
		Small		2	0	8	0	4	1	15	0
		XLarge		38	0	161	0			35	0
NJ/NY	Longline	None		45	0	5	0				
	Otter Trawl	Large	day	426	4	1878	6	936	0	847	0
			multi-day	342	4	421	3	580	0	199	1
		Medium	day	13	1	267	21	464	5	458	4
			multi-day	170	22	42	5	4	1	64	3
		Small	day	29	0	629	5	894	0	465	0
			multi-day	209	8	99	3	105	1	150	5
		XLarge	day			4	0	31	0	20	0
			multi-day	7	0	2	0	1	0	2	0
	Gillnet	Large				72	0	70	0	29	0
		Medium				49	0	81	0	31	0
		None				2	0			4	0
		Small		2	0	8	0	49	0	51	0
		XLarge		418	0	699	1	166	0	995	0
SNE	Otter Trawl	Large	day	273	2	996	20	1399	2	731	2
			multi-day	571	37	515	8	621	21	525	25
		Medium	day			72	3	41	1	158	2
			multi-day	25	1	19	1	4	2	23	0
		Small	day	11	0	104	6	304	2	333	10
			multi-day	503	12	269	8	188	5	373	7
		XLarge	day			2	0			7	0
			multi-day	3	0	1	0	4	0	11	0
	Gillnet	Large		21	1	124	9	170	3	66	2
		Medium						1	0		
		None		1	0	1	0			1	0
		Small				4	0				
		XLarge		314	13	684	38	202	10	582	28

Table 3. Summary of fleet sectors (strata), by species group, that are imputed (1) and not imputed (0); blank cells indicate no fleet activity.

				QUARTER											
				1			2			3			4		
Region	**Gear**	**Mesh**	**Trip length**	NEGF	FSB	MONK	NEGF	FSB	MONK	NEGF	FSB	MONK	NEGF	FSB	MONK
DE/MD	Otter Trawl	Large	day				0	1	1	0	1	1	0	1	1
			multi-day	0	1	1	0	1	1	0	1	1	0	1	1
		Medium	day										0	1	0
			multi-day	0	0	1	0	1	1				0	1	0
		Small	day	0	1	1	0	1	1	0	1	0	0	1	1
			multi-day				0	1	0						
	Gillnet	Medium		0	1	0	0	1	0						
		Small		0	1	0	0	1	0	0	0	1			
		XLarge		0	0	1	0	1	1	0	0	1	0	0	1
ME_NH	Longline	None		1	0	0	1	0	0	1	0	0	1	0	0
	Otter Trawl	Large	day	1	0	1	0	1	0	0	1	0	1	1	1
			multi-day	0	0	0	0	0	0	0	1	0	0	1	0
		Medium	day										0	1	0
			multi-day				1	0	1						
		Small	day							1	0	0	1	0	1
			multi-day										1	0	1
		XLarge	day				1	0	1	1	0	1	0	0	1
			multi-day	0	0	1									
	Gillnet	Large		1	0	1	1	1	1	0	1	0	0	1	1
		Medium											1	0	1
		None					1	0	1	1	0	1	1	0	1
		Small								1	0	1			
		XLarge		1	0	1	1	1	1	0	0	0	1	1	1
N_MA	Longline	None		0	0	0	1	0	0	1	0	0	1	0	0
	Otter Trawl	Large	day	0	1	0	0	0	0	0	1	0	0	1	0
			multi-day	0	1	0	0	0	0	0	0	0	0	1	0
		Medium	day				1	1	1	1	0	1			
			multi-day				0	0	0	1	0	1	1	0	1
		Small	day	1	0	1	0	0	0	0	1	0	0	0	0
			multi-day	0	1	0	0	1	0	0	0	0	0	0	0
		XLarge	day				0	1	0						
			multi-day							1	0	1	1	0	1
	Gillnet	Large		0	1	0	0	0	0	0	0	0	0	1	0
		Medium		1	0	0							1	0	1
		None		1	0	1	0	0	1	1	0	1	1	0	0
		Small		1	0	0	1	0	1	1	0	1	1	0	1
		XLarge		0	0	0	0	0	0	0	0	0	0	0	0
NC/VA	Otter Trawl	Large	day	0	1	0	0	1	1				1	1	1
			multi-day	0	0	0	0	1	1				1	0	0
		Medium	day	0	1	0	0	1	0						
			multi-day	0	0	0	0	1	1				0	0	1
		Small	multi-day	0	0	0	0	1	1	0	1	0	0	1	0
		XLarge	multi-day	0	1	1	0	1	1						
	Gillnet	Large		0	1	1	0	1	1	0	1	0	0	1	1
		Medium		0	1	1	0	1	1				0	1	1
		Small		0	0	1	0	1	1	0	0	0	0	1	1
		XLarge		0	1	1	0	1	1				0	1	1
NJ/NY	Longline	None		1	0	0	1	0	0						
	Otter Trawl	Large	day	0	0	0	0	0	0	1	1	1	1	1	1
			multi-day	0	0	0	1	0	0	1	1	1	0	1	1
		Medium	day	1	1	0	0	0	0	0	0	0	0	0	0
			multi-day	0	0	0	0	0	0	1	0	0	0	0	0
		Small	day	1	1	1	0	0	0	1	1	1	1	1	1
			multi-day	0	0	0	0	0	0	1	0	0	1	0	0
		XLarge	day				1	1	1	0	1	1	0	1	1
			multi-day	0	1	1	0	0	1	0	1	0	0	1	0
	Gillnet	Large					1	1	1	0	1	1	0	1	1
		Medium					1	1	1	1	1	1	1	1	0
		None					0	1	1				0	1	1
		Small		0	0	1	1	1	0	1	1	0	1	1	1
		XLarge		0	1	1	1	1	1	1	1	1	1	1	1
SNE	Otter Trawl	Large	day	0	0	0	0	0	0	1	0	1	0	0	0
			multi-day	0	0	0	0	0	0	0	0	0	0	0	0
		Medium	day				0	0	1	0	1	1	0	0	0
			multi-day	0	1	1	1	1	1	0	1	0	1	1	1
		Small	day	1	1	1	0	0	0	0	0	1	0	0	0
			multi-day	0	0	0	0	0	0	0	1	0	0	0	0
		XLarge	day				0	1	1				0	1	1
			multi-day	1	1	1	0	1	1	1	0	1	0	1	1
	Gillnet	Large		1	0	1	0	0	0	1	0	1	1	0	1
		Medium								0	1	0			
		None		1	0	1	0	0	1				0	1	0
		Small					0	1	1						
		XLarge		0	0	0	0	0	0	0	0	0	0	0	0

Table 4. Summary of contingency table analyses of spatial distribution of VTR and observed trips. Expected value of observed trips is based on proportions of VTR trips by Statistical Area. Critical value of Chi-Square statistics is based on alpha level of 0.05. Degrees of freedom are based on number of Statistical Areas reported in VTR database.

Quarter	Gear	Mesh	Region	Trip Duration	Chi Sqr Test Statistic	df	Chi Sqr Crit Value	Signif Level
3	Gill Net	Large	ME_NH	all	41.92	6	12.59	0.000
3	Gill Net	XLarge	ME_NH	all	32.19	4	9.49	0.000
3	Gill Net	Large	N_MA	all	36.92	11	19.68	0.000
3	Gill Net	XLarge	NJ/NY	all	20.30	5	11.07	0.001
4	Gill Net	XLarge	N_MA	all	16.89	4	9.49	0.002
4	Gill Net	Large	ME_NH	all	14.76	4	9.49	0.005
4	Gill Net	XLarge	NJ/NY	all	10.46	2	5.99	0.005
2	Gill Net	XLarge	ME_NH	all	12.06	7	14.07	0.098
2	Gill Net	Large	NC/VA	all	3.06	2	5.99	0.216
1	Gill Net	XLarge	NC/VA	all	2.15	2	5.99	0.341
1	Gill Net	Large	SNE	all	0.40	1	3.84	0.527
4	Gill Net	Large	N_MA	all	2.69	4	9.49	0.611
2	Gill Net	Large	N_MA	all	6.10	8	15.51	0.636
2	Gill Net	XLarge	N_MA	all	1.48	3	7.81	0.687
1	Gill Net	XLarge	N_MA	all	1.23	3	7.81	0.746
3	Gill Net	XLarge	N_MA	all	2.29	5	11.07	0.808
1	Gill Net	Large	N_MA	all	1.29	4	9.49	0.862
2	Longline	None	ME_NH	all	1.15	3	7.81	0.764
1	Longline	None	N_MA	all	1.63	7	14.07	0.977
2	Trawl	Large	N_MA	1day	243.29	6	12.59	0.000
2	Trawl	Medium	SNE	2+day	120.00	3	7.81	0.000
3	Trawl	Large	NJ/NY	1day	80.97	13	22.36	0.000
2	Trawl	Large	NJ/NY	1day	61.00	5	11.07	0.000
4	Trawl	Large	ME_NH	2+day	49.91	9	16.92	0.000
1	Trawl	Small	NJ/NY	1day	32.36	3	7.81	0.000
4	Trawl	Medium	NJ/NY	2+day	28.00	2	5.99	0.000
3	Trawl	Large	N_MA	1day	37.19	9	16.92	0.000
4	Trawl	Small	NJ/NY	1day	15.00	2	5.99	0.001
4	Trawl	Small	N_MA	2+day	14.00	2	5.99	0.001
1	Trawl	Large	NC/VA	2+day	29.65	13	22.36	0.005
2	Trawl	Small	DE/MD	1day	8.67	3	7.81	0.034
1	Trawl	Medium	SNE	2+day	4.00	1	3.84	0.046
2	Trawl	Large	NC/VA	2+day	14.28	8	15.51	0.075
2	Trawl	Large	N_MA	2+day	22.66	15	25.00	0.092
2	Trawl	Small	NJ/NY	1day	13.22	8	15.51	0.105
2	Trawl	Large	DE/MD	2+day	13.03	8	15.51	0.111
4	Trawl	Large	SNE	2+day	2.00	1	3.84	0.157
3	Trawl	Large	ME_NH	1day	14.30	10	18.31	0.160
4	Trawl	Large	NC/VA	2+day	19.92	15	25.00	0.175
2	Trawl	Small	NJ/NY	2+day	7.58	5	11.07	0.181
3	Trawl	Small	NJ/NY	1day	1.00	1	3.84	0.317
1	Trawl	Large	SNE	2+day	3.81	4	9.49	0.432
4	Trawl	Small	N_MA	1day	0.60	1	3.84	0.439
2	Trawl	Medium	N_MA	1day	0.50	1	3.84	0.480
4	Trawl	Large	NC/VA	1day	7.45	8	15.51	0.489
2	Trawl	Large	DE/MD	1day	0.41	1	3.84	0.520
4	Trawl	Small	NJ/NY	2+day	8.01	9	16.92	0.533
4	Trawl	Medium	NC/VA	2+day	0.33	1	3.84	0.564
2	Trawl	Small	SNE	1day	1.00	2	5.99	0.607
4	Trawl	Large	N_MA	1day	5.25	7	14.07	0.630
1	Trawl	Small	N_MA	2+day	1.67	3	7.81	0.644
1	Trawl	Large	NJ/NY	1day	3.08	5	11.07	0.687
4	Trawl	Large	NJ/NY	2+day	0.71	2	5.99	0.700
1	Trawl	Large	N_MA	1day	6.29	10	18.31	0.790
3	Trawl	Large	ME_NH	2+day	3.02	6	12.59	0.807
4	Trawl	Large	N_MA	2+day	5.87	10	18.31	0.826
1	Trawl	Large	N_MA	2+day	1.08	4	9.49	0.897
1	Trawl	Large	ME_NH	1day	3.40	8	15.51	0.907
3	Trawl	Large	N_MA	2+day	2.06	6	12.59	0.914
1	Trawl	Large	NJ/NY	2+day	2.00	6	12.59	0.920
4	Trawl	Large	ME_NH	1day	0.39	3	7.81	0.943
2	Trawl	Large	ME_NH	2+day	4.43	11	19.68	0.956
1	Trawl	Large	ME_NH	2+day	0.85	6	12.59	0.991
3	Trawl	Large	DE/MD	1day	0.81	6	12.59	0.992
2	Trawl	Large	ME_NH	1day	1.67	9	16.92	0.996

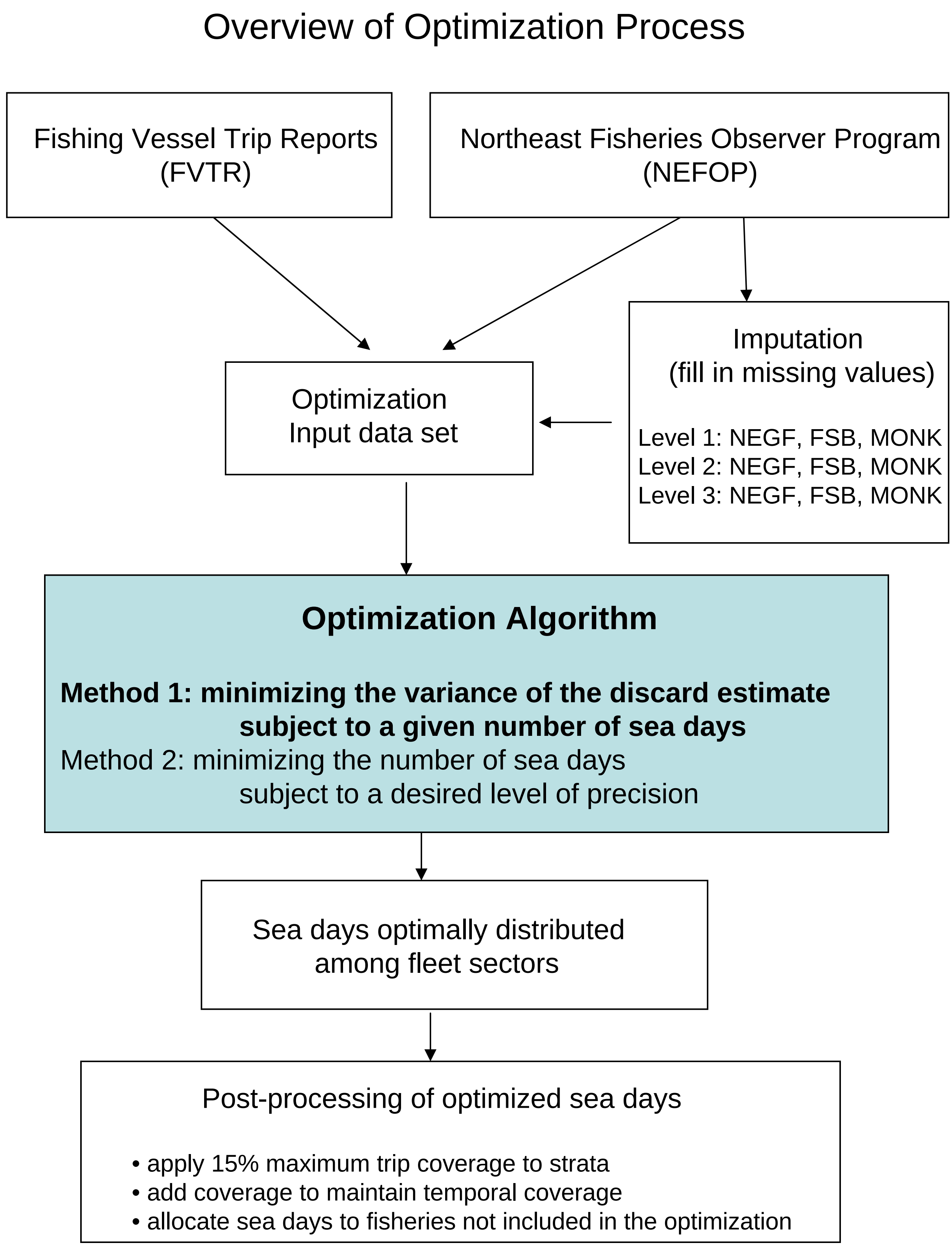
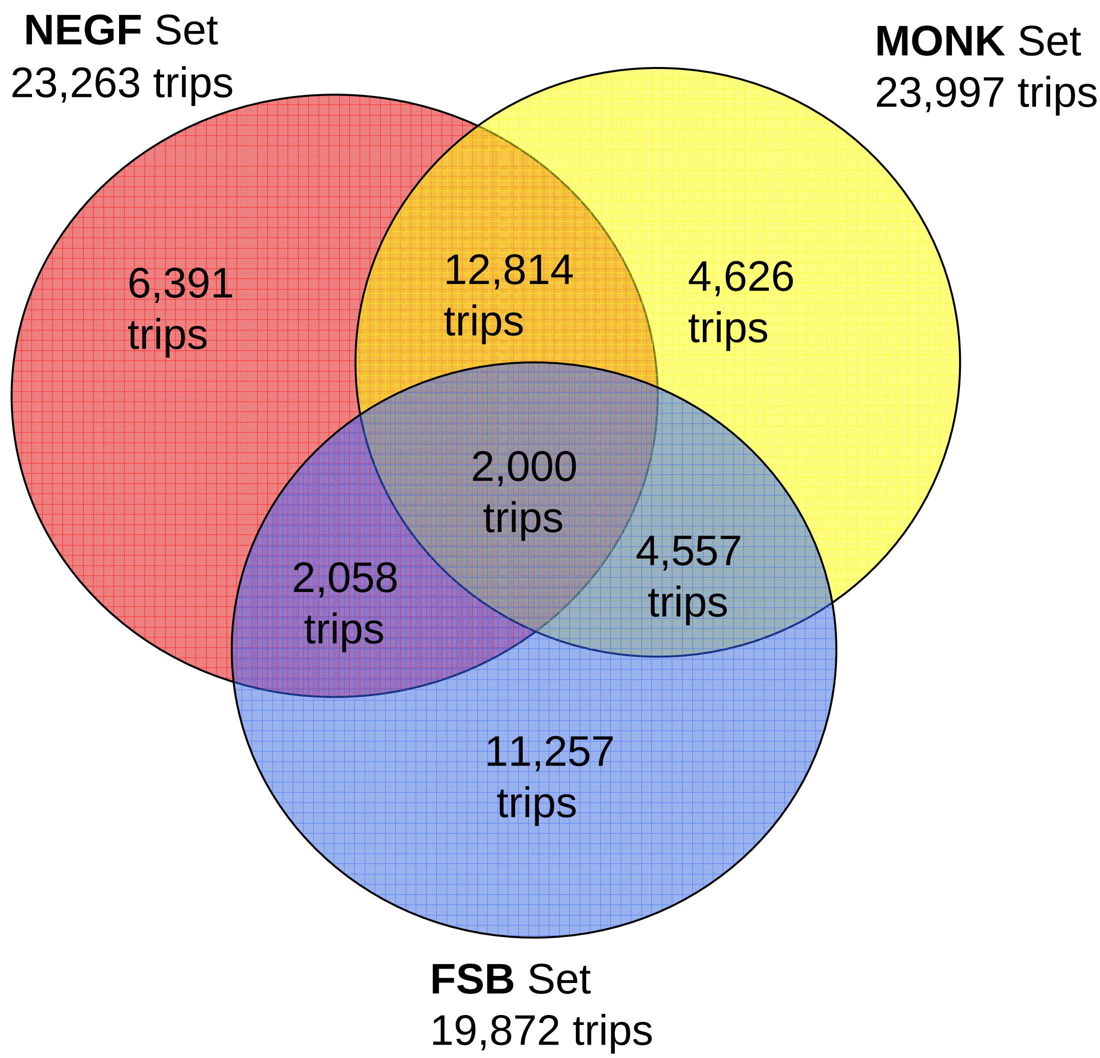


Figure 1. An overview of the optimization process used to allocate sea days to fisheries in the Northeast region.

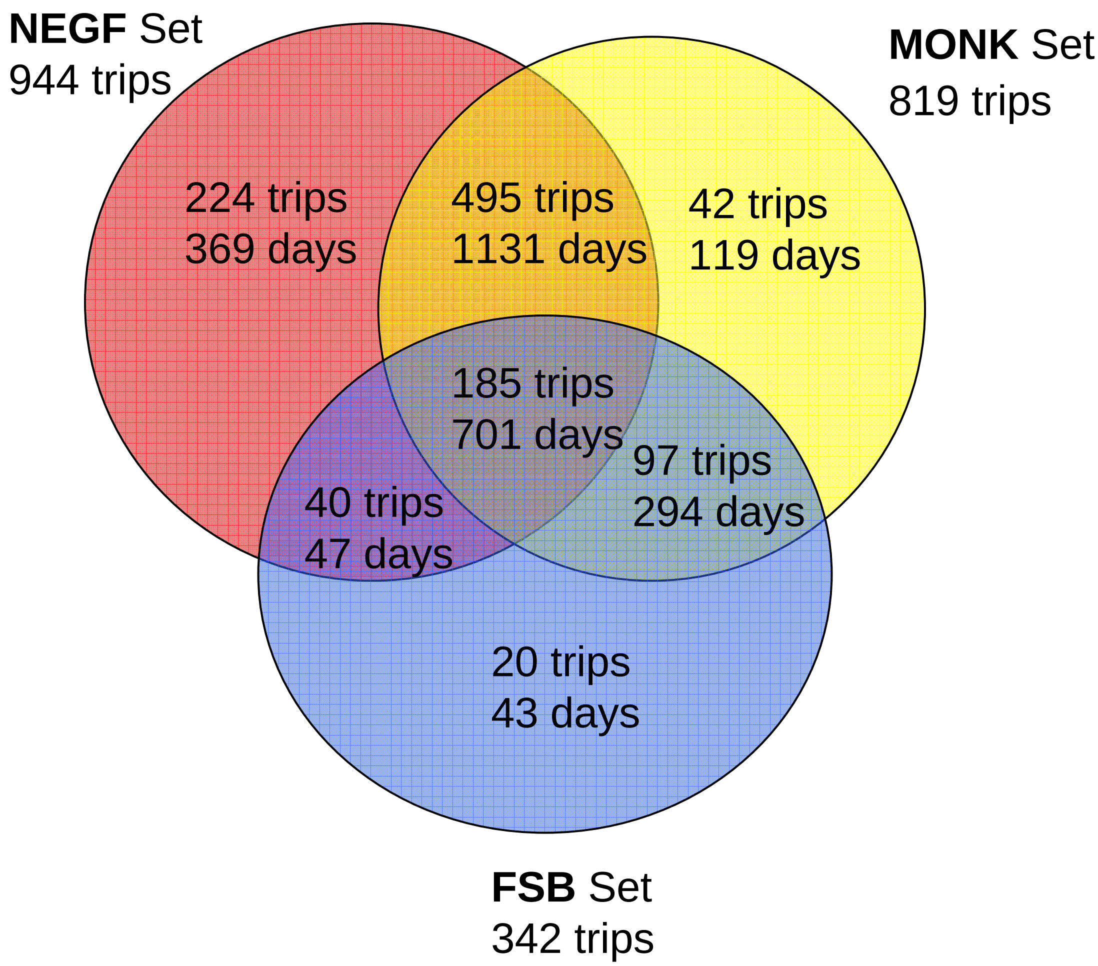
Number of trips in 2003/2004 VTR data subsets for otter trawl, gillnet and longline trips
(43,703 trips)



Total Unique Trips: 43,703
Total Trips with Overlap: 21,429
Sum of Trip Sets: 67,132

Figure 2. Number of trips in the 2003/2004 Vessel Trip Report (VTR), by data subsets (New England groundfish -NEGF; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

Number of trips and sea days
in the 2003/2004 Observer data subsets
for otter trawl, gillnet and longline trips
(1,103 trips and 2,704 sea days)

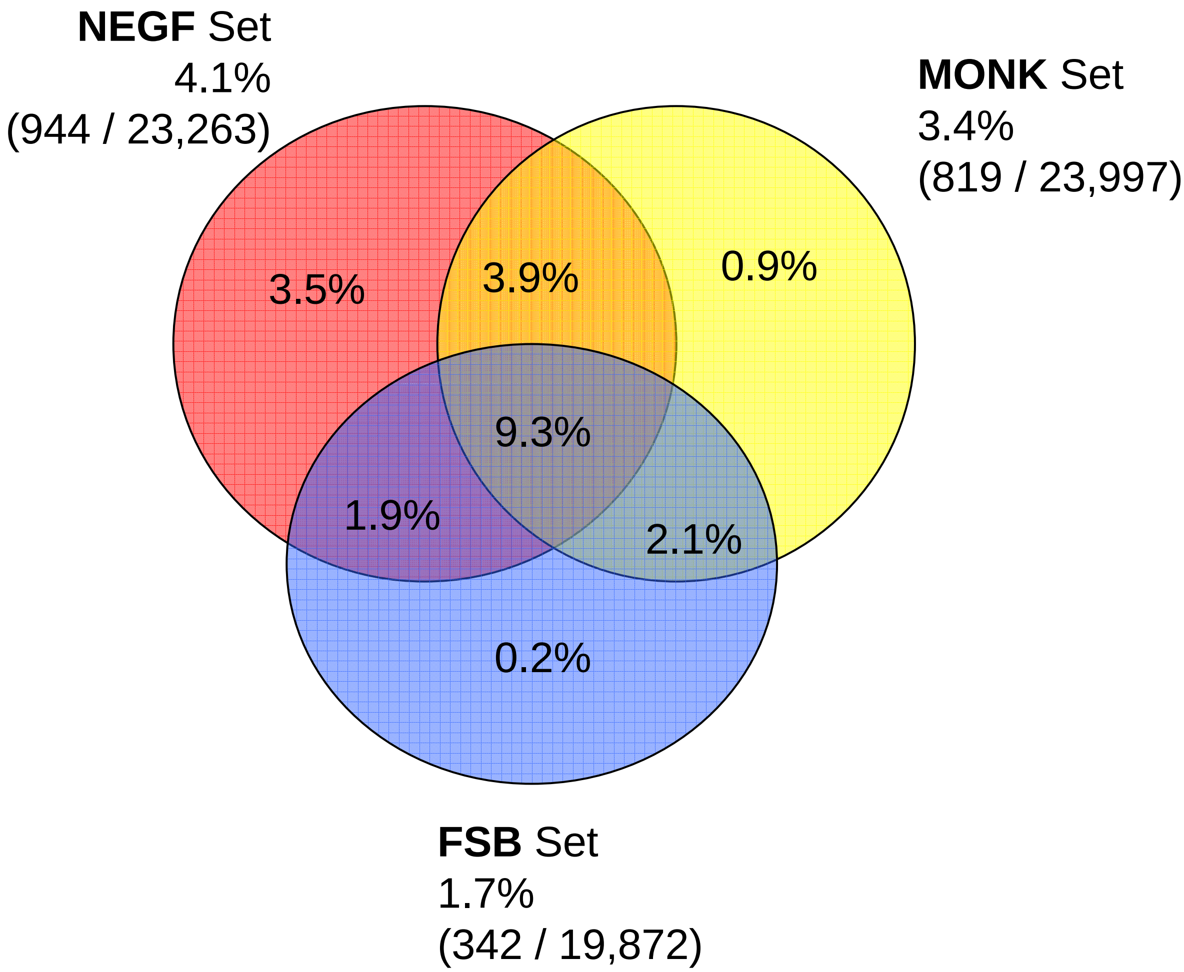


Total Unique Trips: 1,103
Total Trips with Overlap: 817
Sum of Trip Sets: 2,105

Figure 3. Number of trips and sea days in the 2003/2004 Northeast Fisheries Observer Program, by data subsets (New England groundfish - NEFG; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

Sampling Fraction: 2003/2004 Observer trips/VTR trips for otter trawl, gillnet and longline trips

(43,703 unique trips)



Total Unique Trips: 2.5% (1,103 / 43,703)
Total Trips with Overlap: 3.8% (817/ 21,429)
Sum of Trip Sets: 3.1% (2,105 / 67,132)

Figure 4. The sampling fraction of 2003/2004 Observed trips to Vessel Trip Report trips, by data subset (New England groundfish - NEGF; Monkfish - MONK; and summer flounder, scup and black sea bass - FSB) for otter trawl, gillnet and longline trips.

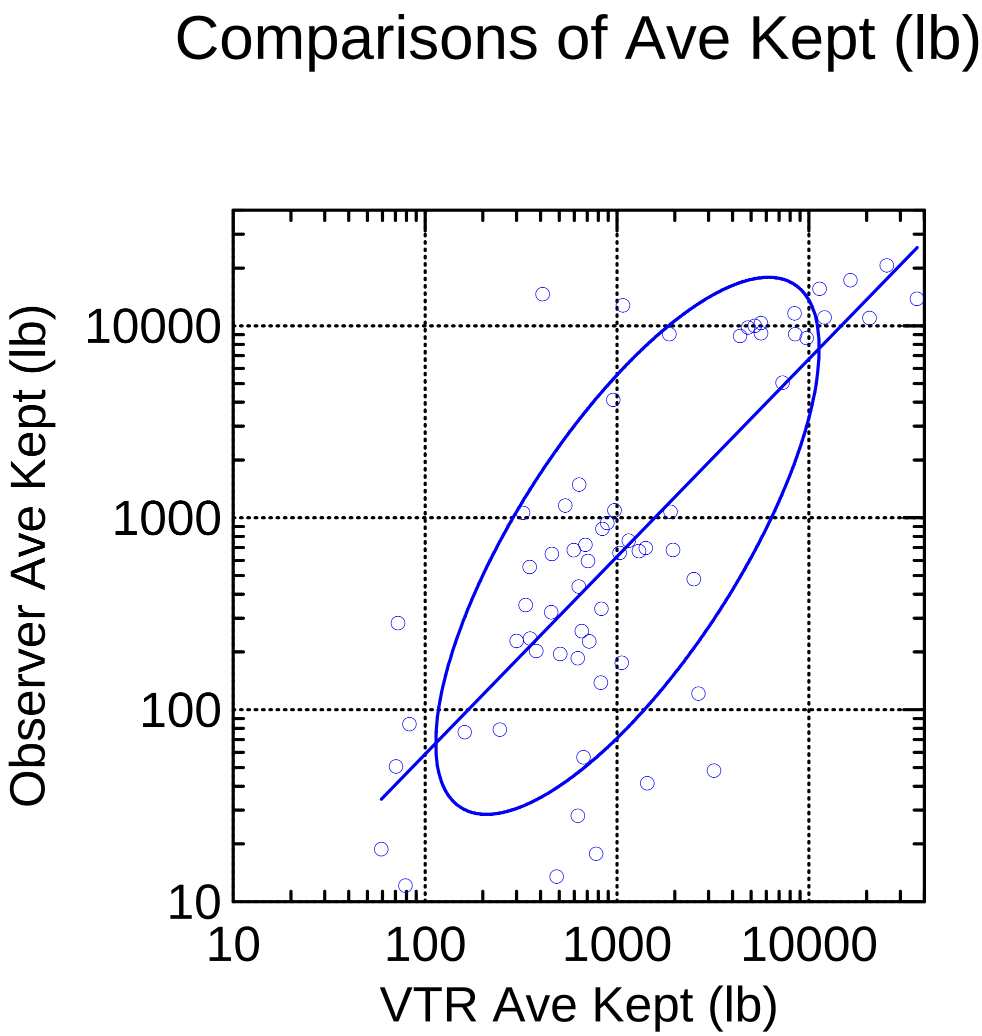


Figure 5. Comparison of average kept pounds of groundfish (natural log scale) in the Northeast Fisheries Observer Program and Vessel Trip Report data sets for 2003/2004. Each point represents the mean of an individual stratum.

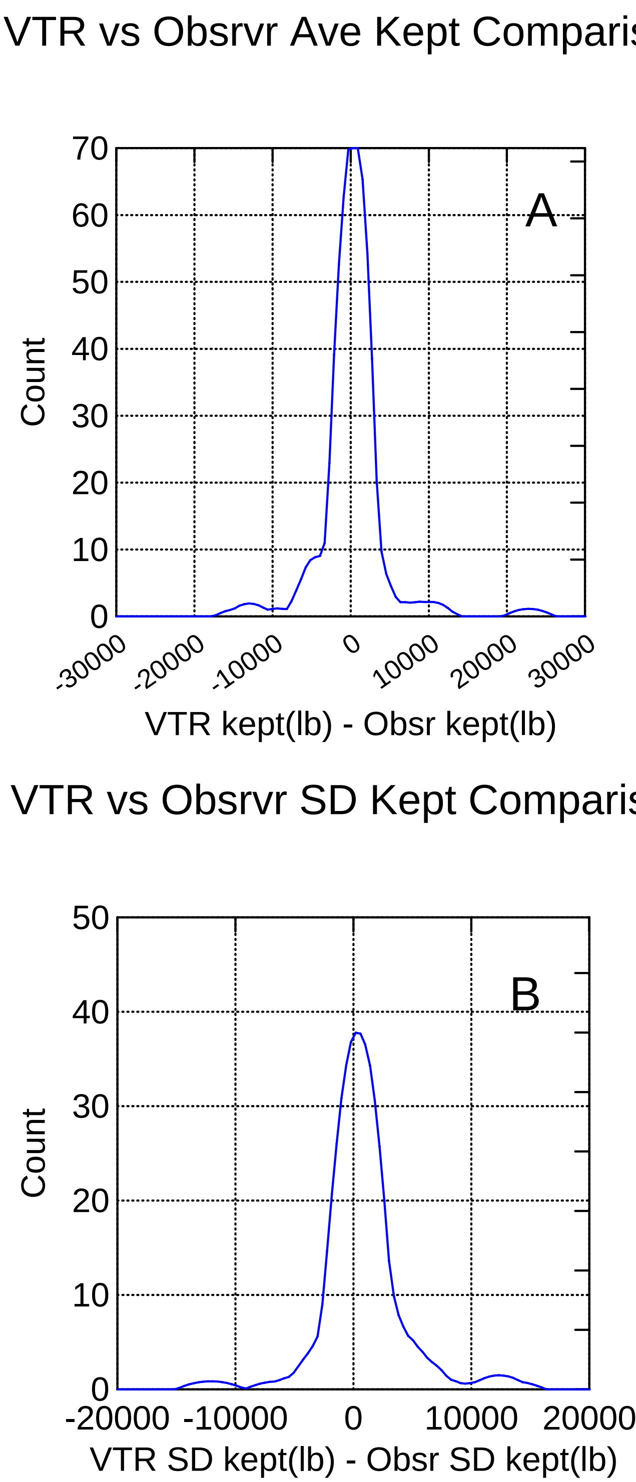


Figure 6. The distribution of differences between the average kept pounds (A) and the standard deviation (SD) of average kept pounds (B) of groundfish in the Northeast Fisheries Observer Program (Obsrvr) and the Vessel Trip Report (VTR) data for 2003/2004. Histograms are non-parametric smooths of the stratum specific differences.

Comparisons of Ave Trip Duration

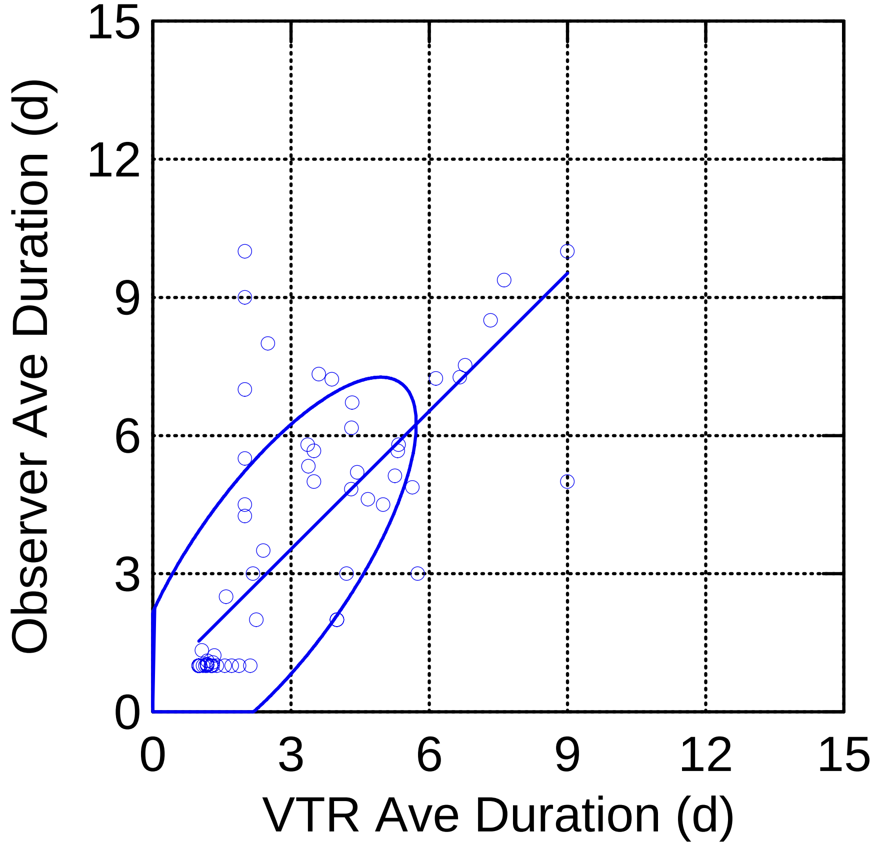


Figure 7. Comparison of average trip duration (in days) for trips that caught groundfish in the Northeast Fisheries Observer Program and Vessel Trip Report (VTR) data sets for 2003/2004. Each point represents the mean of an individual stratum.

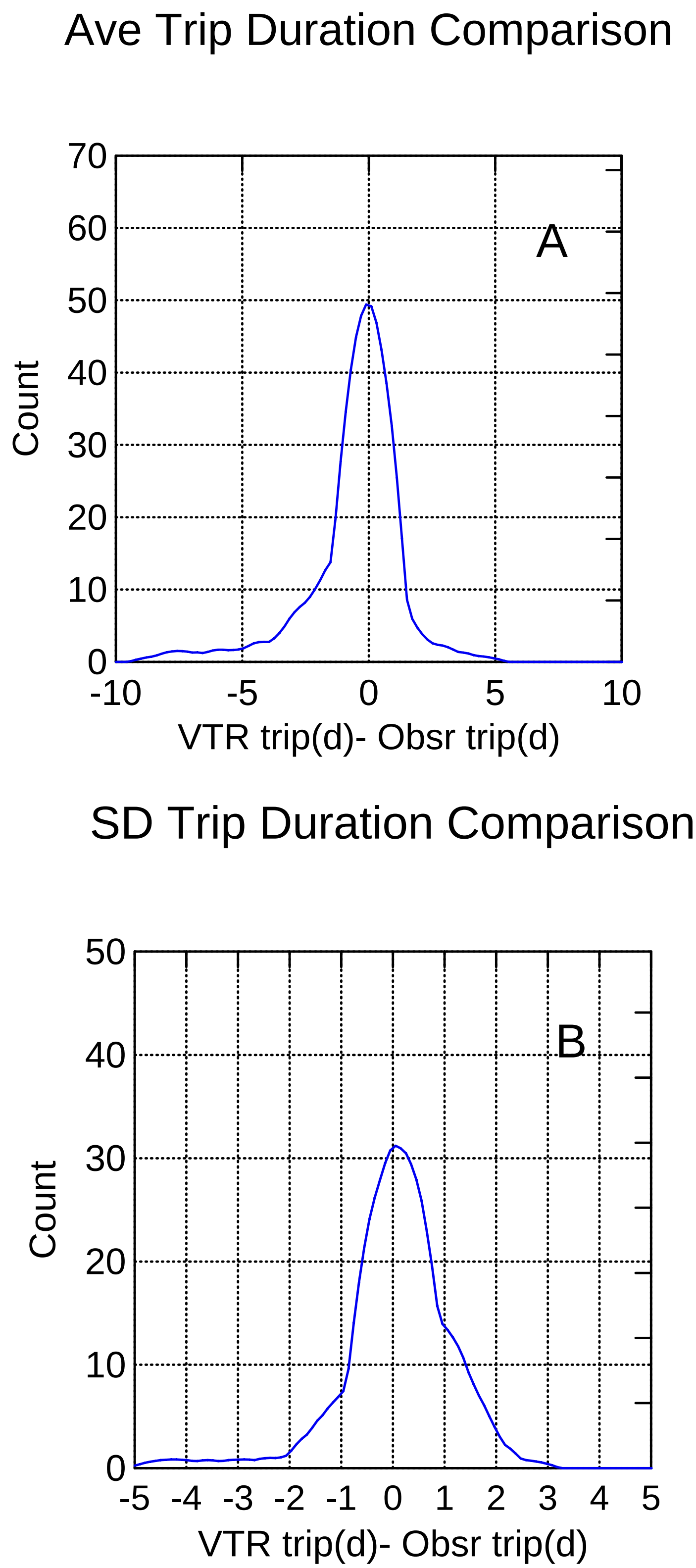


Figure 8. The distribution of differences in average trip duration (in days) (A) and the standard deviation of average trip duration (B) of trips that caught groundfish in the Northeast Fisheries Observer Program (Obsrvr) and the Vessel Trip Report (VTR) data for 2003/2004. Histograms are non-parametric smooths of the stratum specific differences.

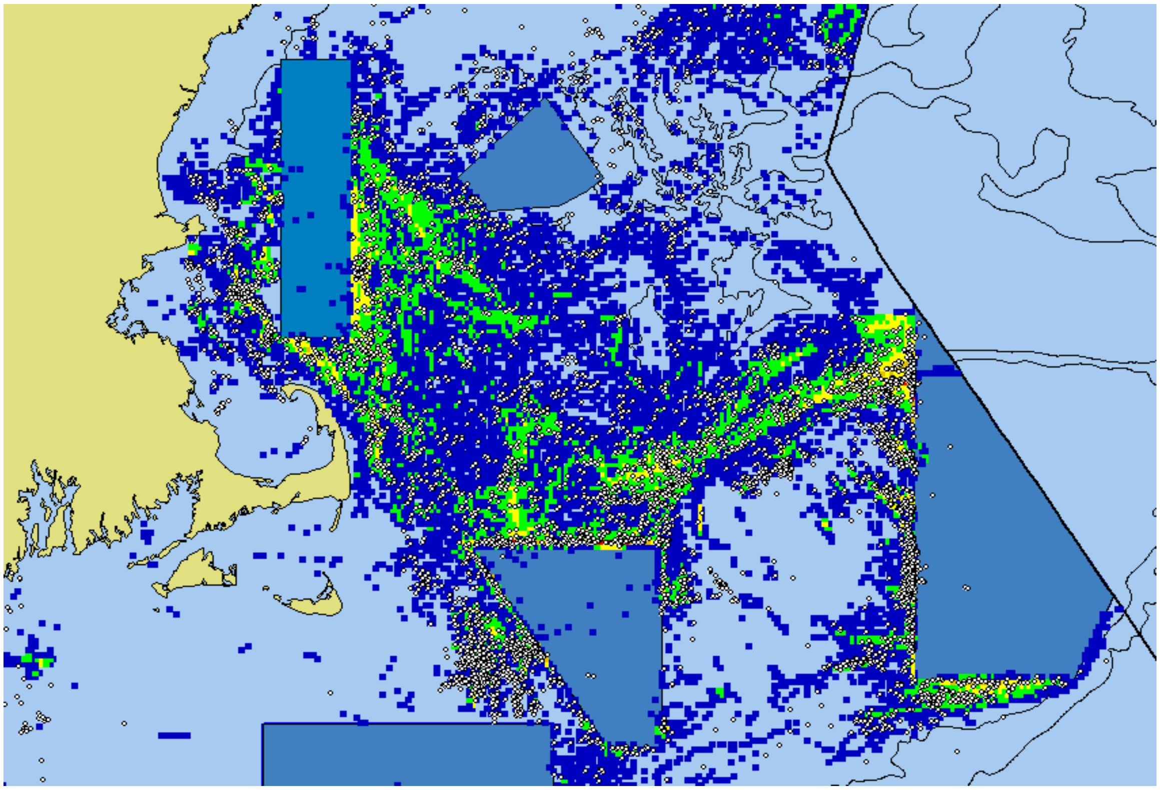


Figure 9. Locations of otter trawl fishing effort (color squares) in 2003 from vessels using VMS (vessel monitoring systems). Locations are plotted only for vessels speeds <= 3.5 knots and data are aggregated to 1' square. Blue squares represent 1-8 hours, green 9 – 25 hours; yellow 26-63 hours; orange 64 – 145 hours, and red 146 – 309 hours. Observed otter trawl tows (white circles) in 2003. Locations are the starting positions of each tow. Taken from Murawski et al. (article in press).

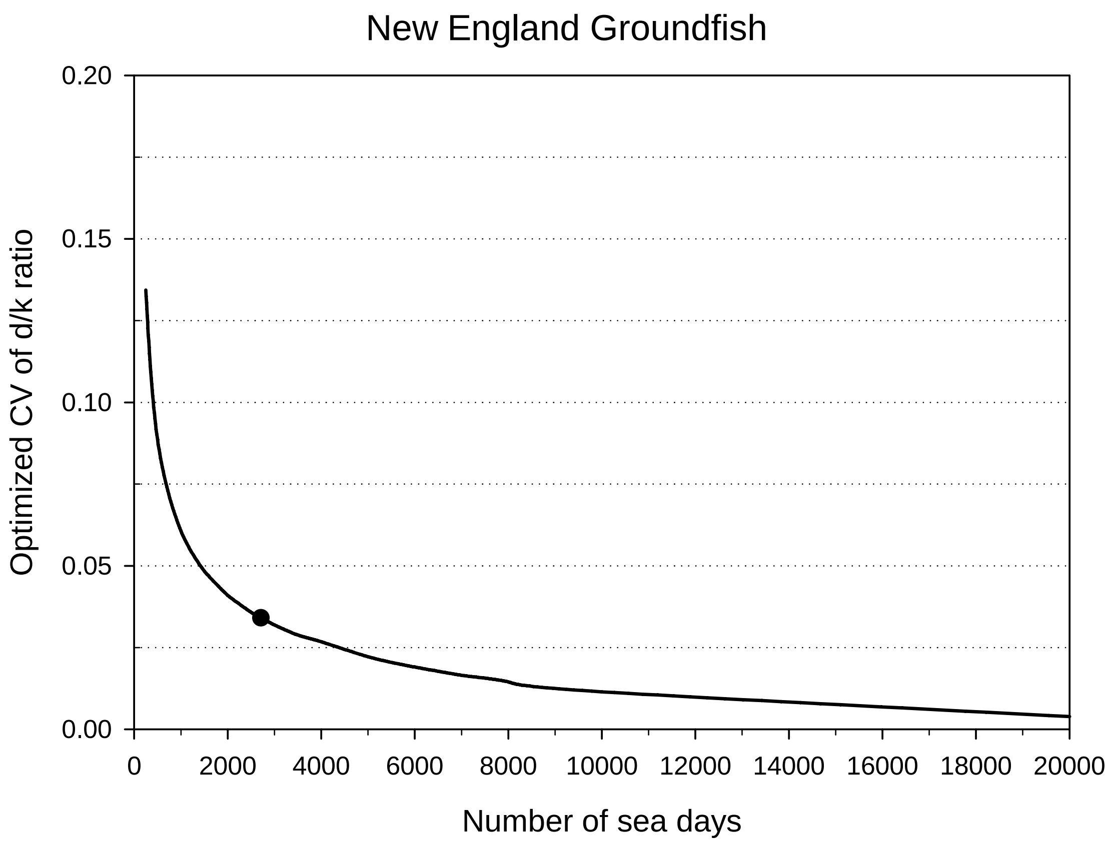


Figure 10. The optimized coefficient of variation (CV) of the discard to kept ratio (d/k) for New England groundfish over a range of sea days; 2,708 sea days (solid circle) are allocated to cover New England groundfish fisheries in 2005.

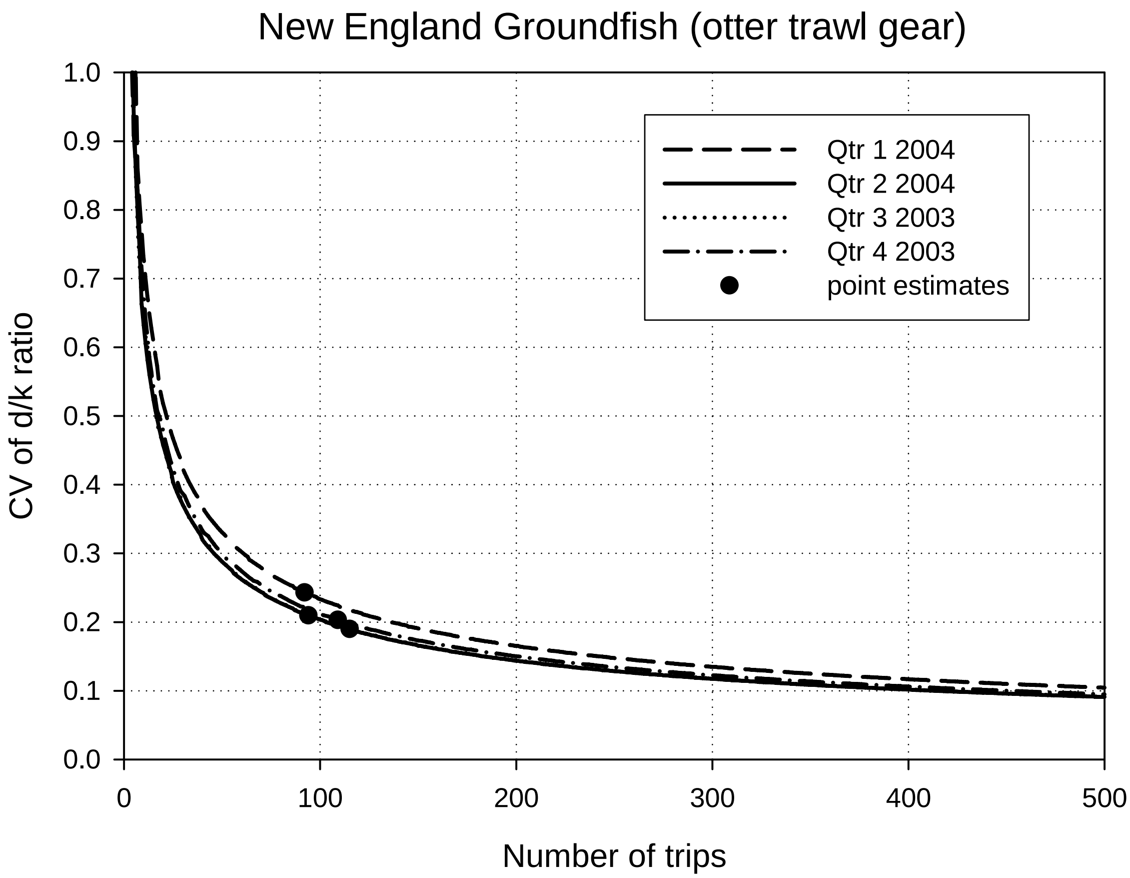


Figure 11. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with otter trawl gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips).

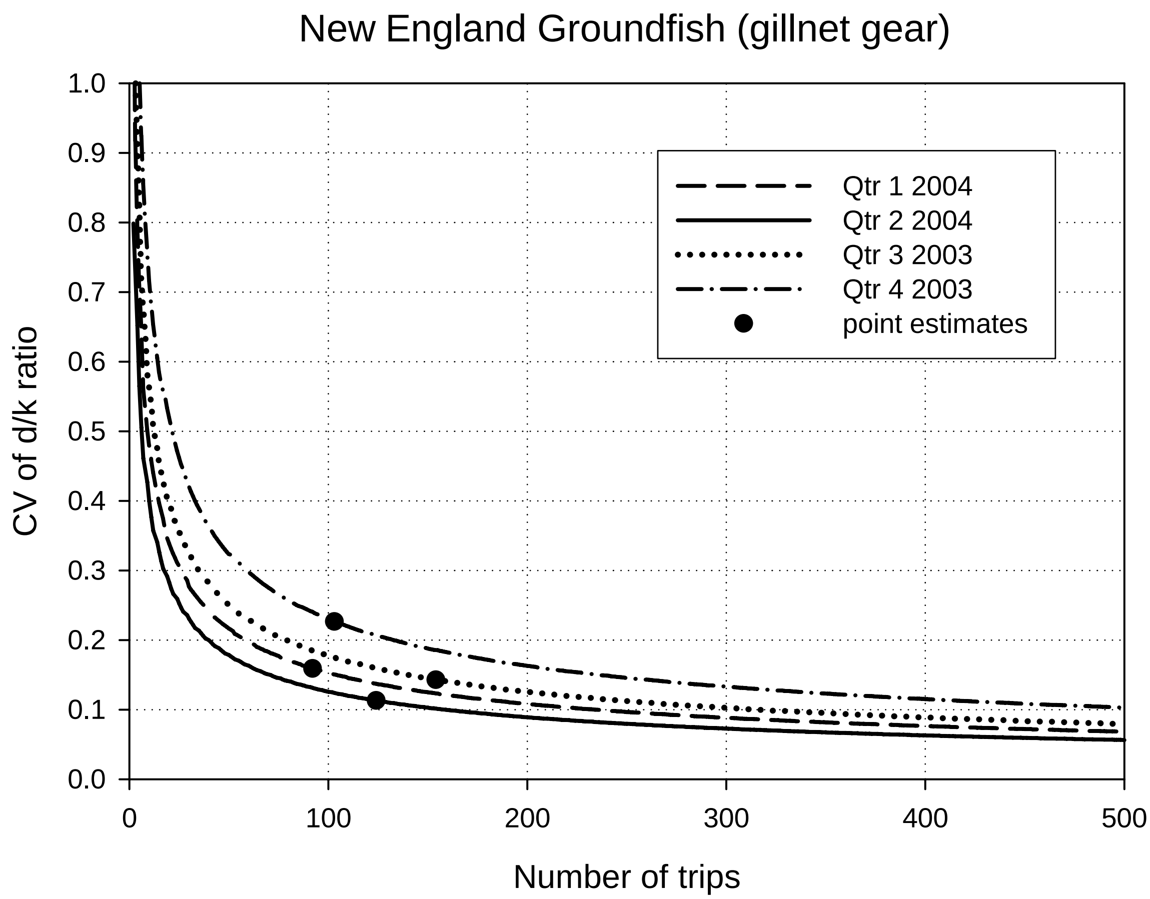


Figure 12. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with gillnet gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips).

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Appendix B
Detailed Tables and Figures from Chapter 5

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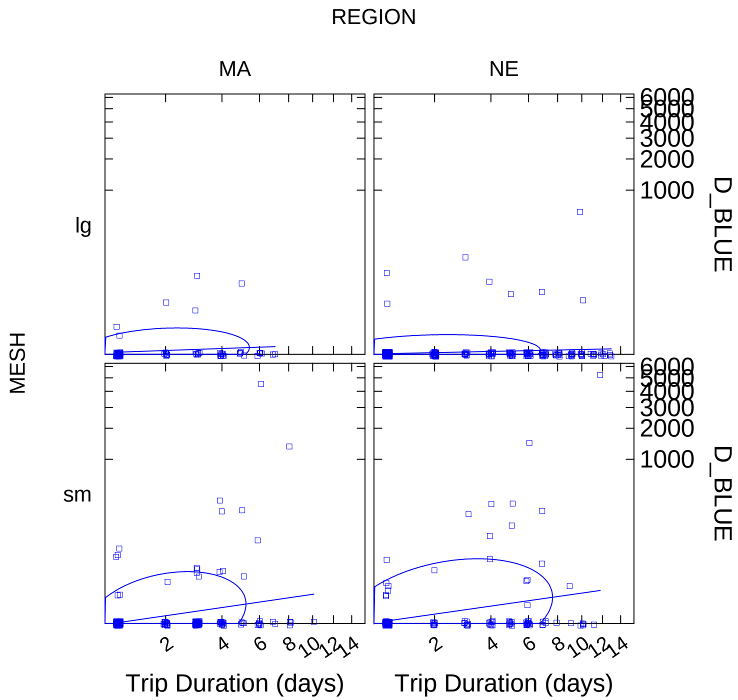


Figure B-1a. Comparison of bluefish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

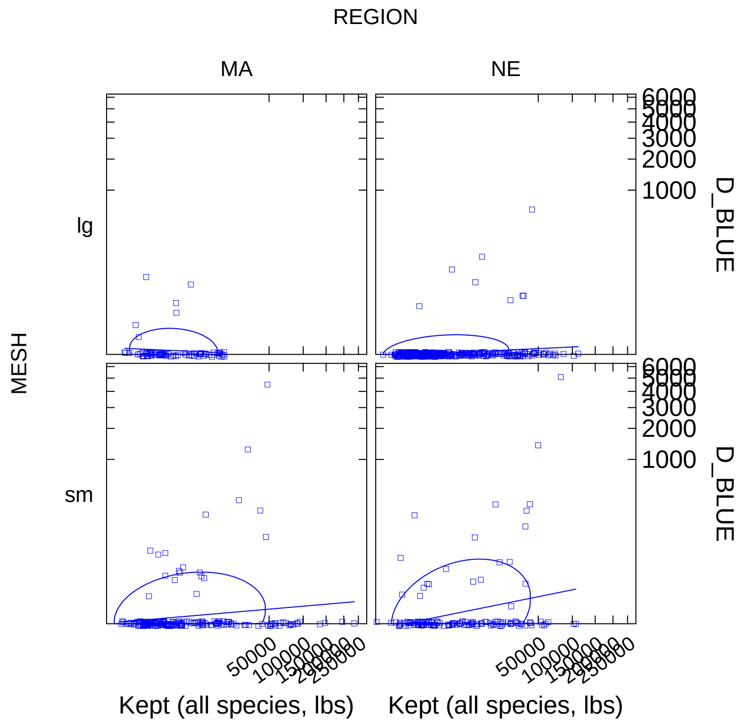


Figure B-1b. Comparison of bluefish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

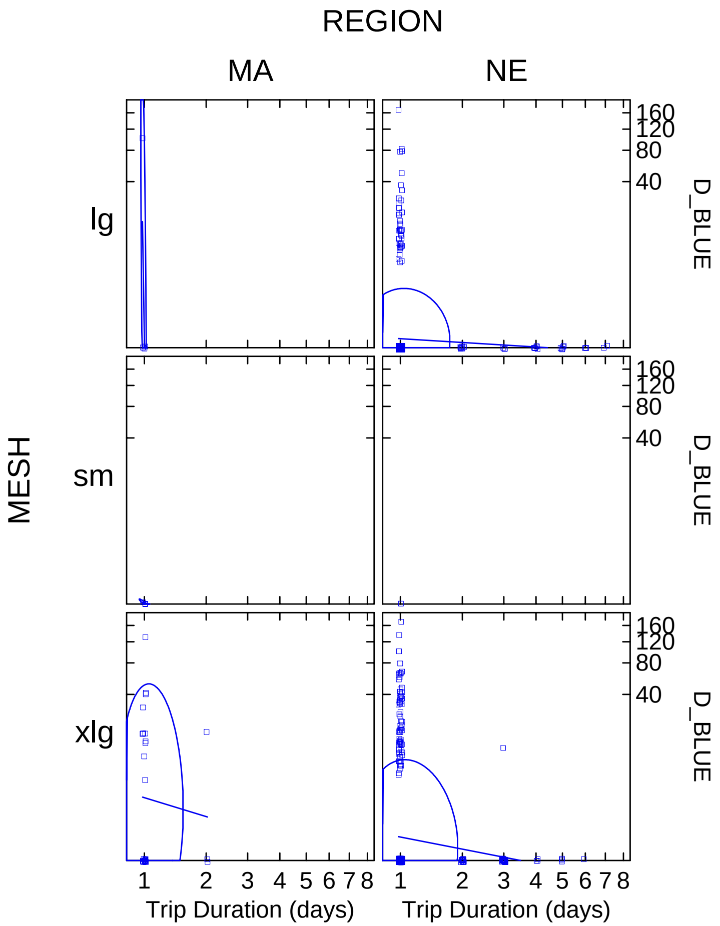


Figure B-1c. Comparison of bluefish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

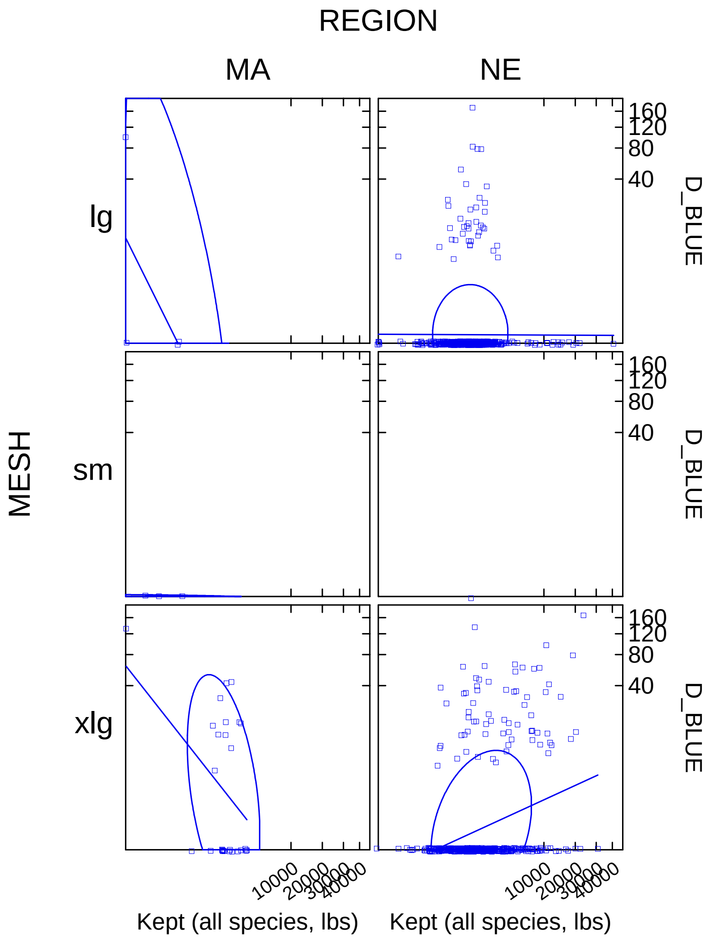


Figure B-1d. Comparison of bluefish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

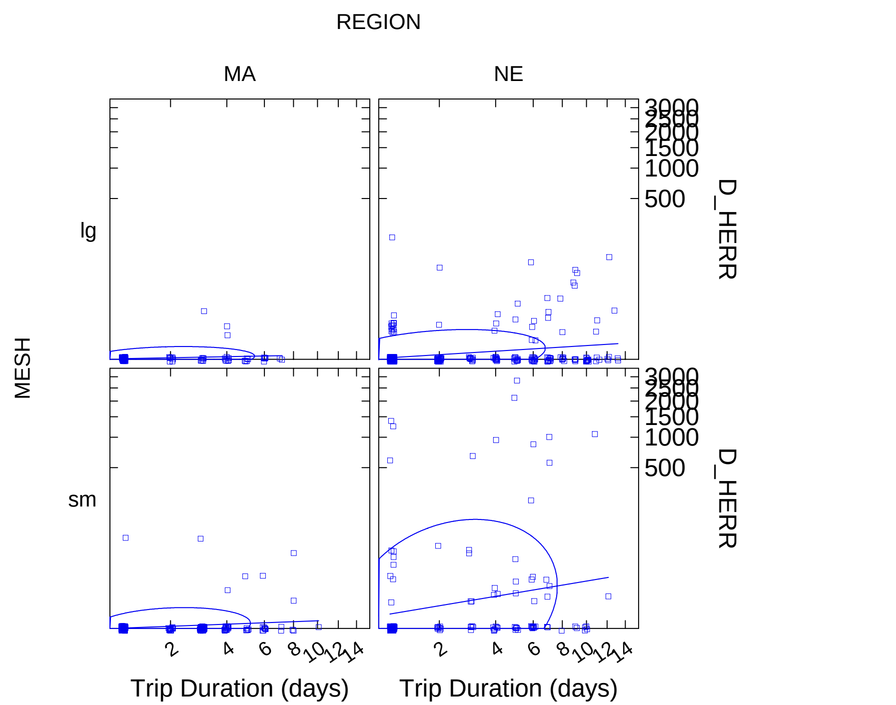


Figure B-1e. Comparison of herring discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

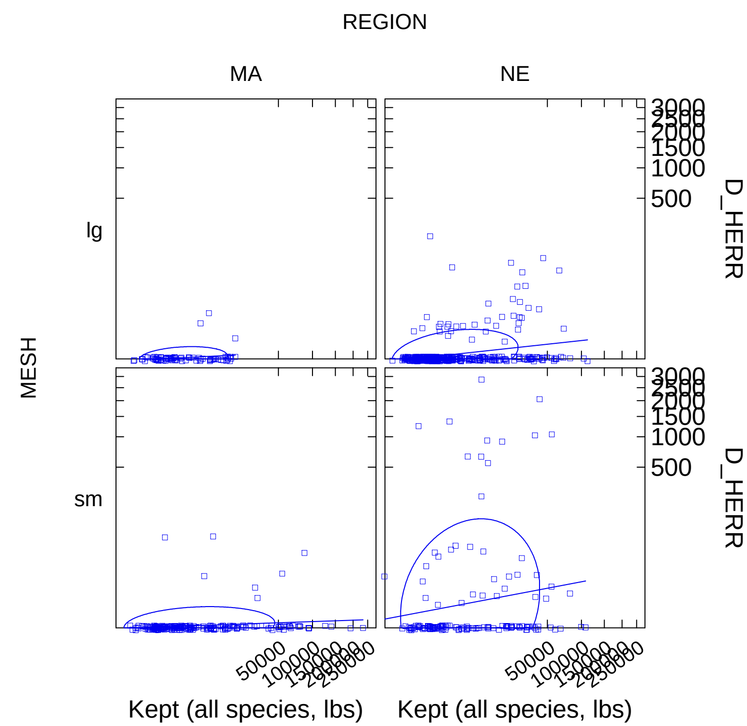


Figure B-1f. Comparison of herring discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

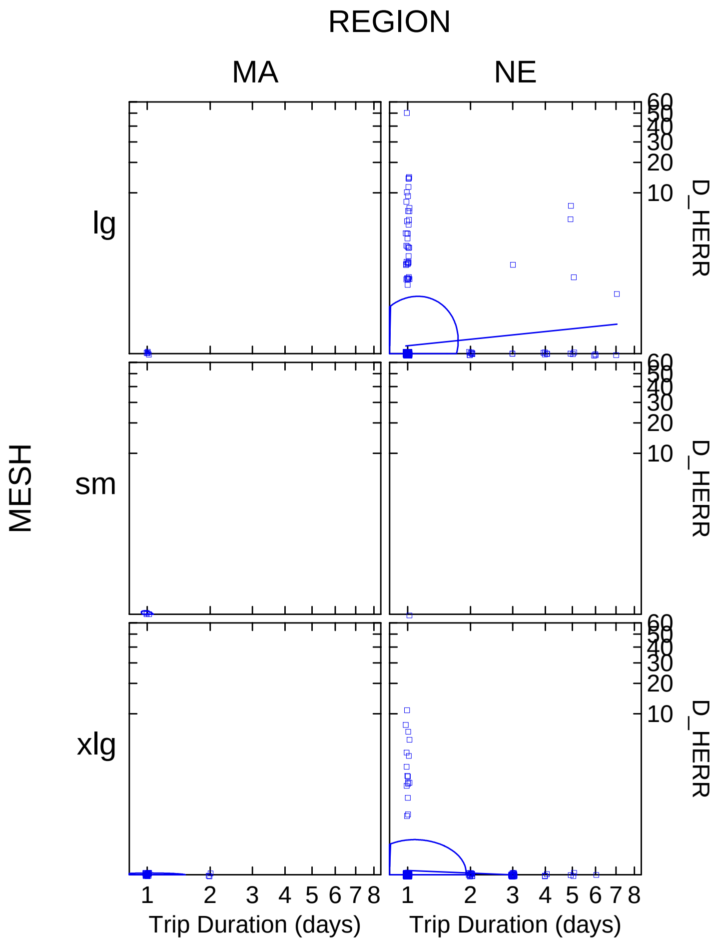


Figure B-1g. Comparison of herring discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

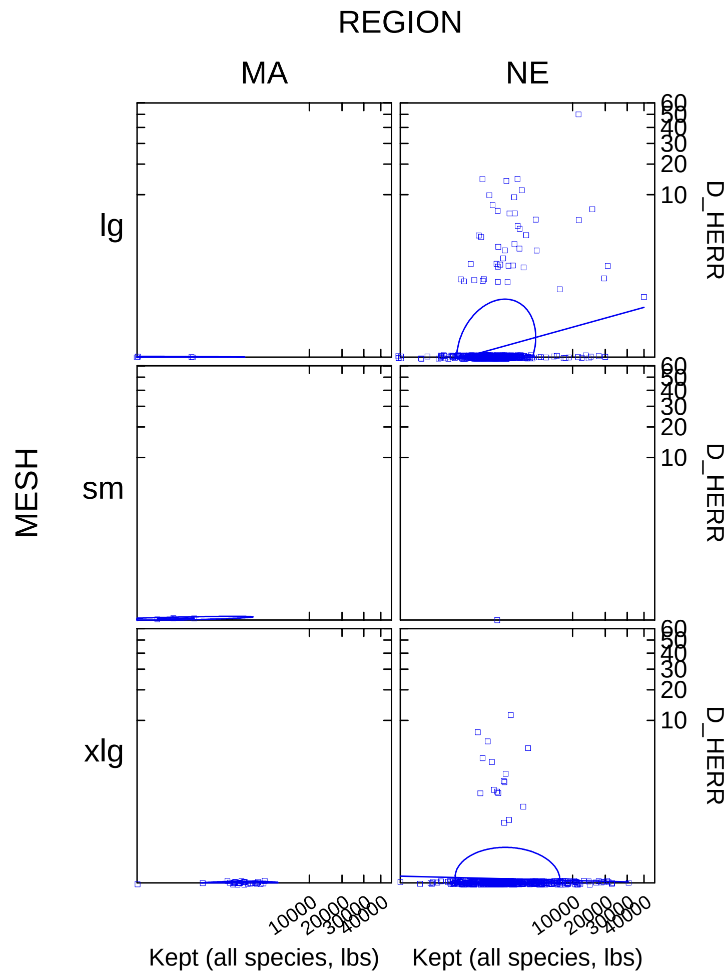


Figure B-1h. Comparison of herring discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

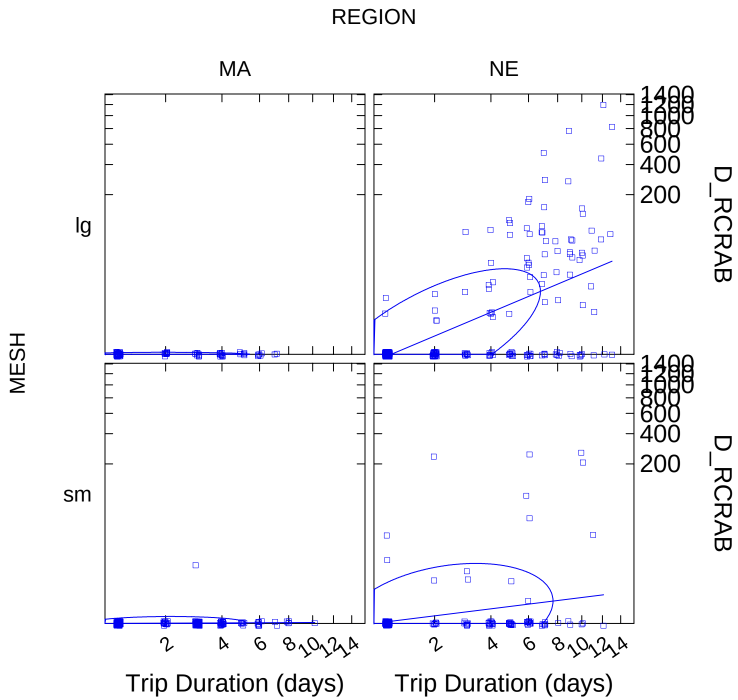


Figure B-1i. Comparison of red crab discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

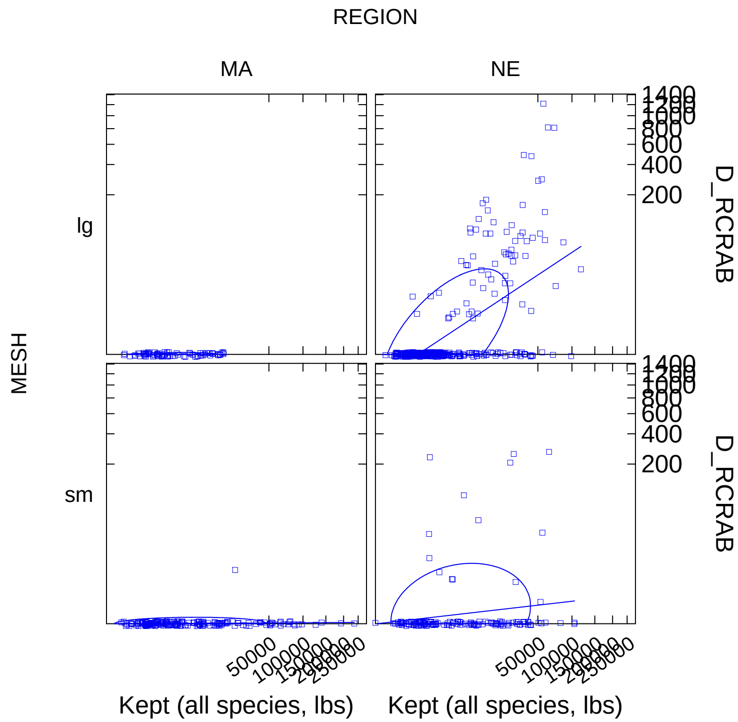


Figure B-1j. Comparison of red crab discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

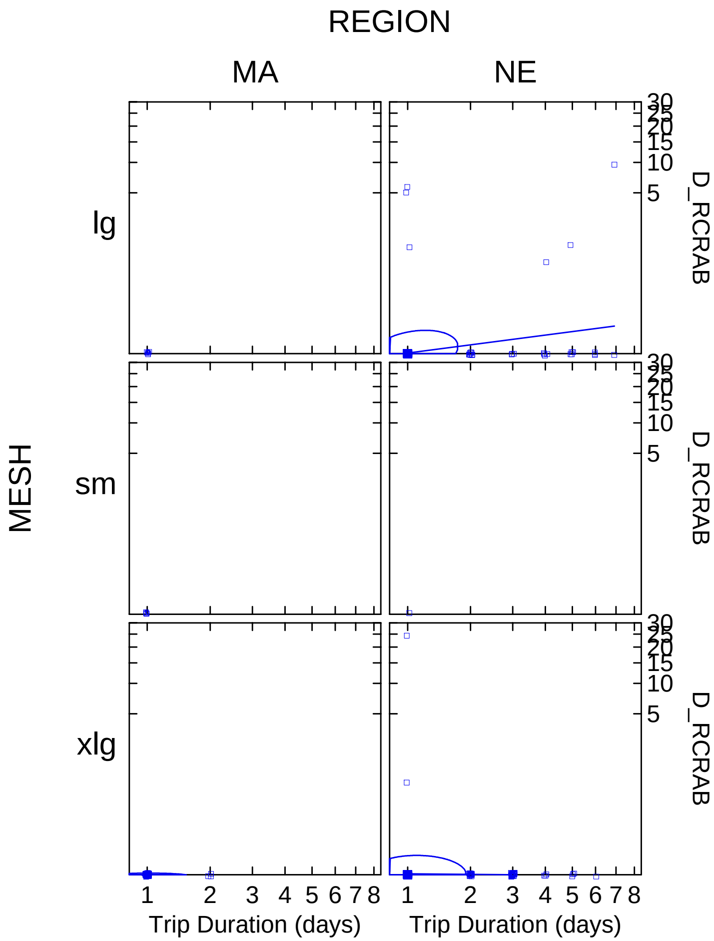


Figure B-1k. Comparison of red crab discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

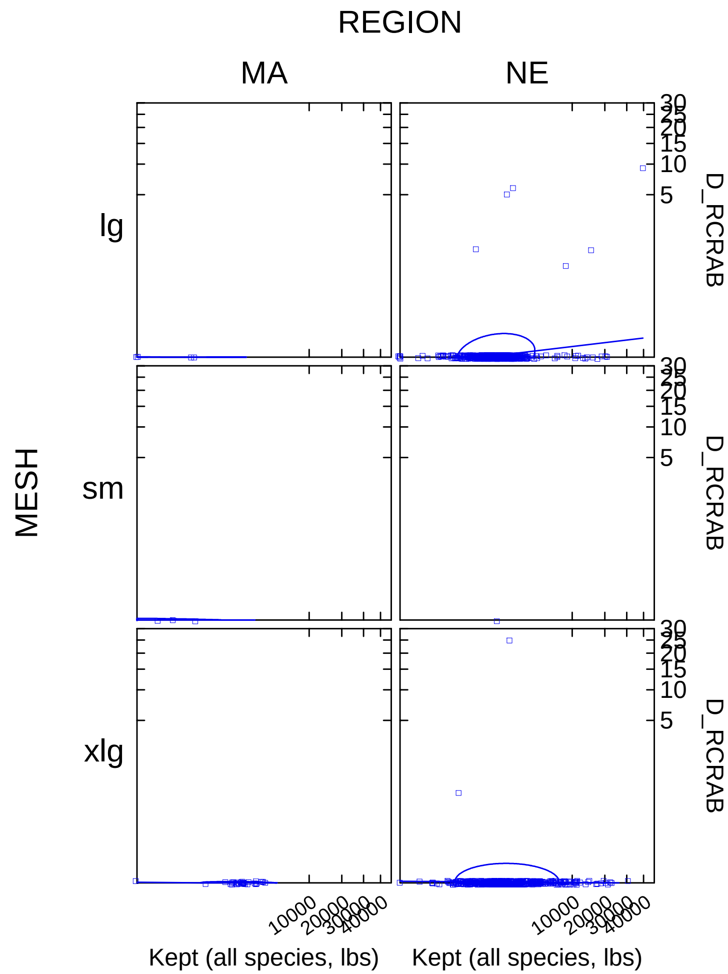


Figure B-1l. Comparison of red crab discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

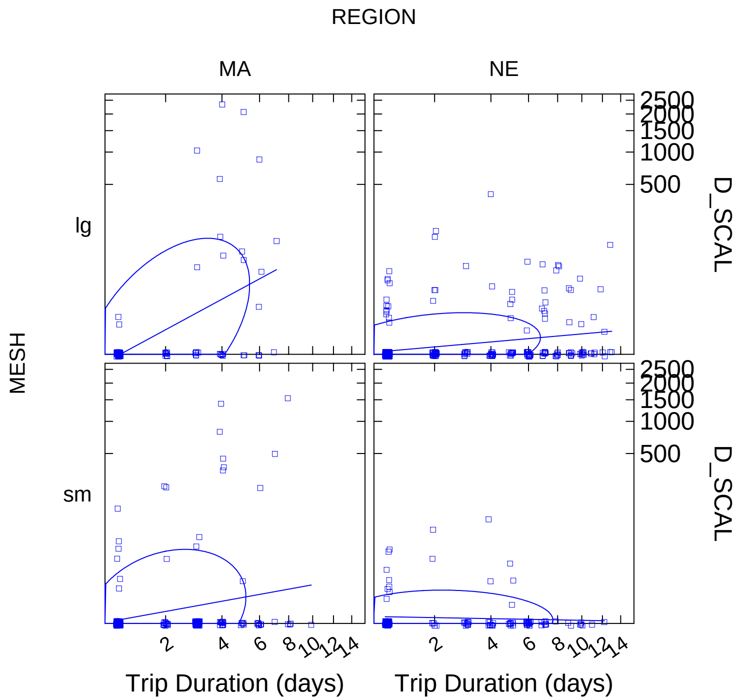


Figure B-1m. Comparison of scallop discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

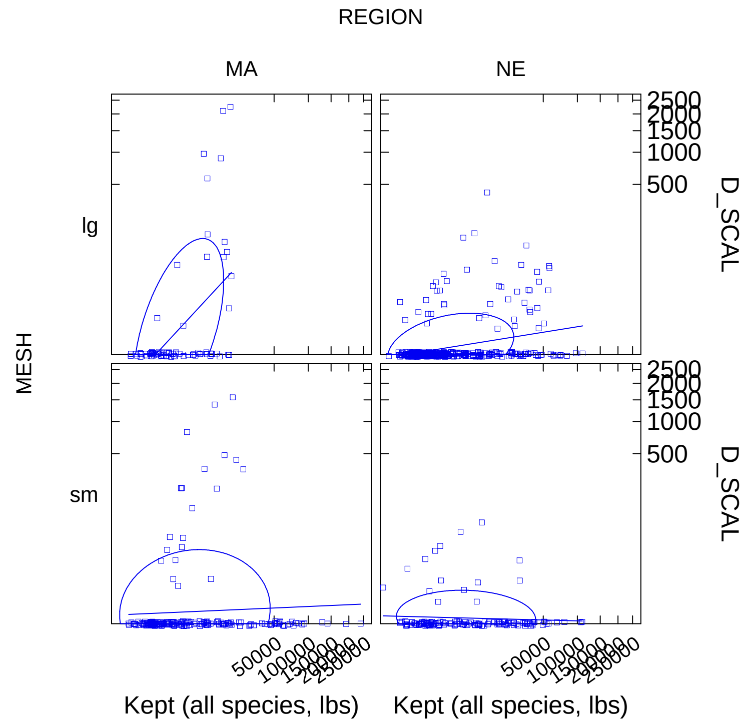


Figure B-1n. Comparison of scallop discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

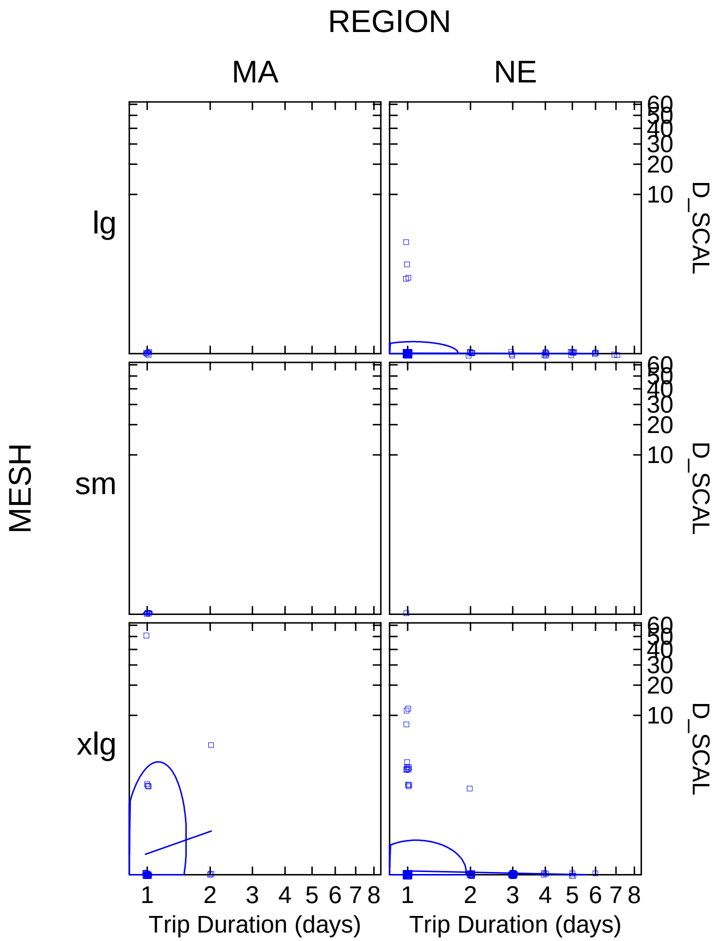


Figure B-1o. Comparison of scallop discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

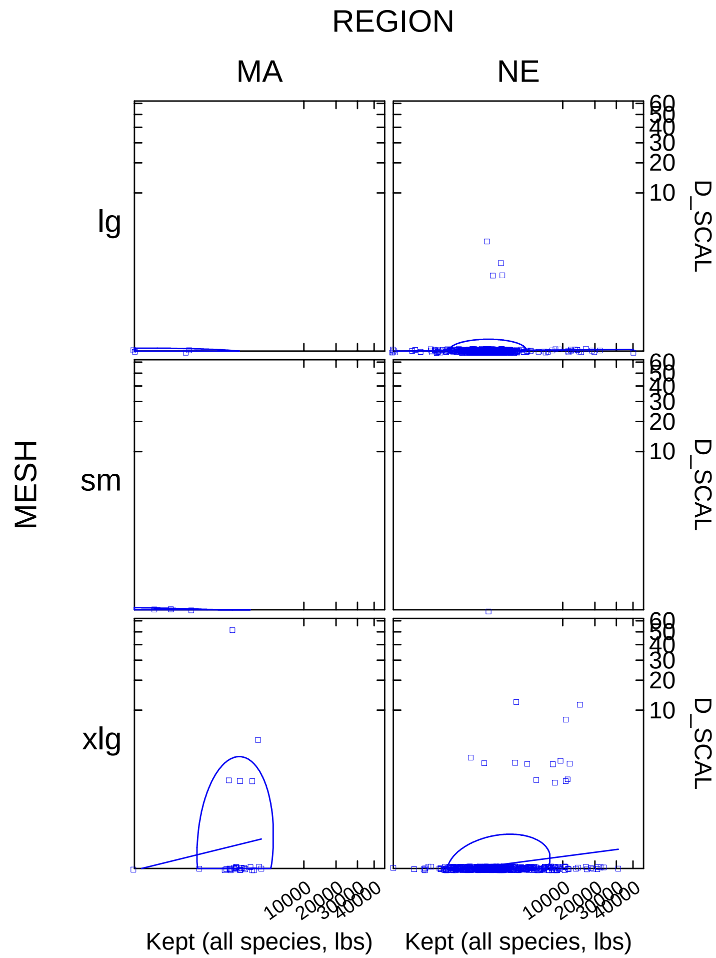


Figure B-1p. Comparison of scallop discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

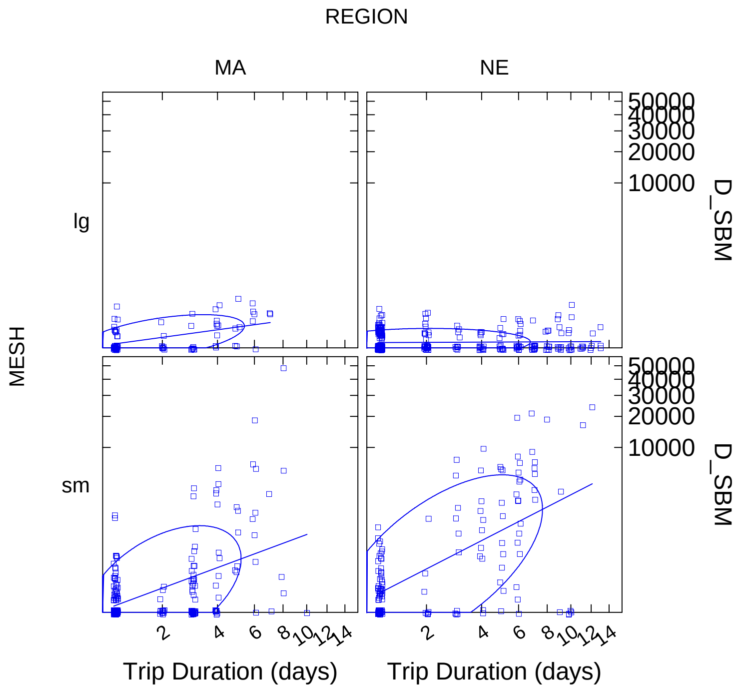


Figure B-1q. Comparison of squid-butterfish-mackerel discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

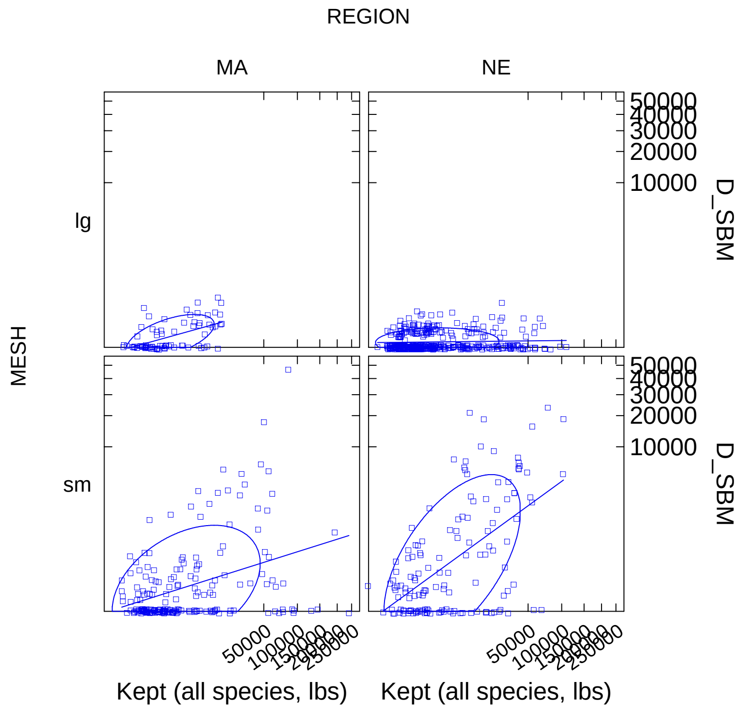


Figure B-1r. Comparison of squid-butterfish-mackerel discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

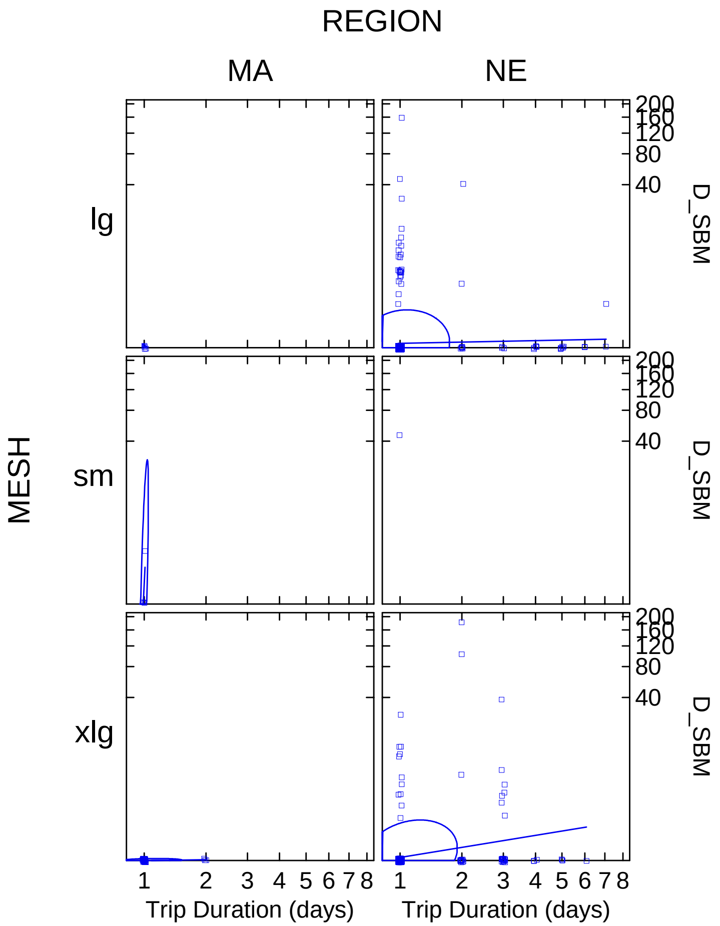


Figure B-1s. Comparison of squid-butterfish-mackerel discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

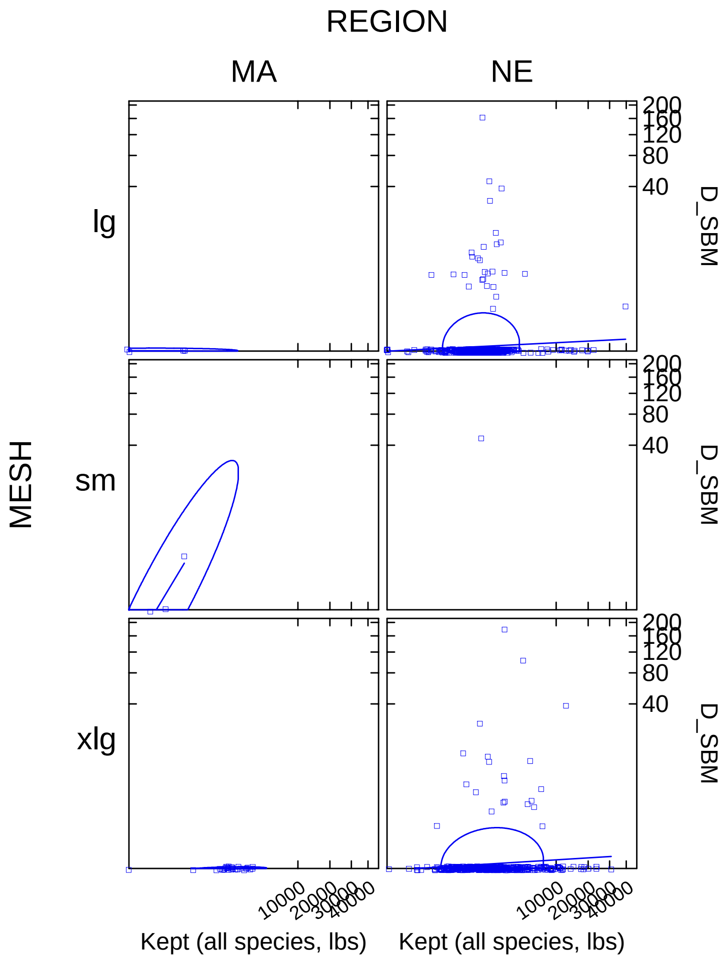


Figure B-1t. Comparison of squid-butterfish-mackerel discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

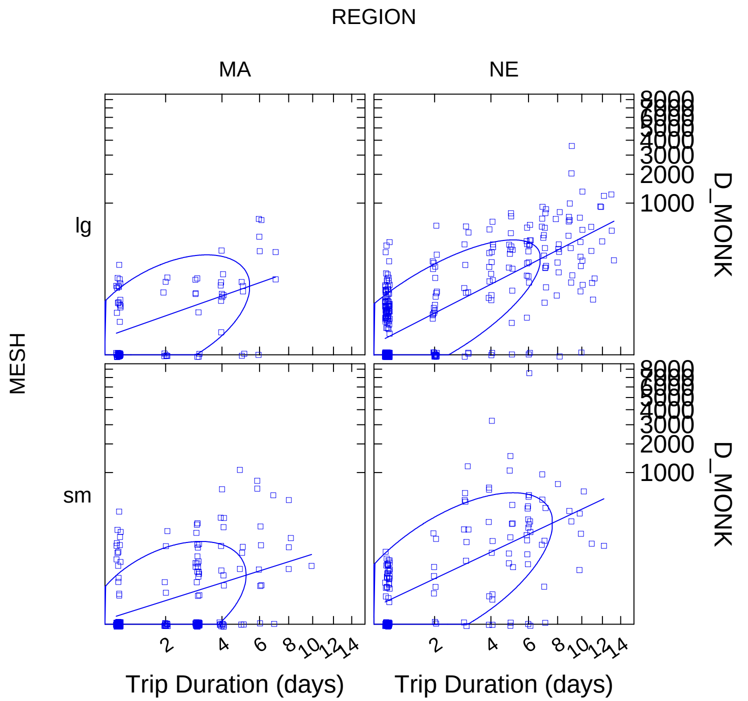


Figure B-1u. Comparison of monkfish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

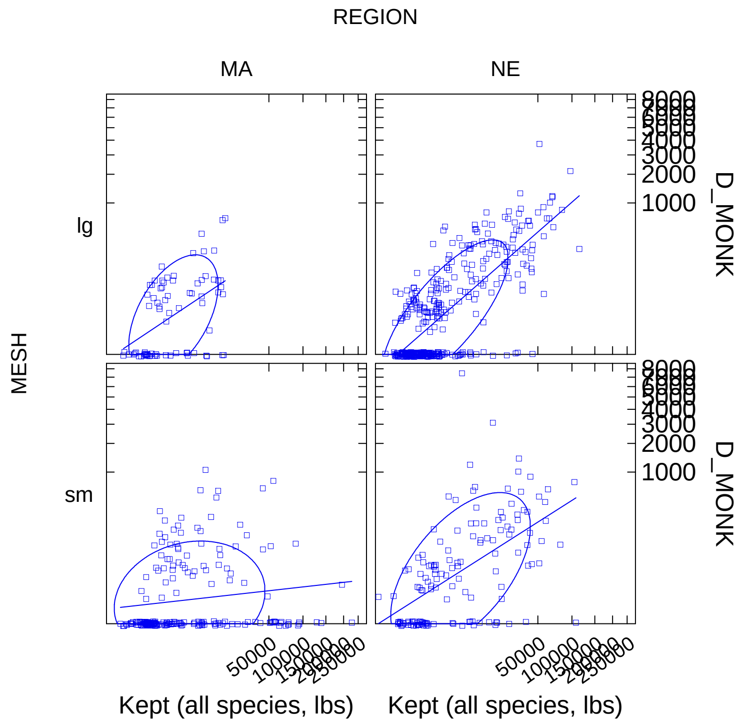


Figure B-1v. Comparison of monkfish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches)); fourth root transformation used, each dot represents a trip.

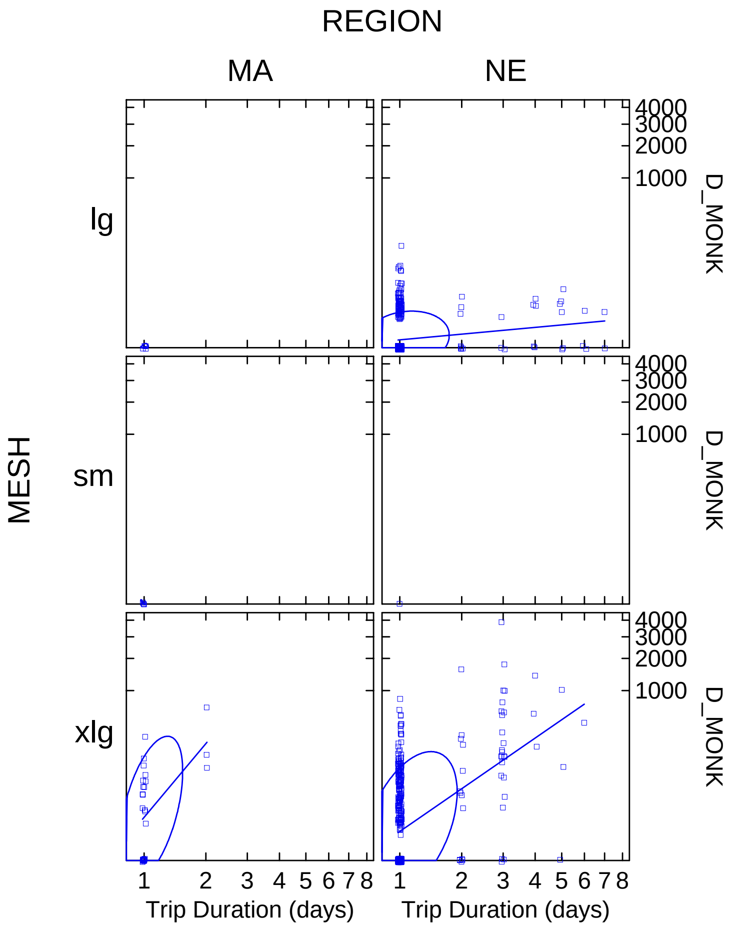


Figure B-1w. Comparison of monkfish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

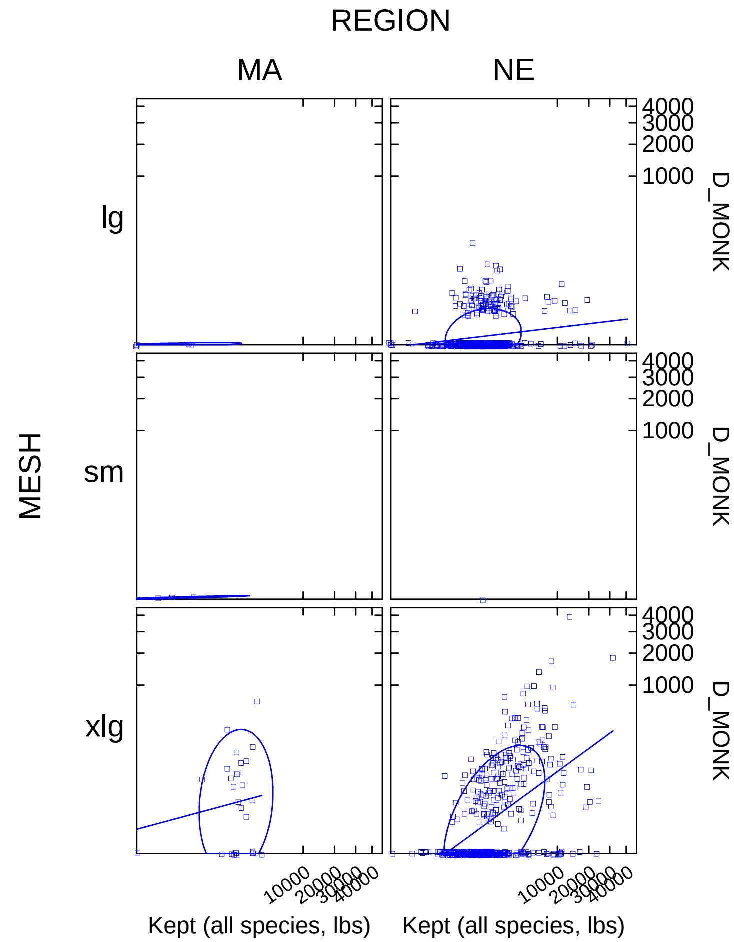


Figure B-1x. Comparison of monkfish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

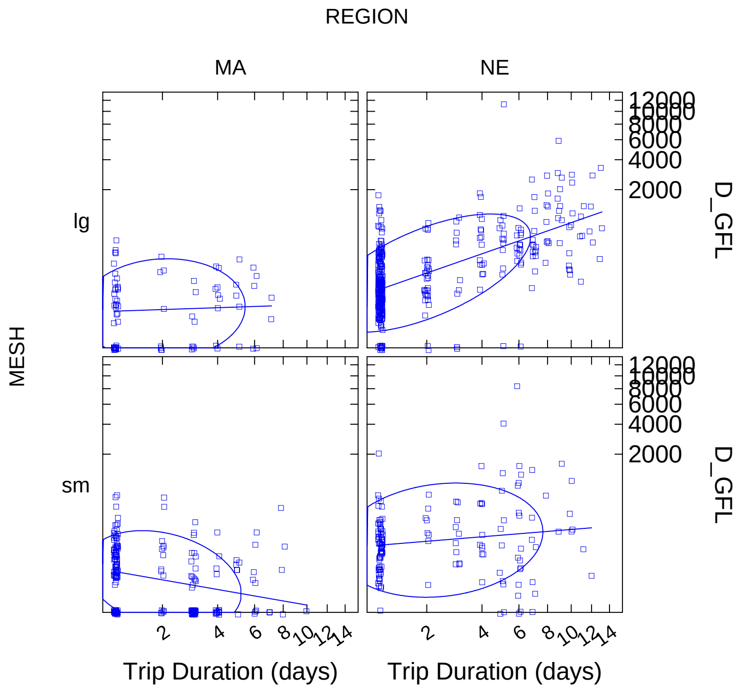


Figure B-1y. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

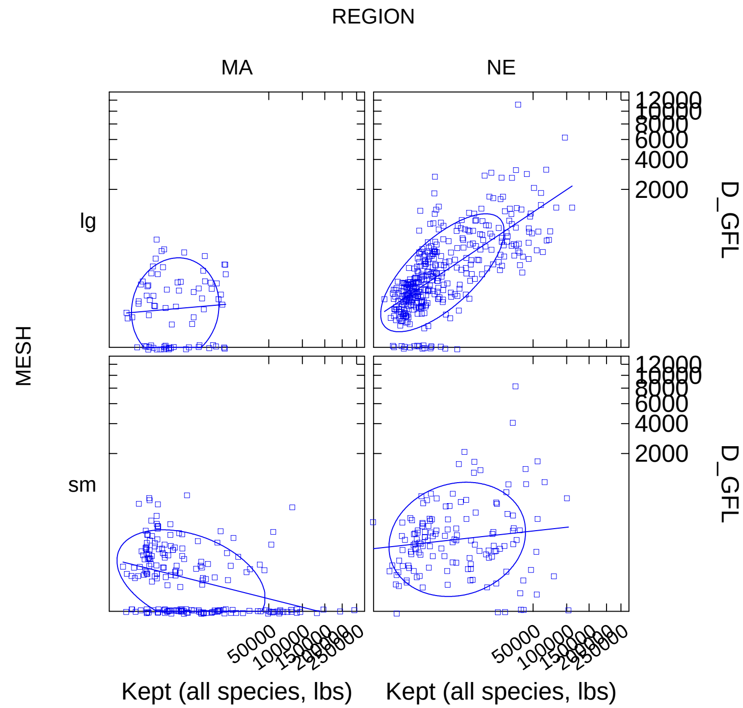


Figure B-1z. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

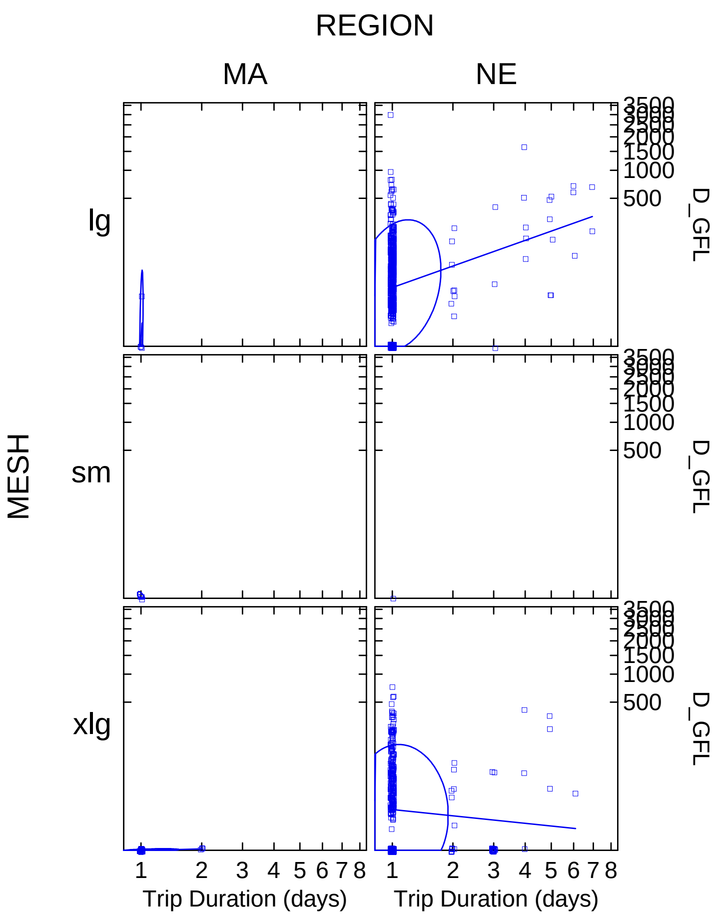


Figure B-1aa. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

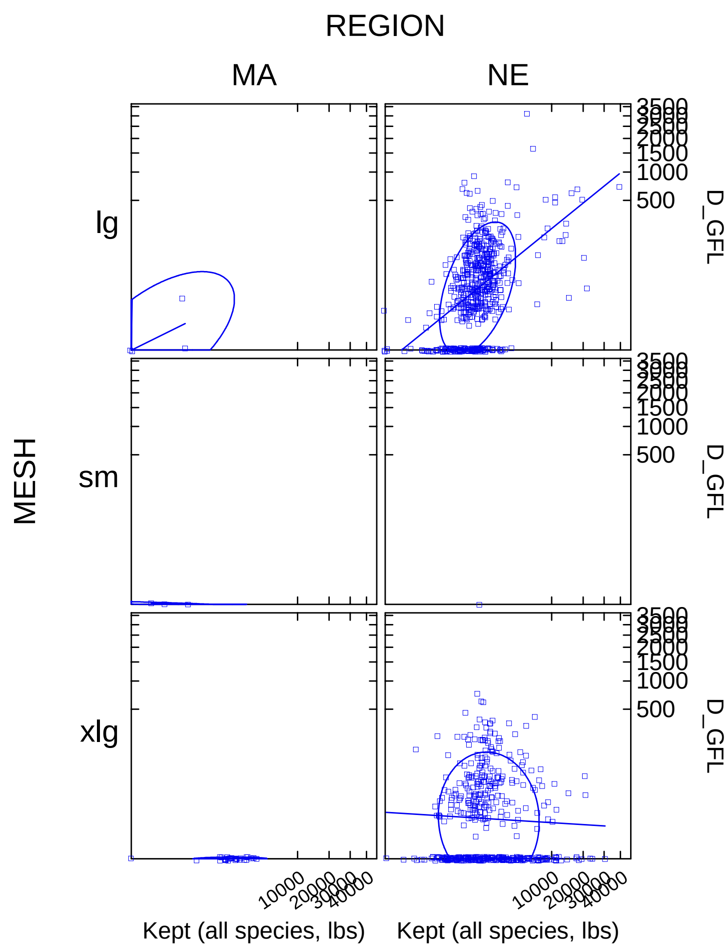


Figure B-1bb. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

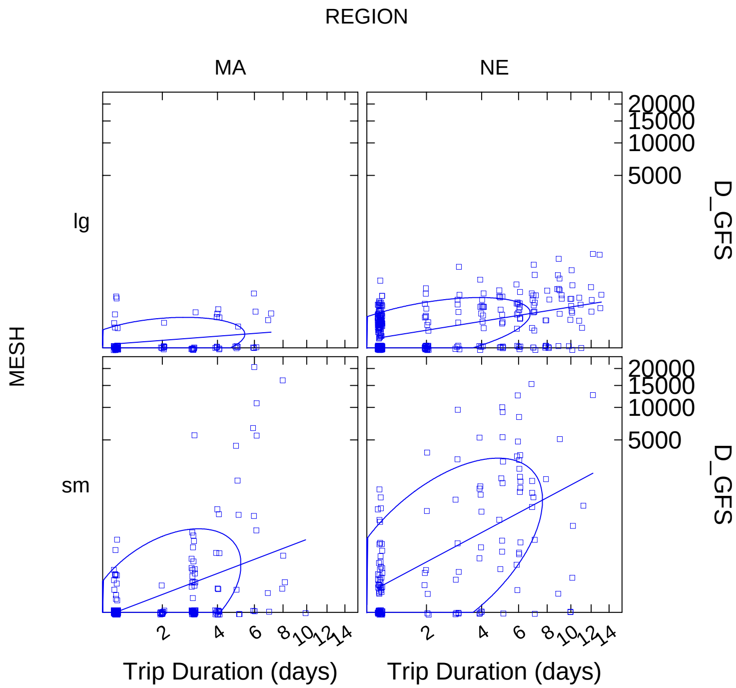


Figure B-1cc. Comparison of Northeast multispecies (small-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

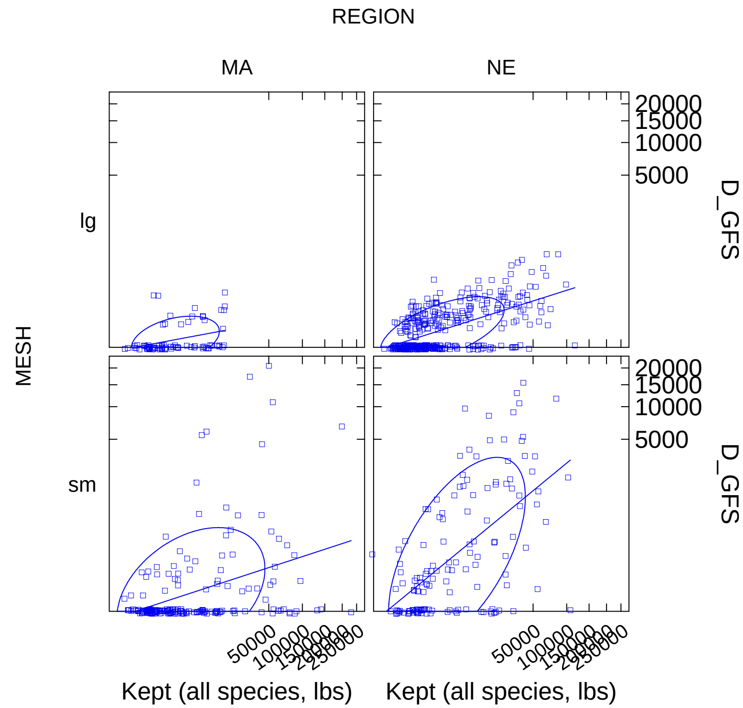


Figure B-1dd. Comparison of Northeast multispecies (small-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

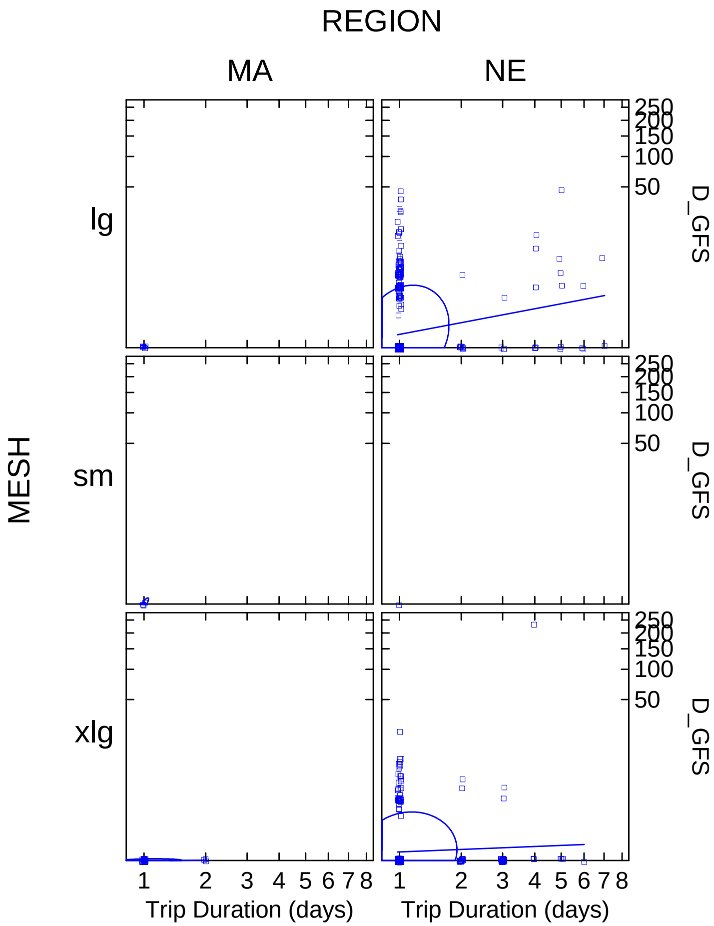


Figure B-1ee. Comparison of Northeast multispecies (small-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

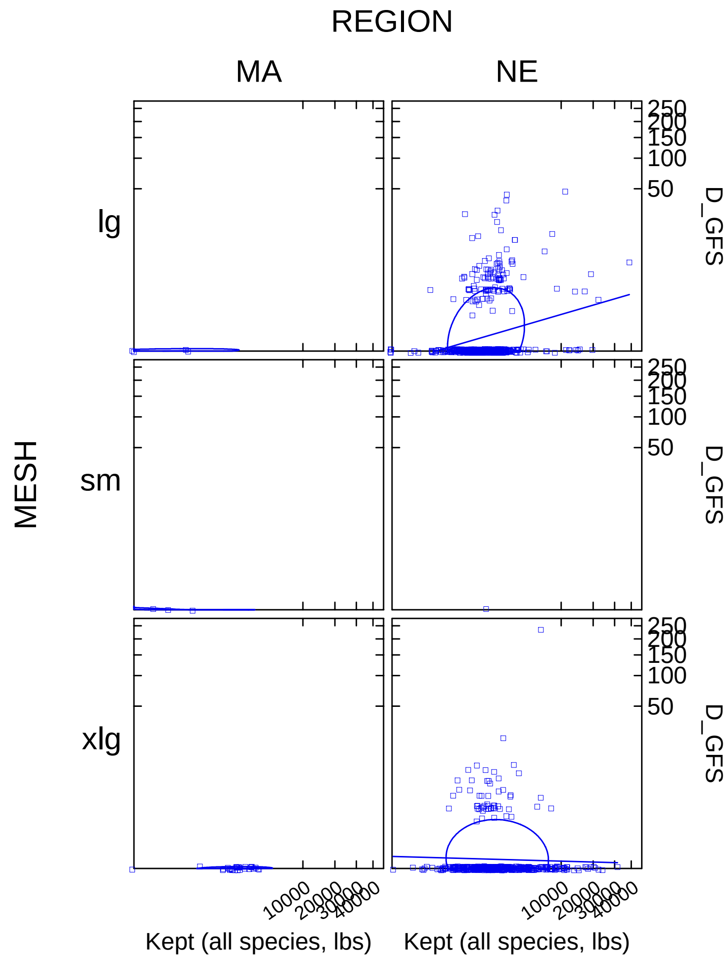


Figure B-1ff. Comparison of Northeast multispecies (small-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

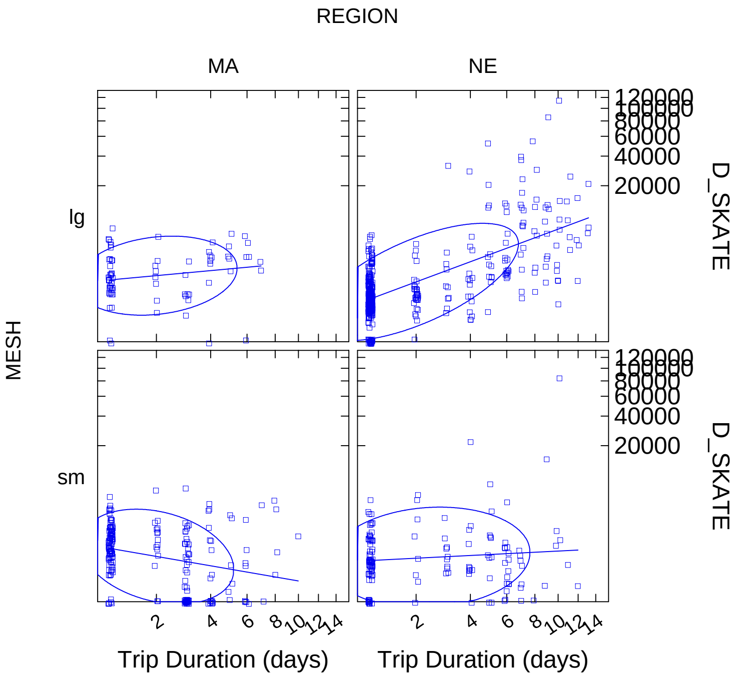


Figure B-1gg. Comparison of skates discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

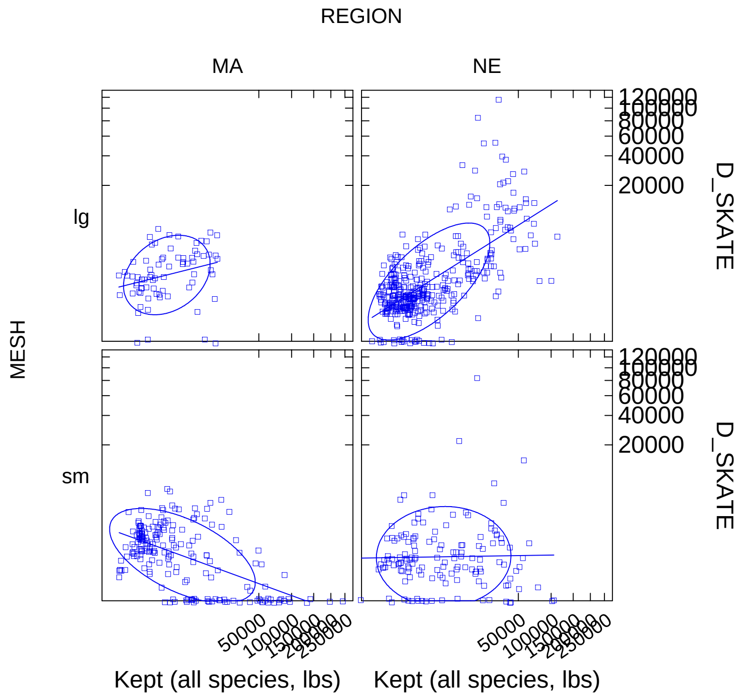


Figure B-1hh. Comparison of skates discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

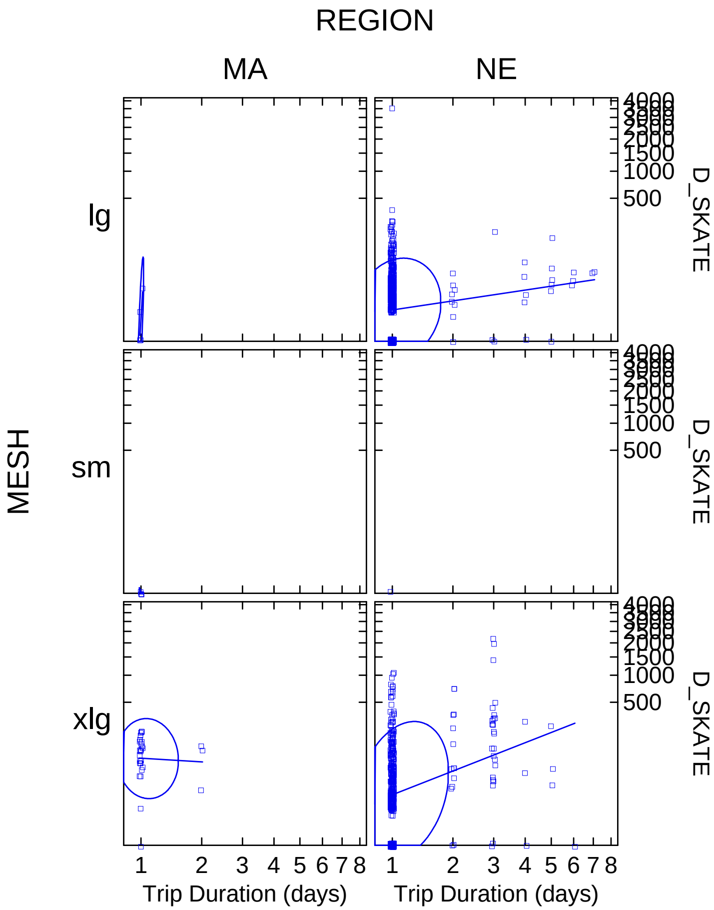


Figure B-1ii. Comparison of skates discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

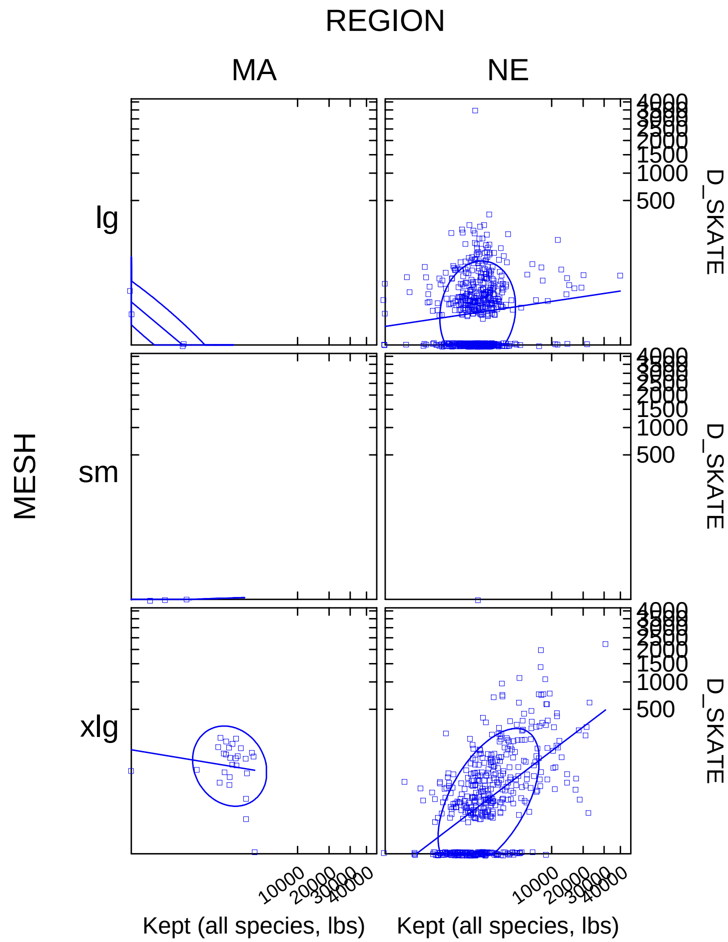


Figure B-1jj. Comparison of skates discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

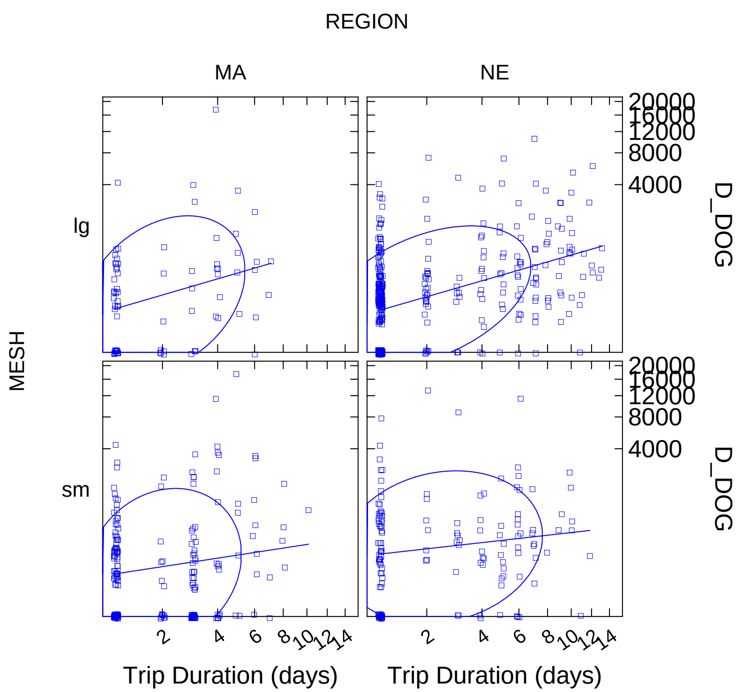


Figure B-1kk. Comparison of spiny dogfish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

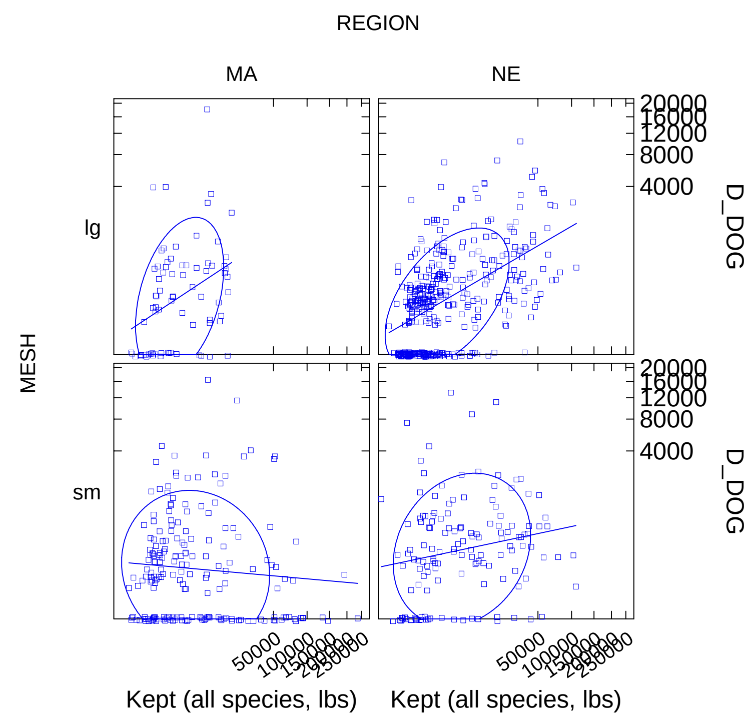


Figure B-1ll. Comparison of spiny dogfish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

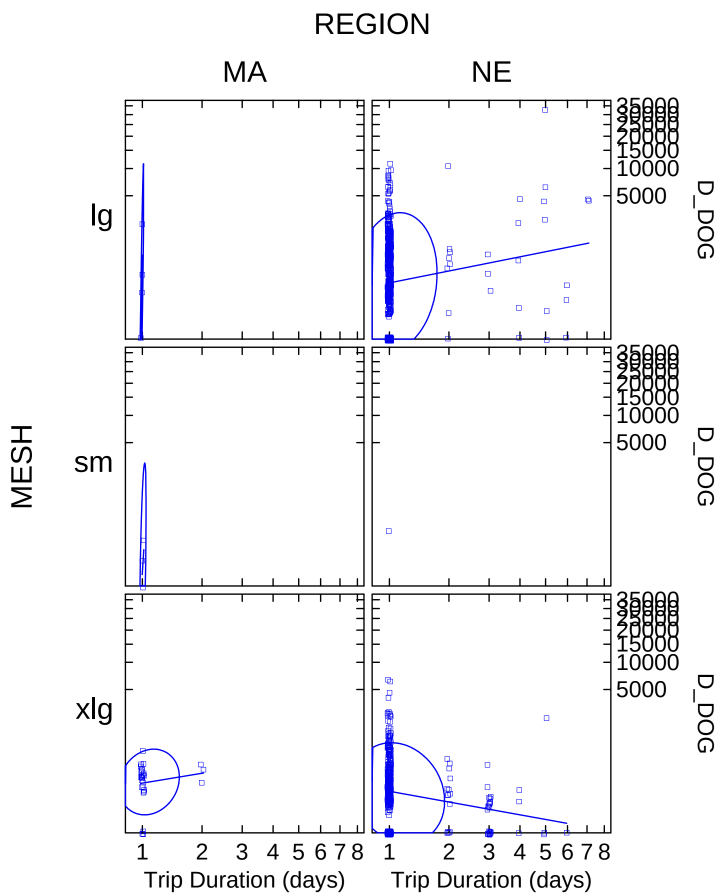


Figure B-1mm. Comparison of spiny dogfish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

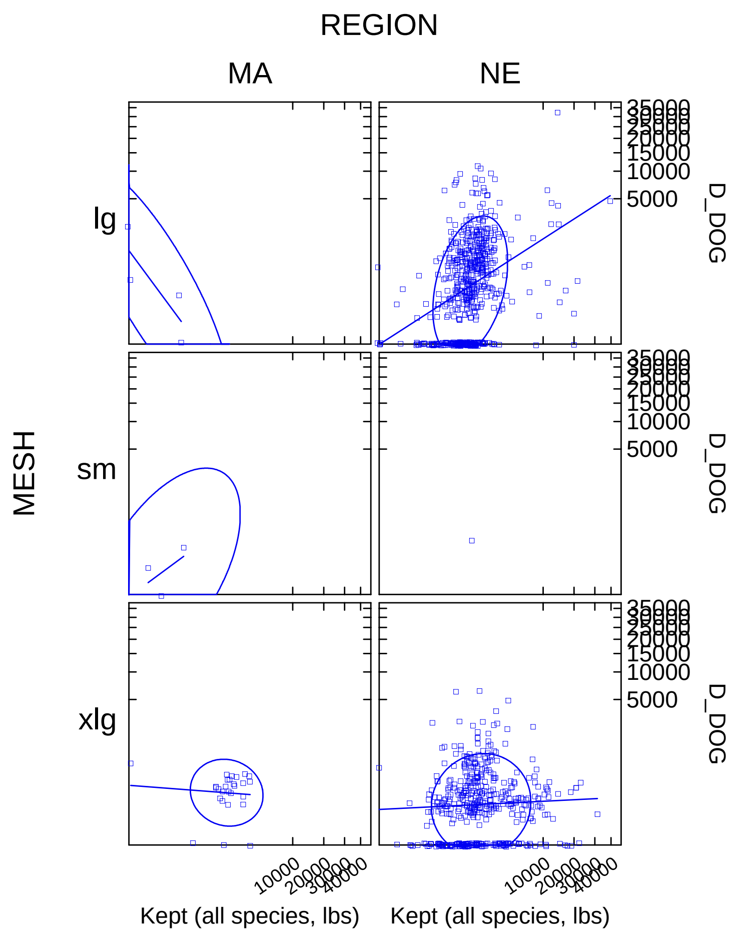


Figure B-1nn. Comparison of spiny dogfish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

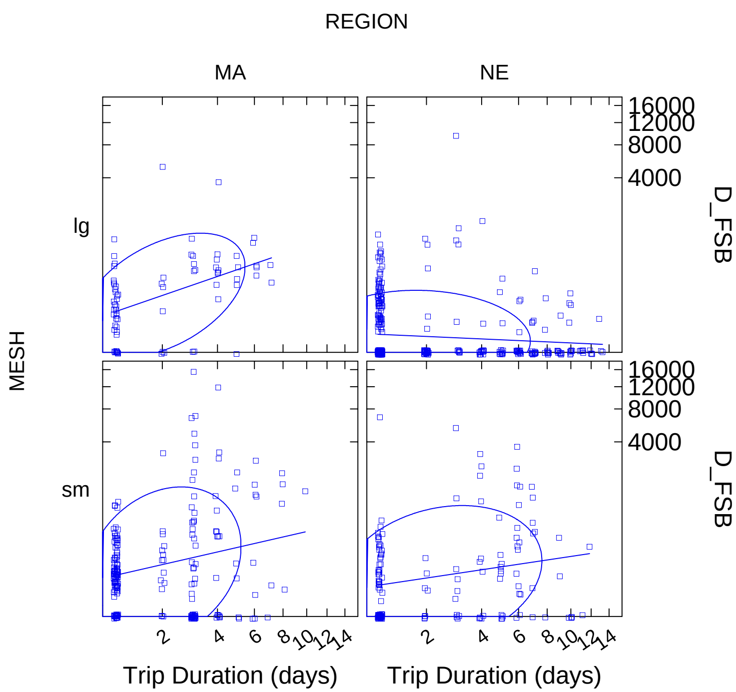


Figure B-1oo. Comparison of fluke-scup-black sea bass discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (; sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

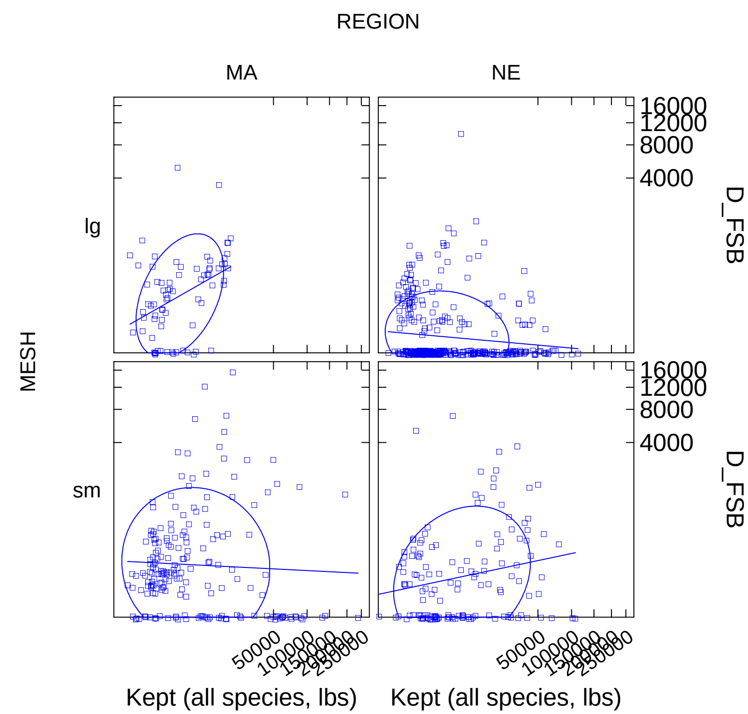


Figure B-1pp. Comparison of fluke-scup-black sea bass discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

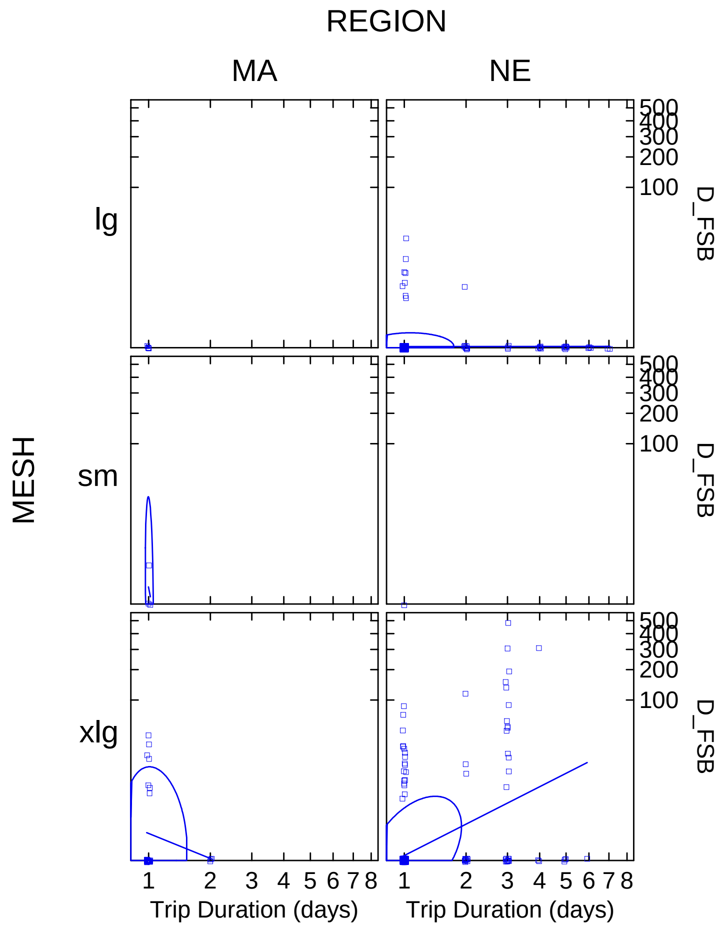


Figure B-1qq. Comparison of fluke-scup-black sea bass discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

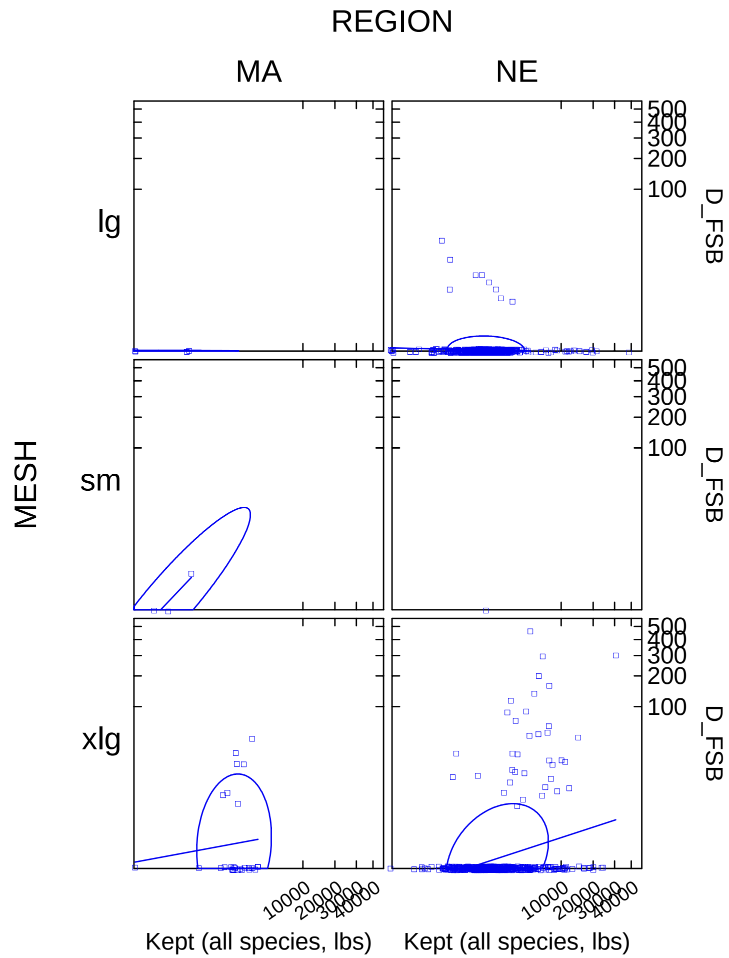


Figure B-1rr. Comparison of fluke-scup-black sea bass discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

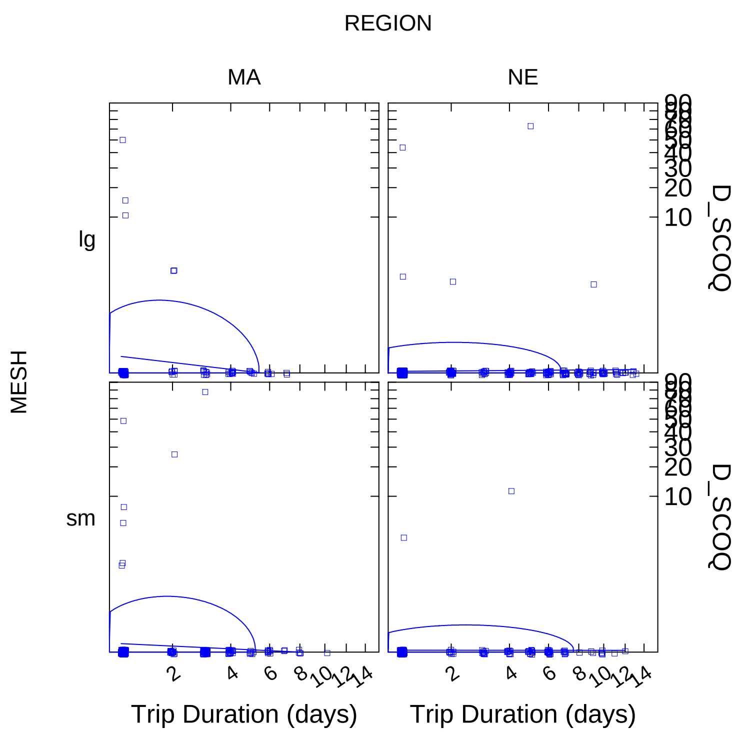


Figure B-1ss. Comparison of surfclams/quahogs discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

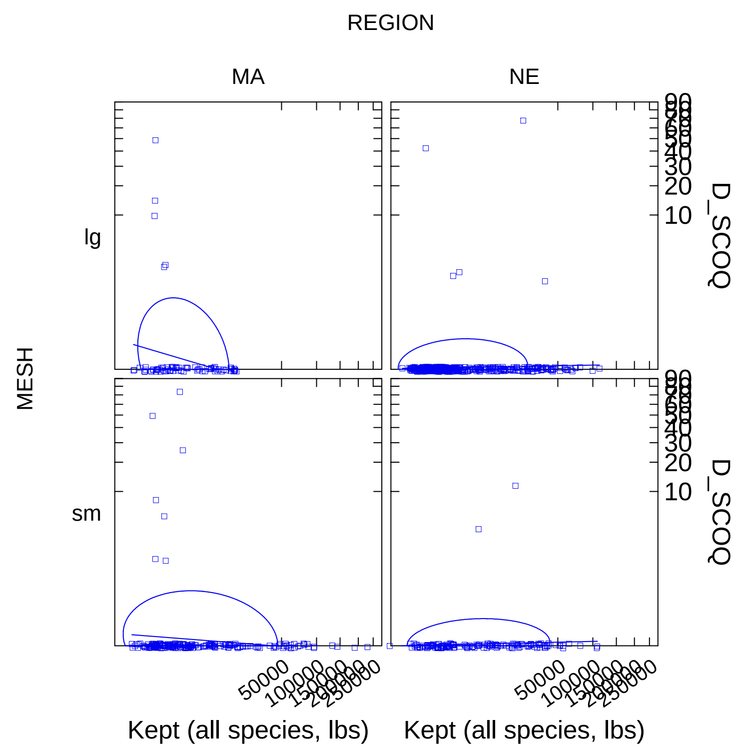


Figure B-1tt. Comparison of surfclams/quahogs discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

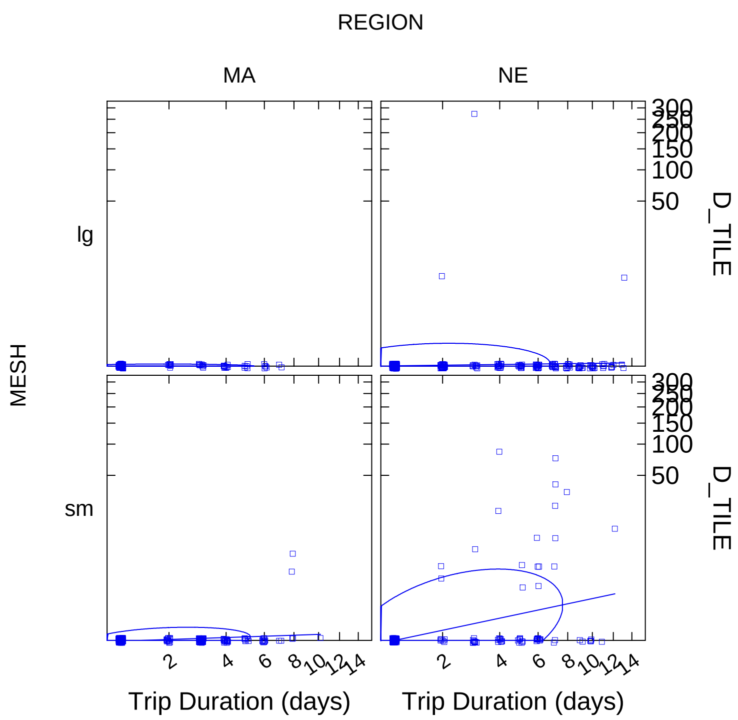


Figure B-1uu. Comparison of tilefish discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

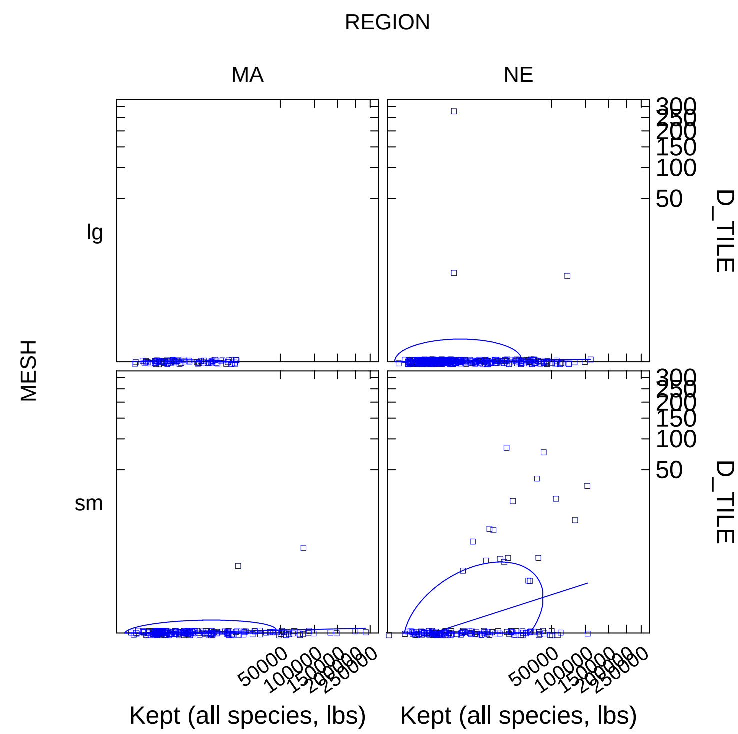


Figure B-1vv. Comparison of tilefish discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip.

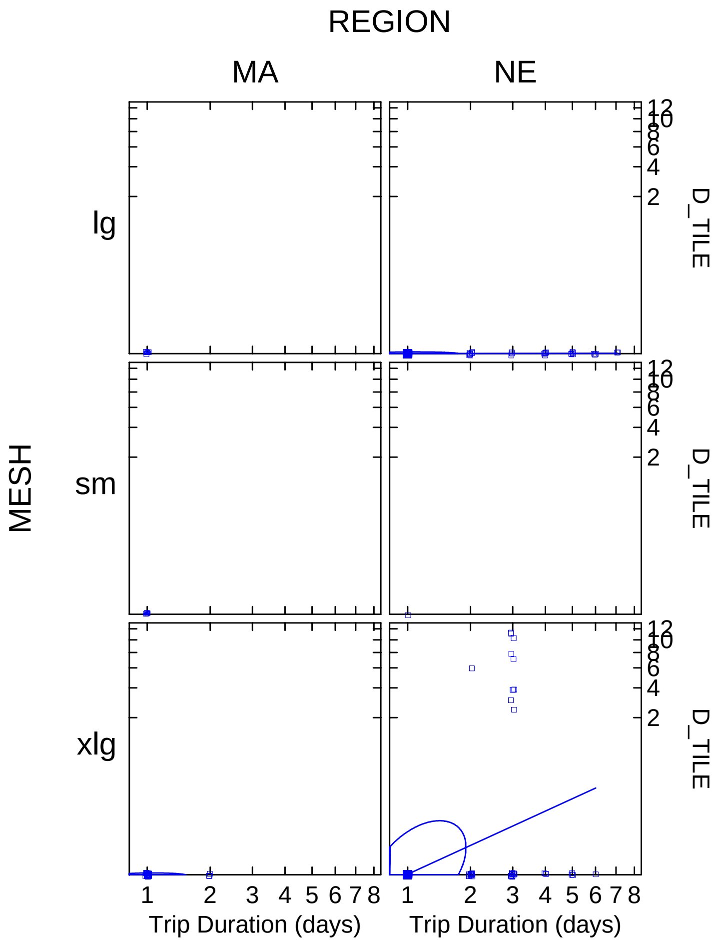


Figure B-1ww. Comparison of tilefish discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

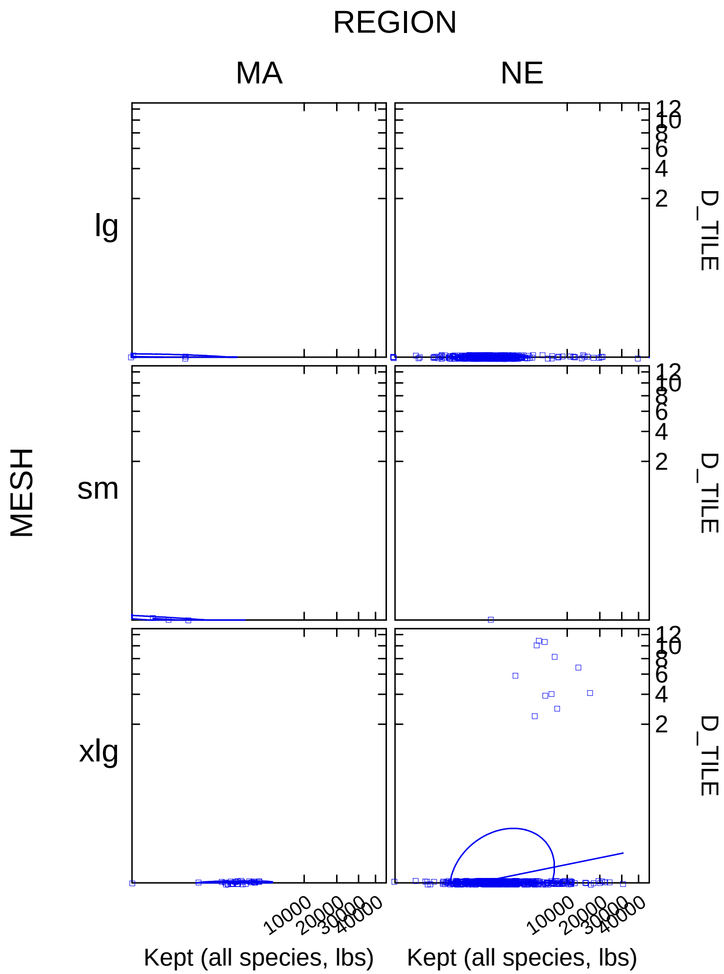


Figure B-1xx. Comparison of tilefish discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip.

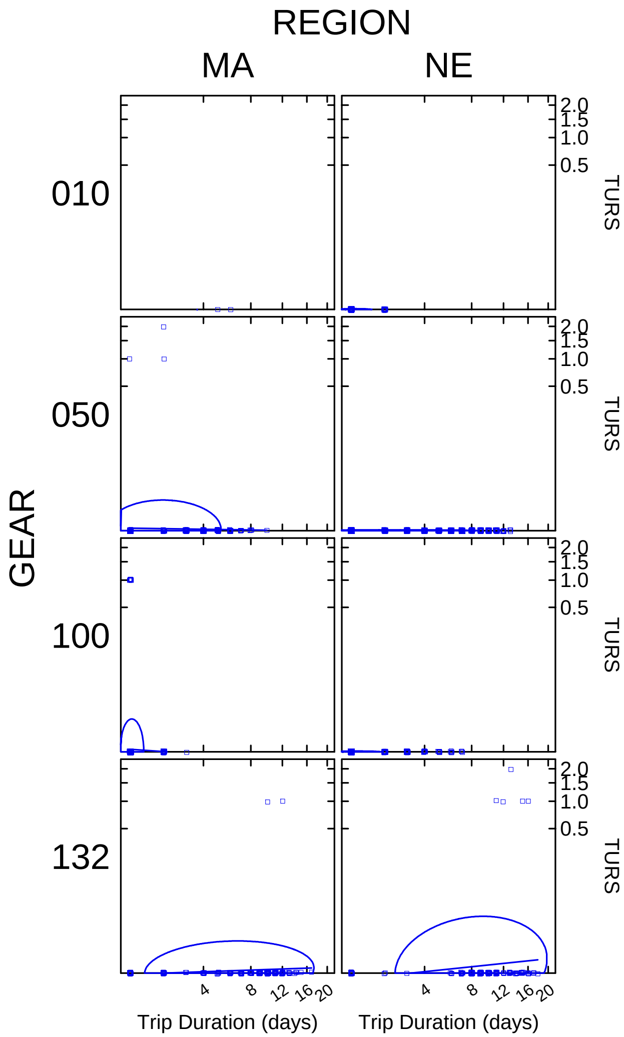


Figure B-2a. Comparison of sea turtles and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

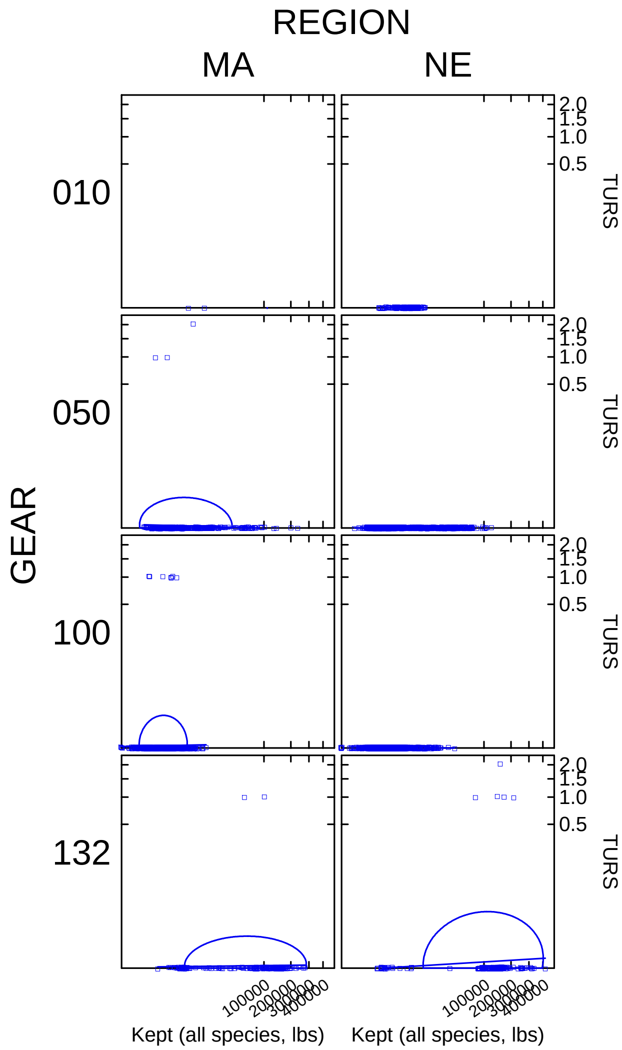


Figure B-2b. Comparison of sea turtles and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

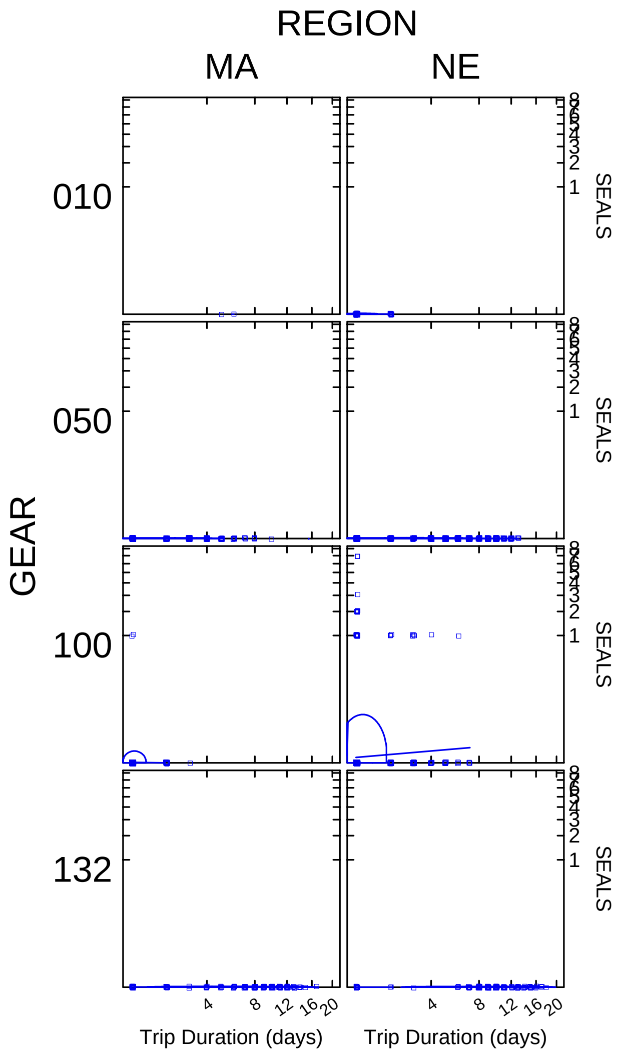


Figure B-2c. Comparison of seals and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

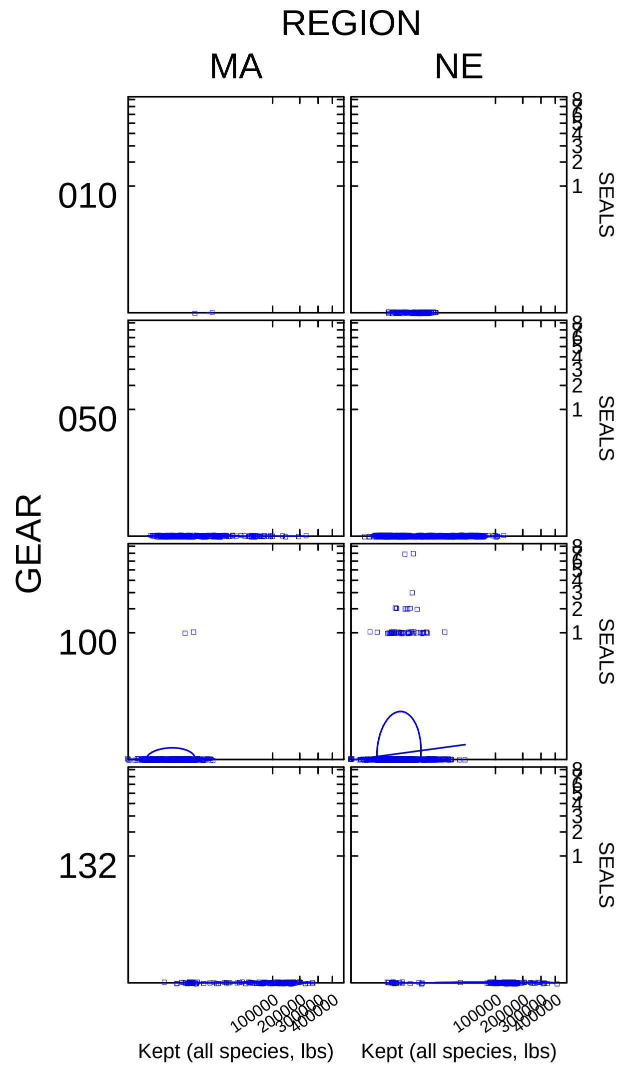


Figure B-2d. Comparison of seals and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

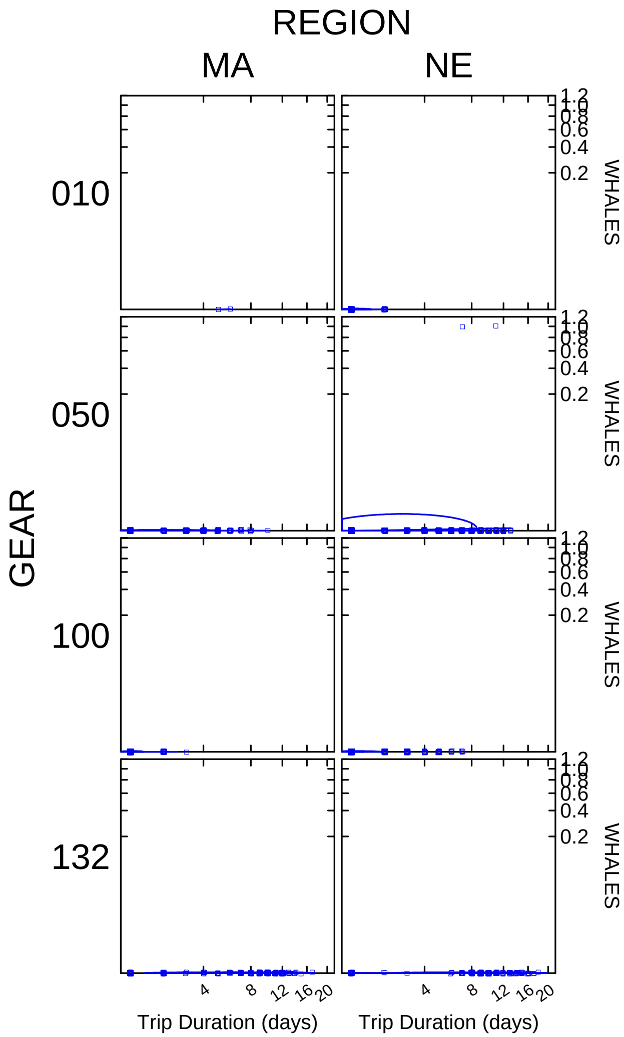


Figure B-2e. Comparison of whales and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

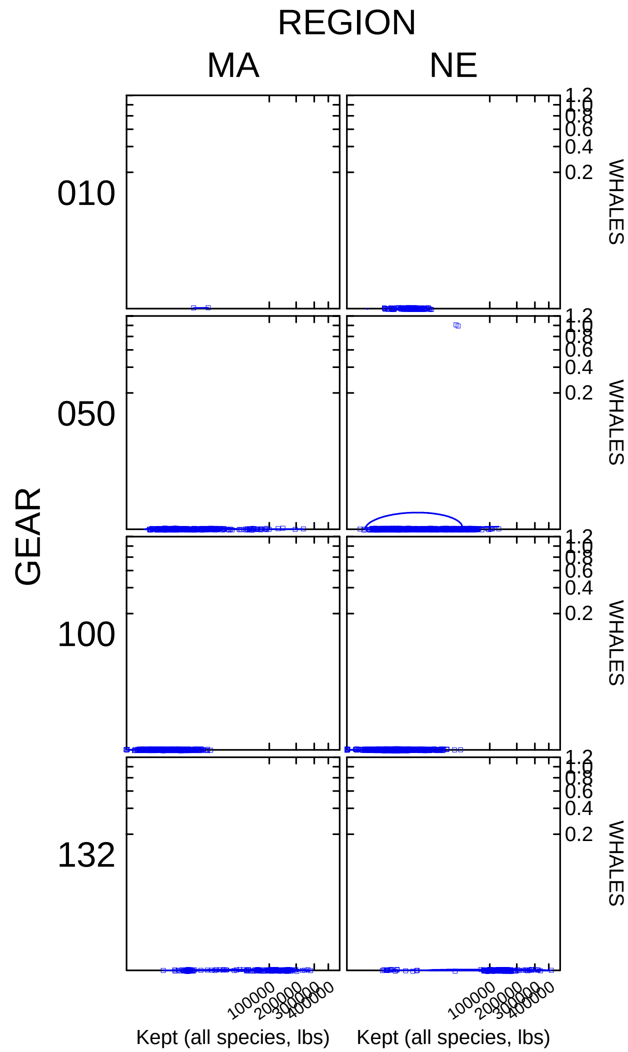


Figure B-2f. Comparison of whales and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

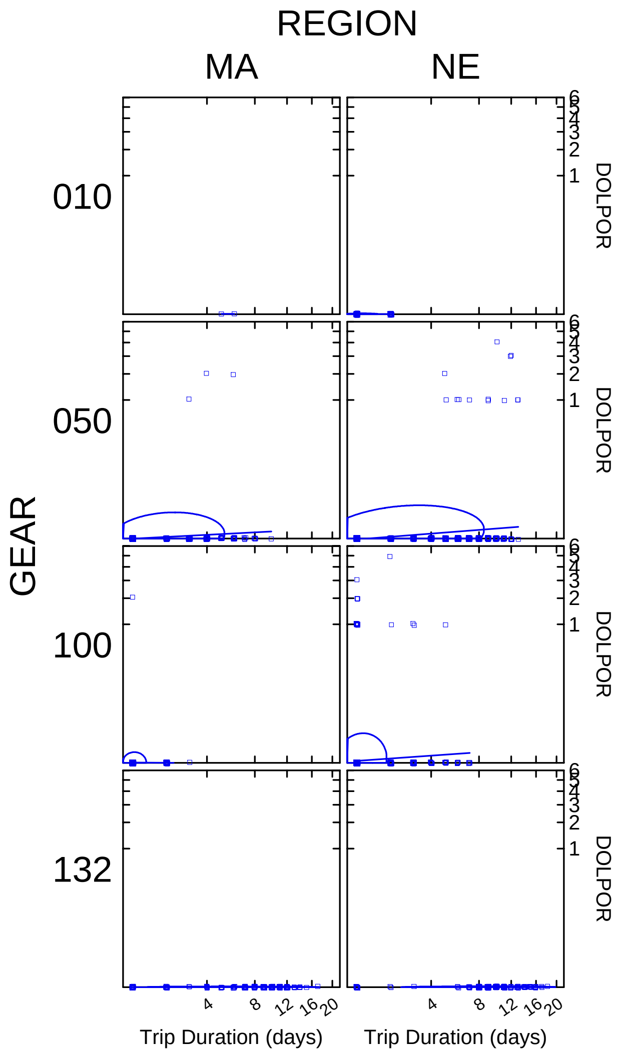


Figure B-2g. Comparison of dolphins/porpoises and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

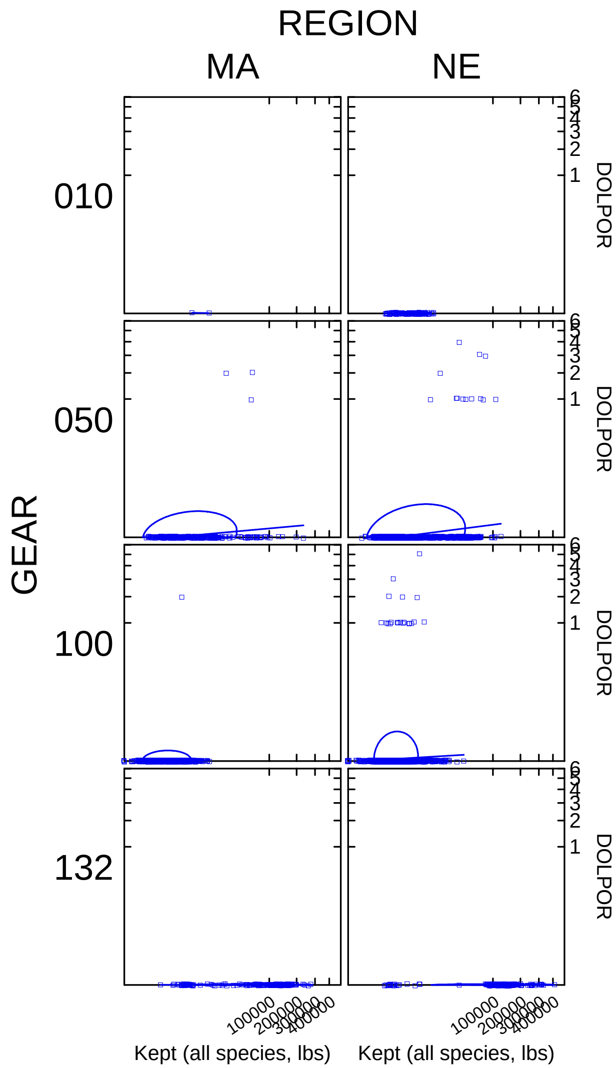


Figure B-2h. Comparison of dolphins/porpoises and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

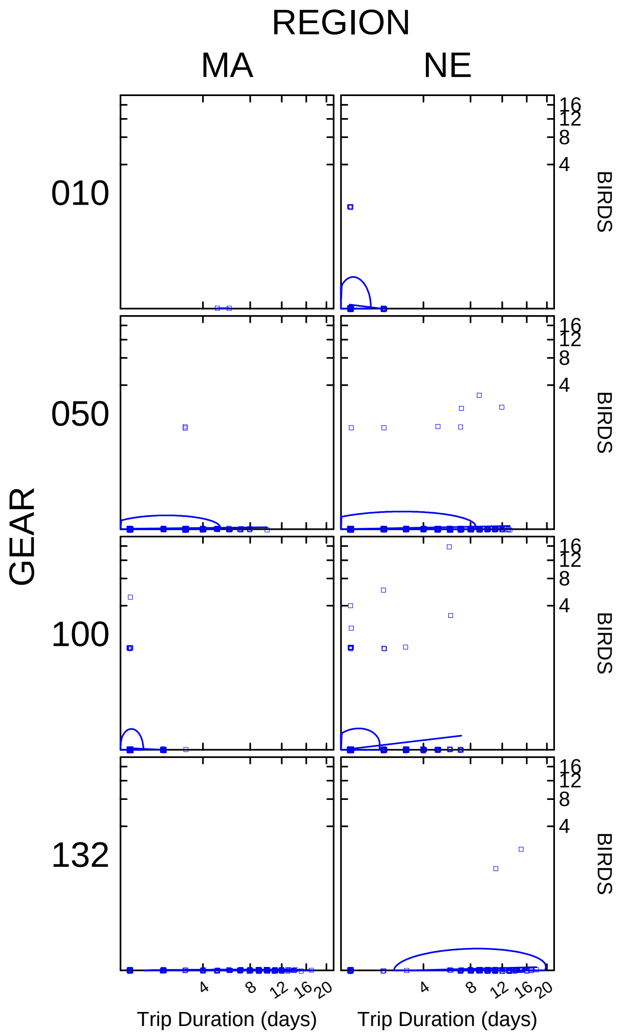


Figure B-2i. Comparison of sea birds and trip duration (days) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

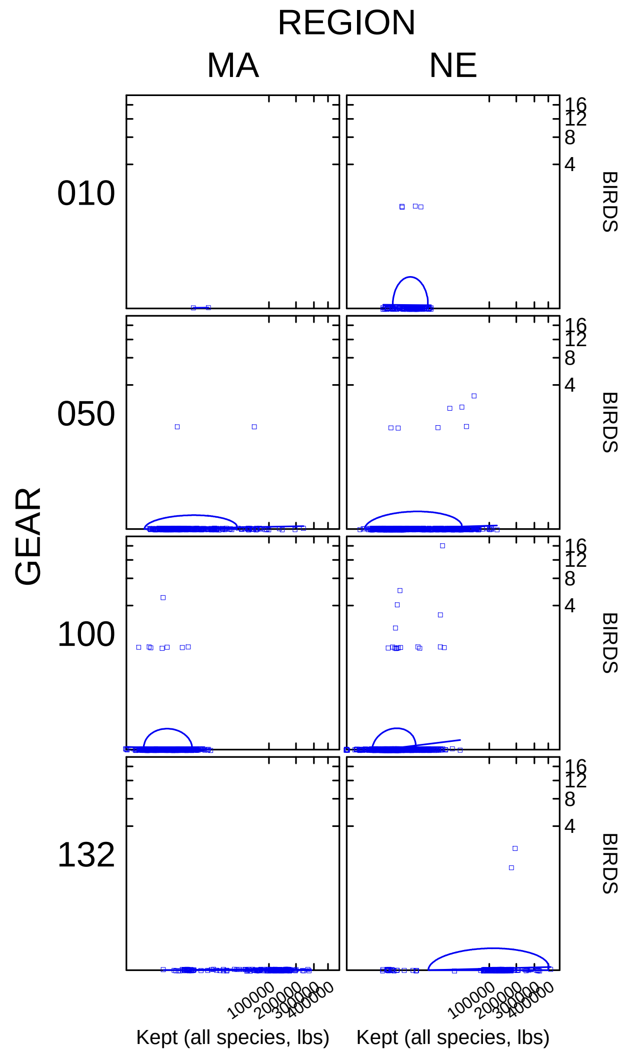


Figure B-2j. Comparison of sea birds and kept weight of all species (pounds) from 2004 observed longline (010), otter trawl (050), gillnet (100) and scallop dredge (132) trips, by region; each dot represents a trip.

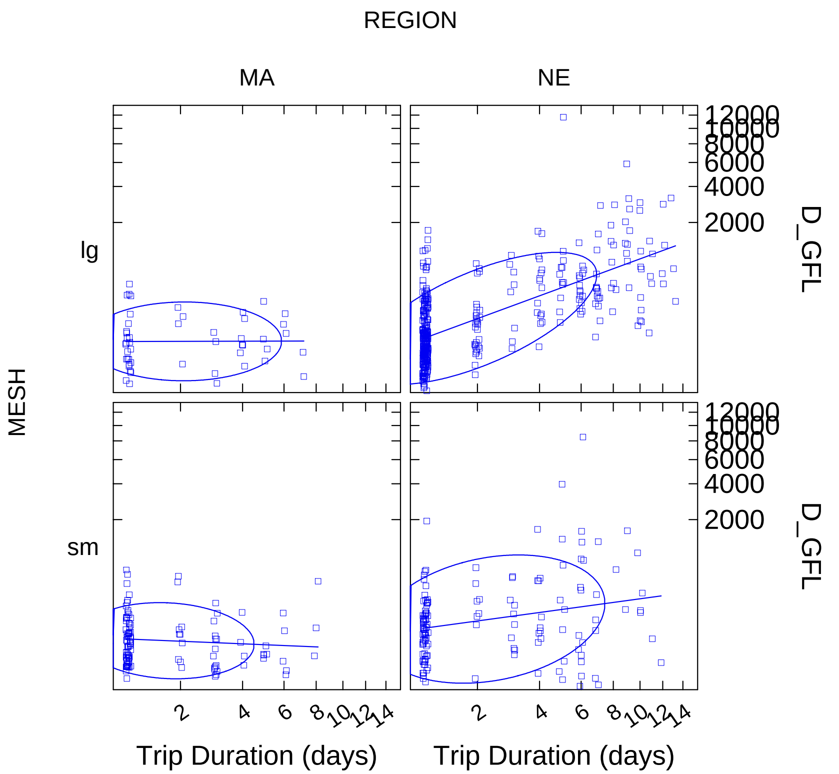


Figure B-3a. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed otter trawl trips, by region and mesh size group (sm <5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

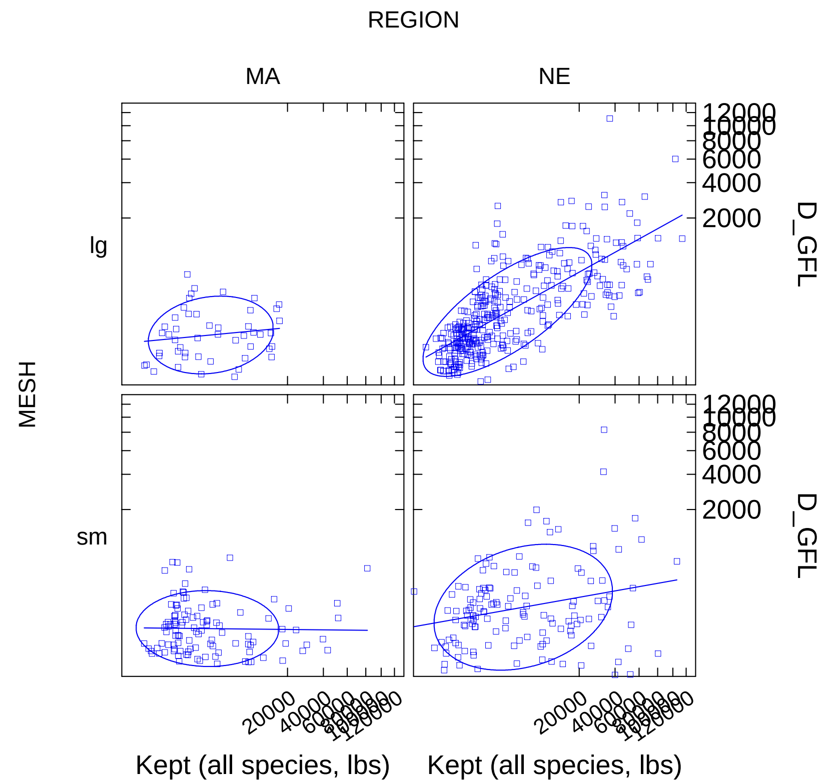


Figure B-3b. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed otter trawl trips by region and mesh size group (sm < 5.5 inches, and lg => 5.5 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded

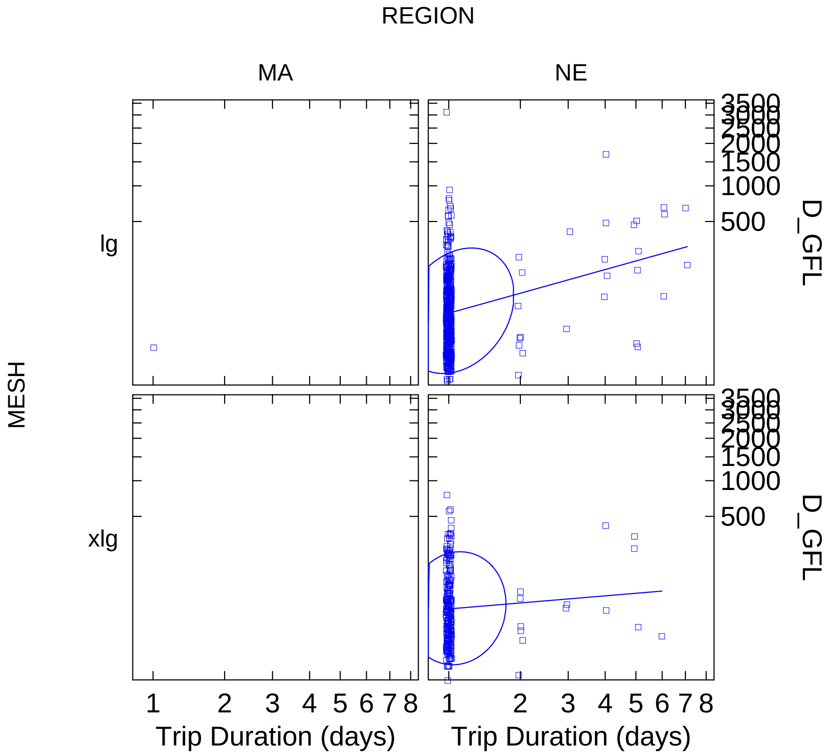


Figure B-3c. Comparison of Northeast multispecies (large-mesh) discards (pounds) and trip duration (days) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

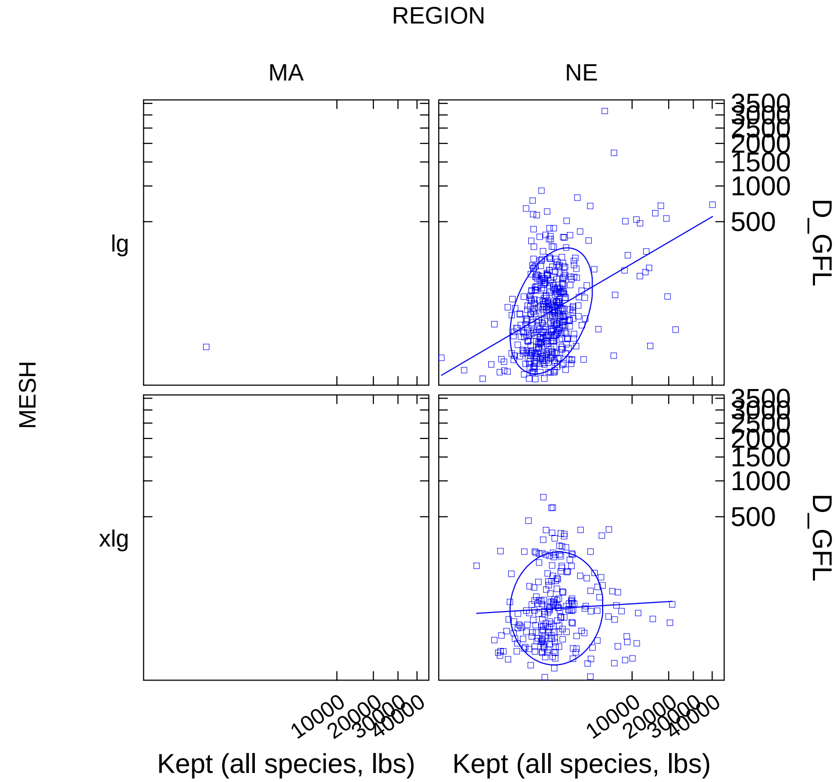


Figure B-3d. Comparison of Northeast multispecies (large-mesh) discards (pounds) and kept weight of all species (pounds) from 2004 observed gillnet trips by region and mesh size group (lg = 5.5 to 7.99 inches; sm < 5.5 inches, and xlg > 8 inches); fourth root transformation used, each dot represents a trip. Trips with zero discards of Northeast multispecies (large-mesh) are excluded.

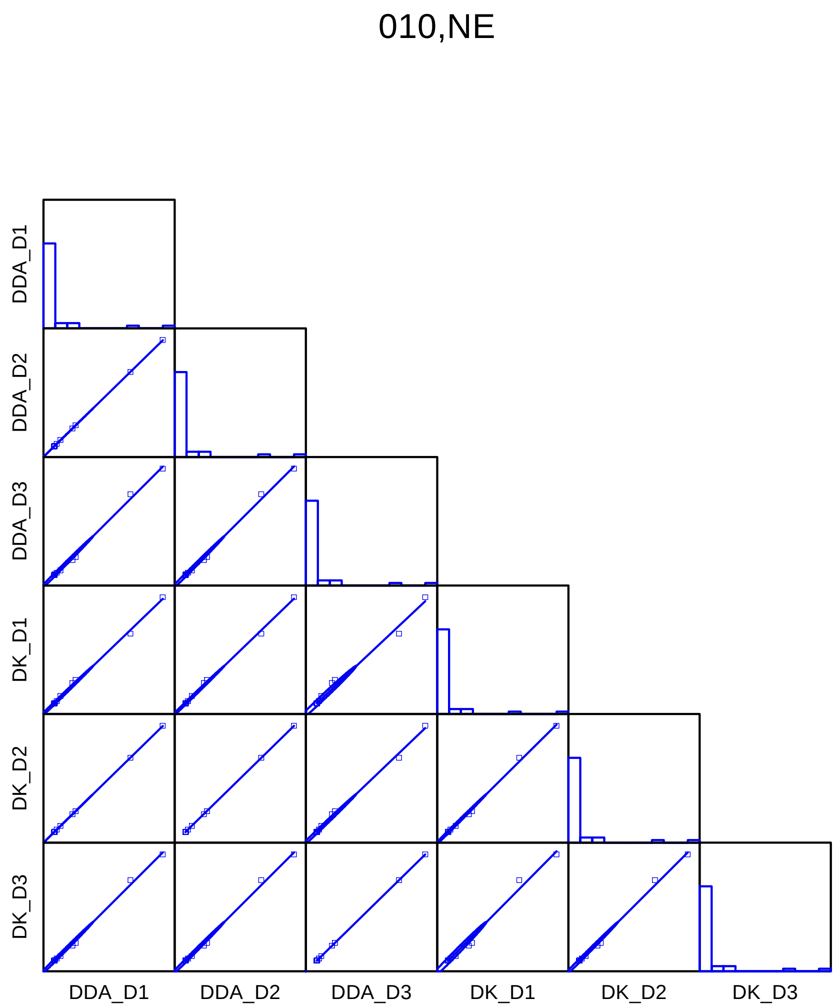


Figure B-4a. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

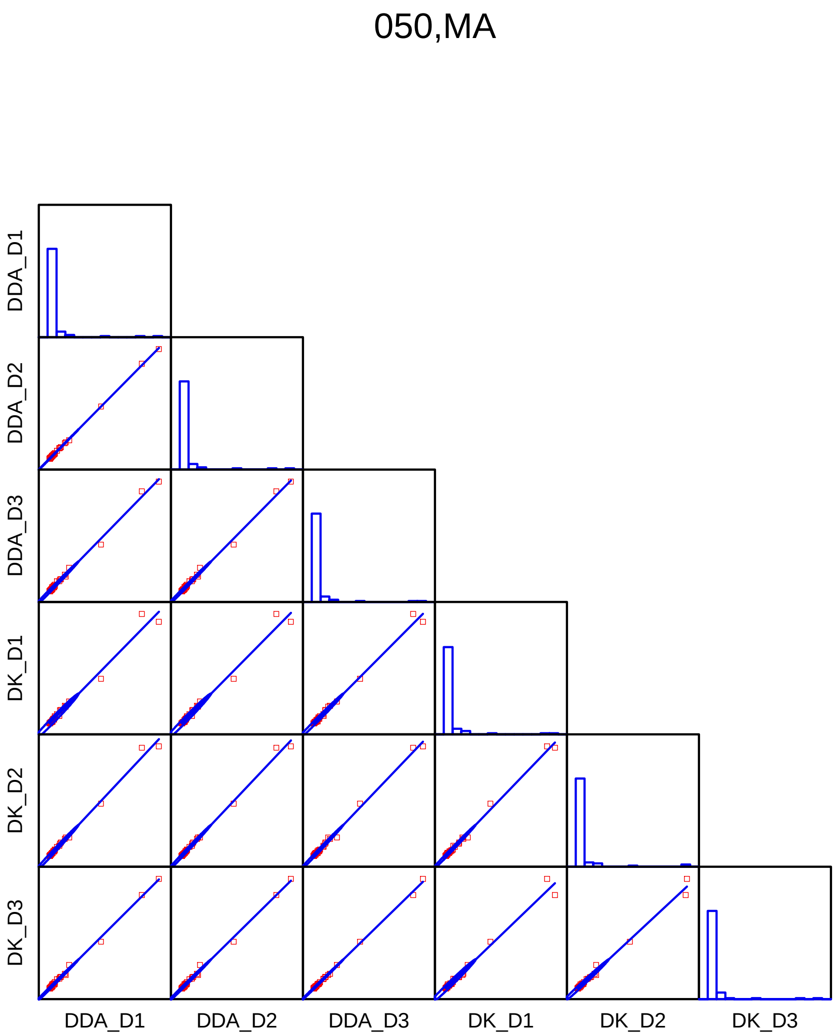


Figure B-4b. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

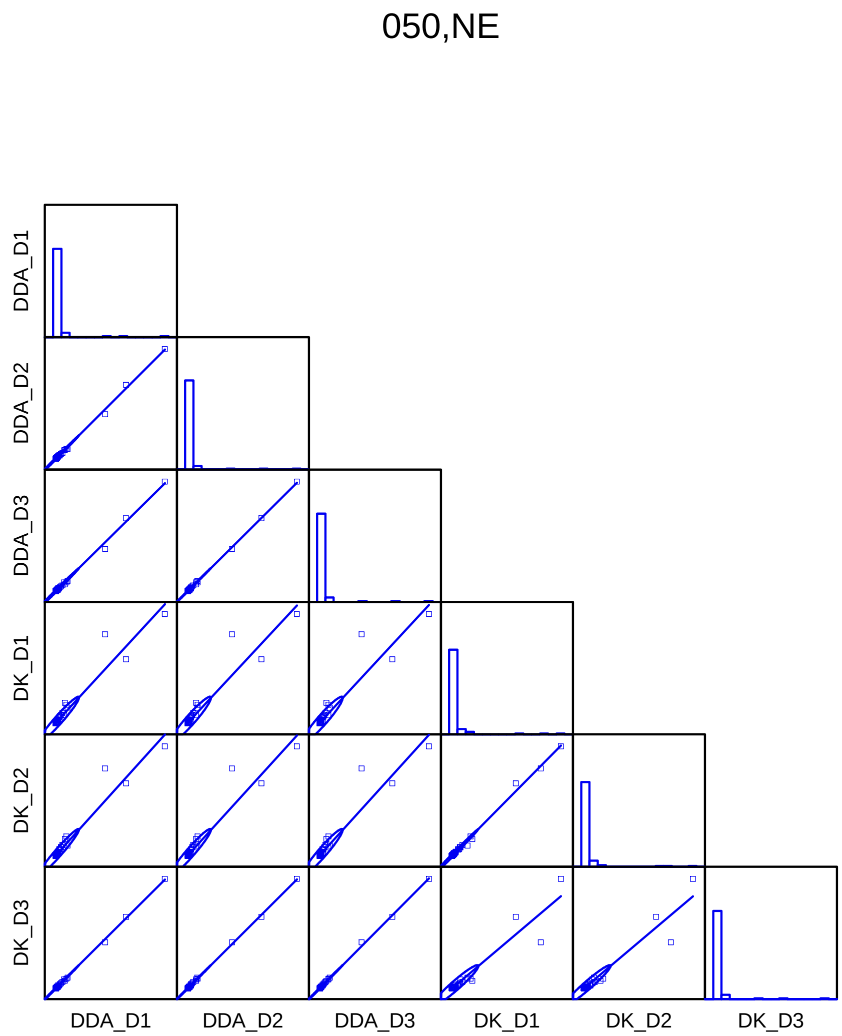


Figure B-4c. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

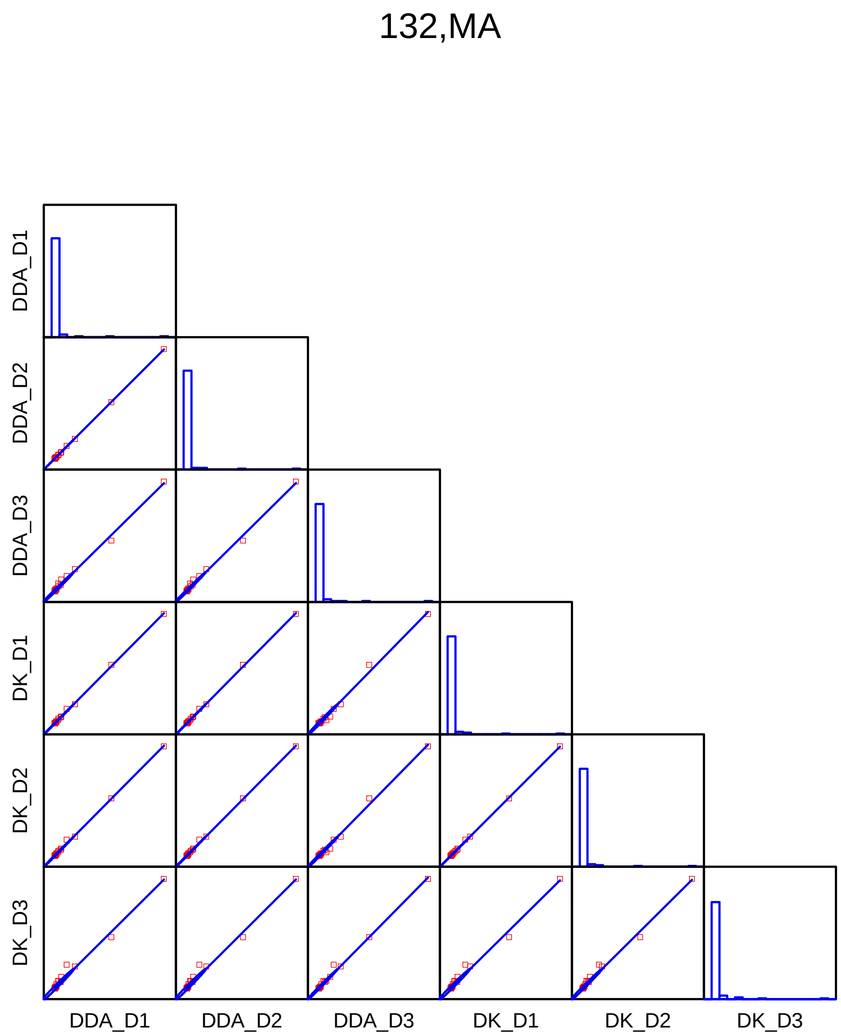


Figure B-4d. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge; each dot represents a species group and mesh size.

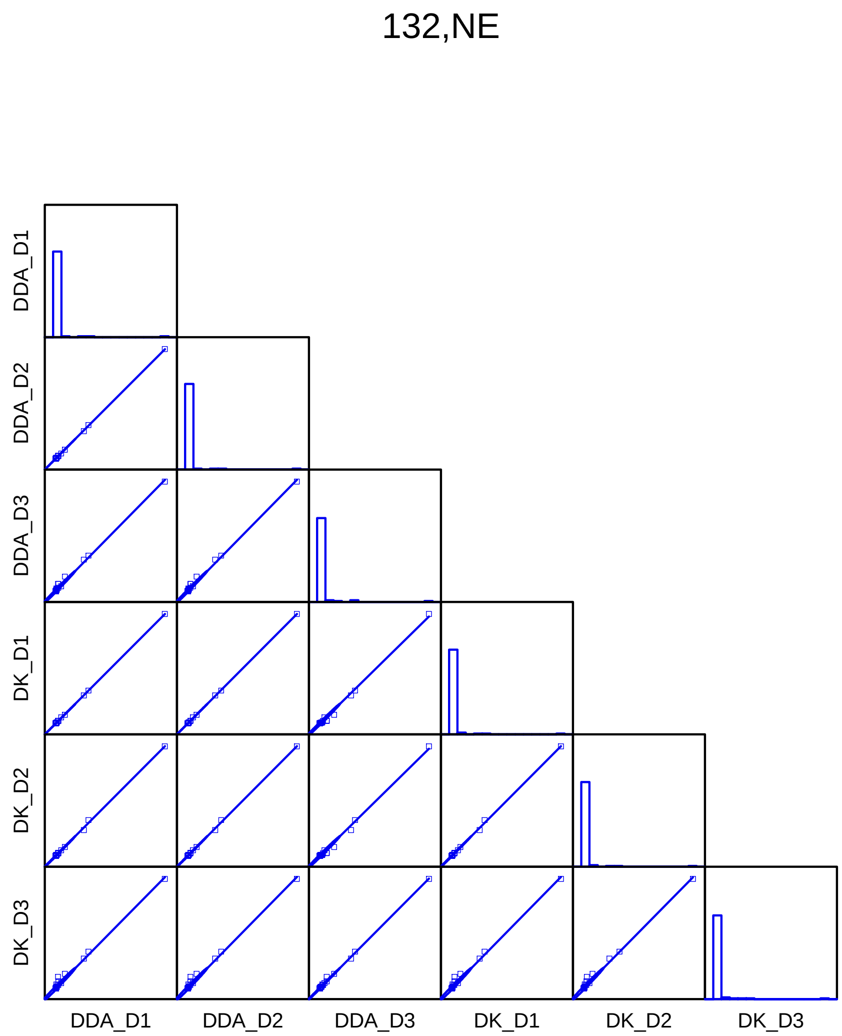


Figure B-4e. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge; each dot represents a species group and mesh size.

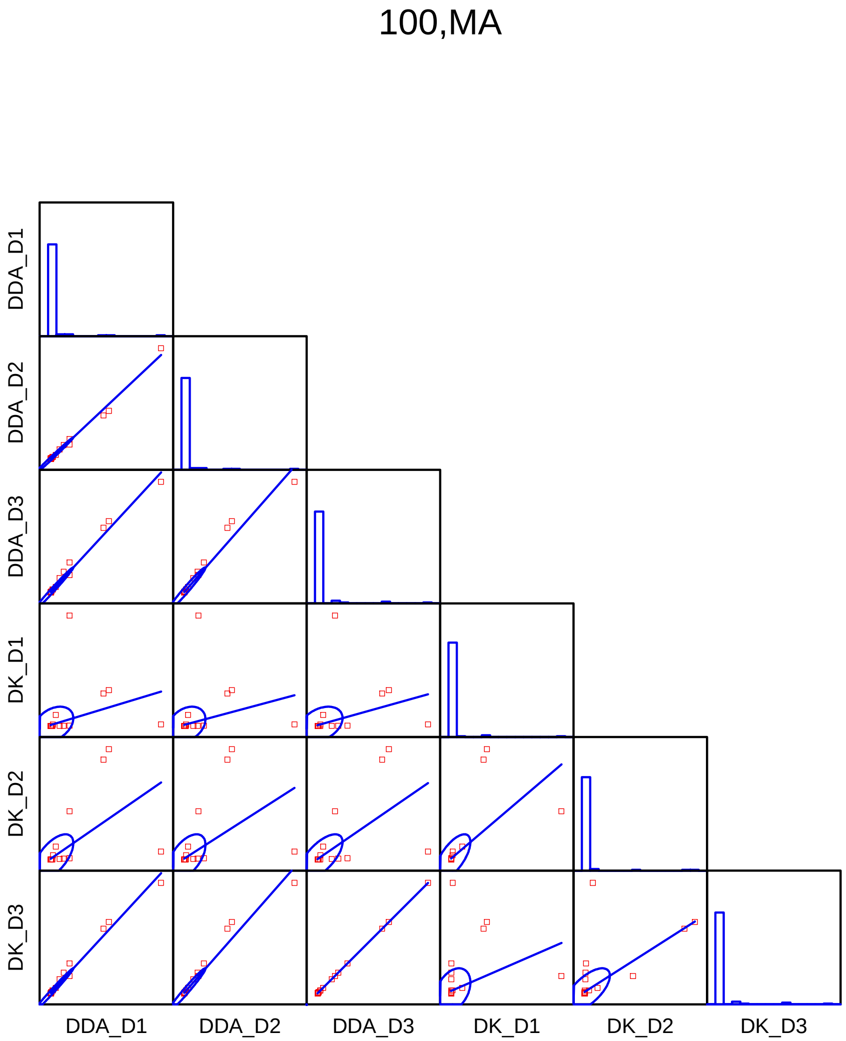


Figure B-4f. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet; each dot represents a species group and mesh size.

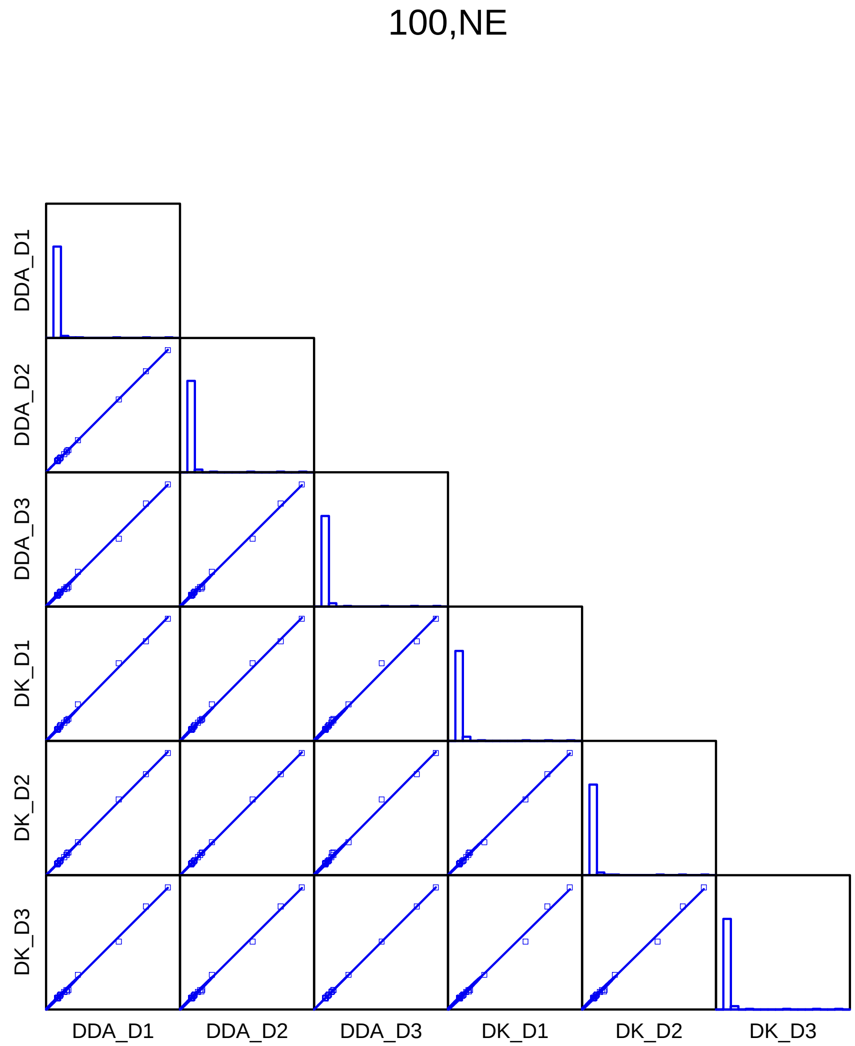


Figure B-4g. Comparisons of the total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet; each dot represents a species group and mesh size.

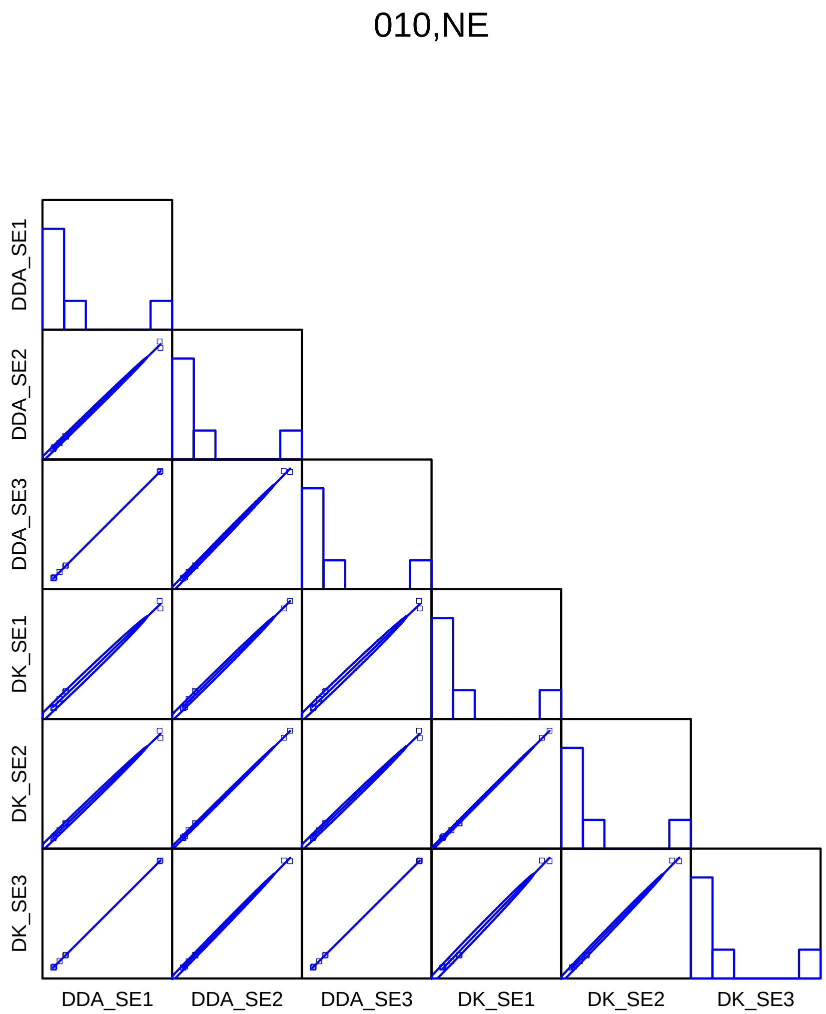


Figure B-5a. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

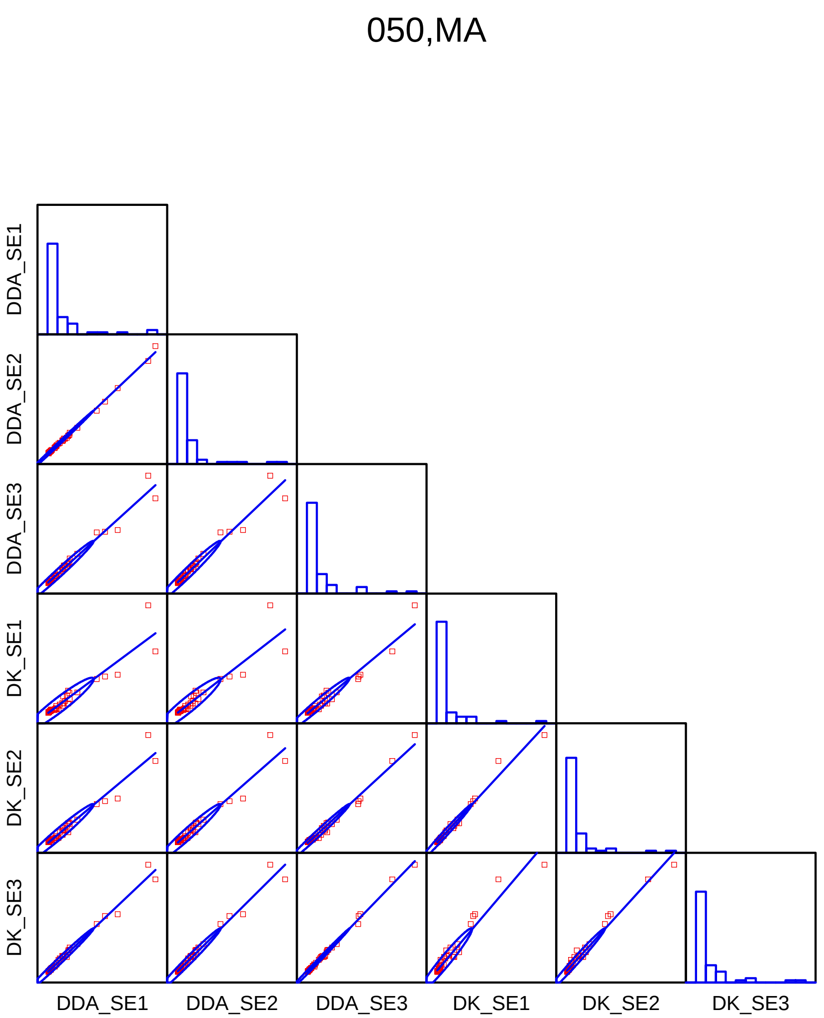


Figure B-5b. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

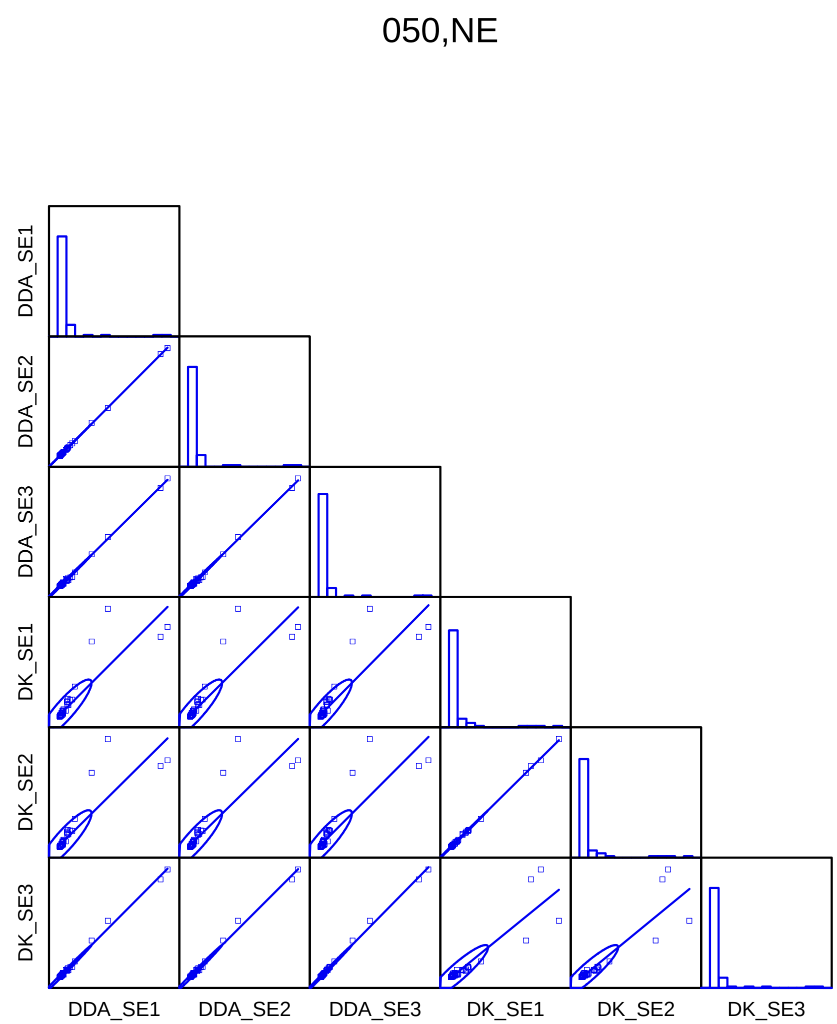


Figure B-5c. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

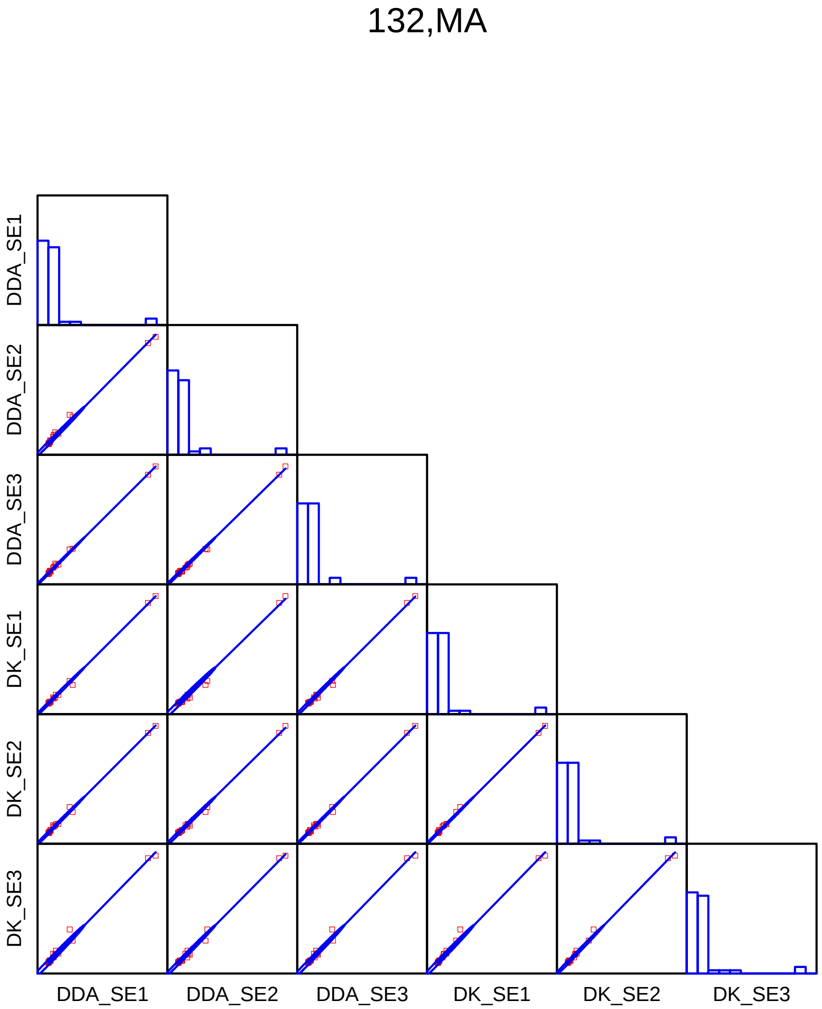


Figure B-5d. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge each dot represents a species group and mesh size

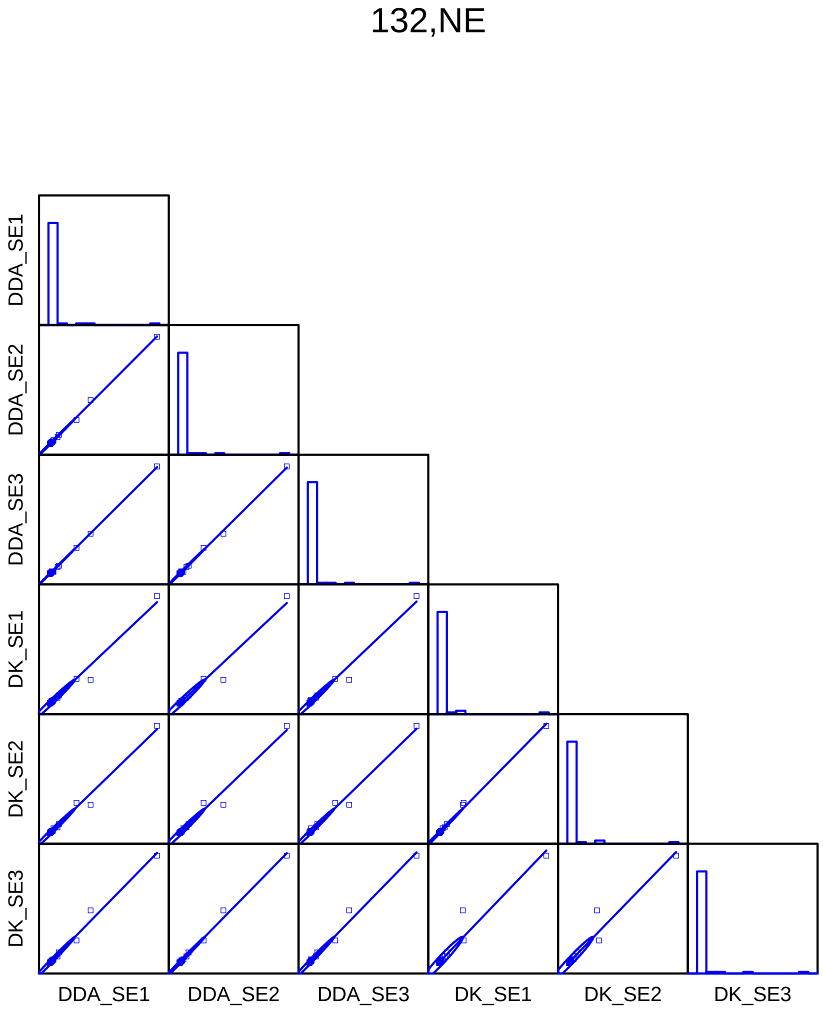


Figure B-5e. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge each dot represents a species group and mesh size

100,MA

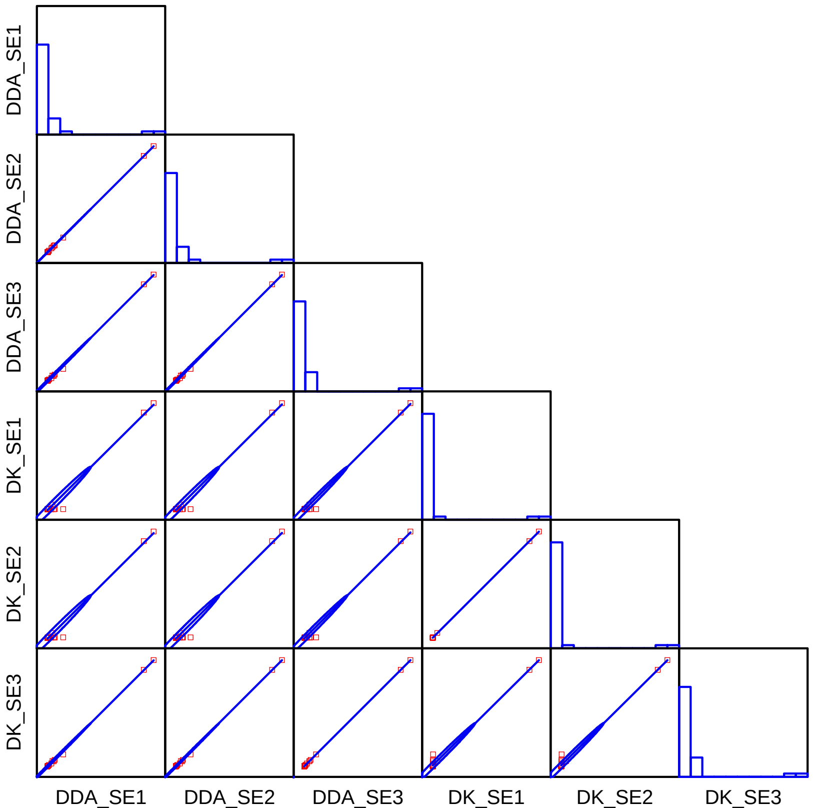


Figure B-5f. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet each dot represents a species group and mesh size.

100,NE

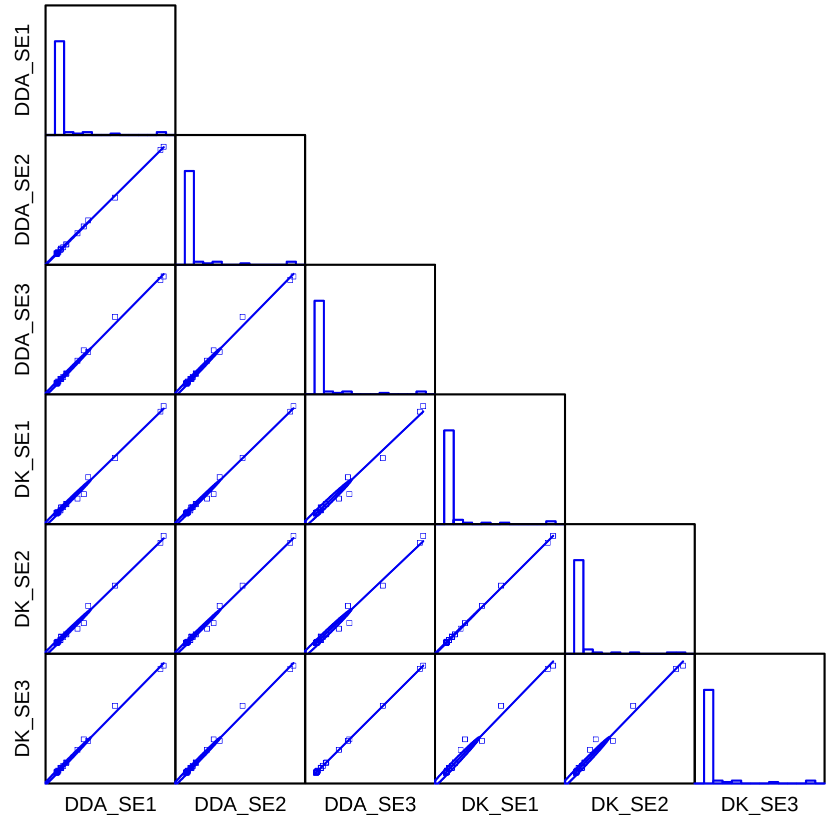


Figure B-5g. Comparisons of the standard error (SE) of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet each dot represents a species group and mesh size.

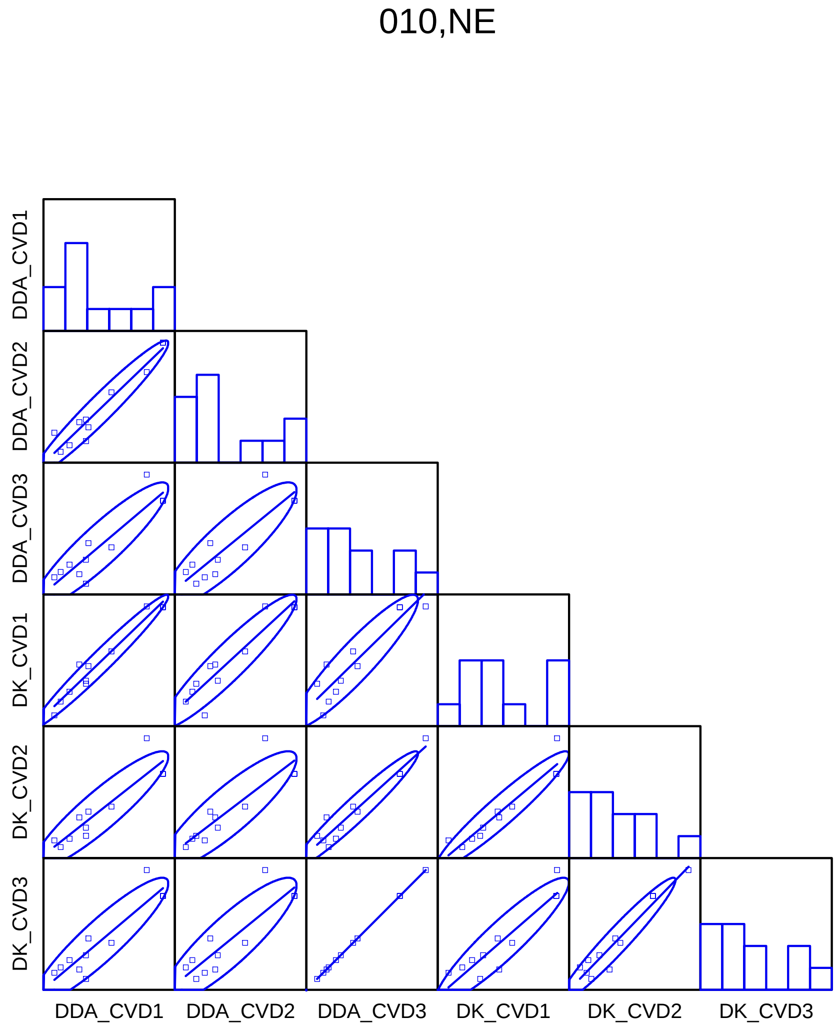


Figure B-5h. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England longline; each dot represents a species group and mesh size.

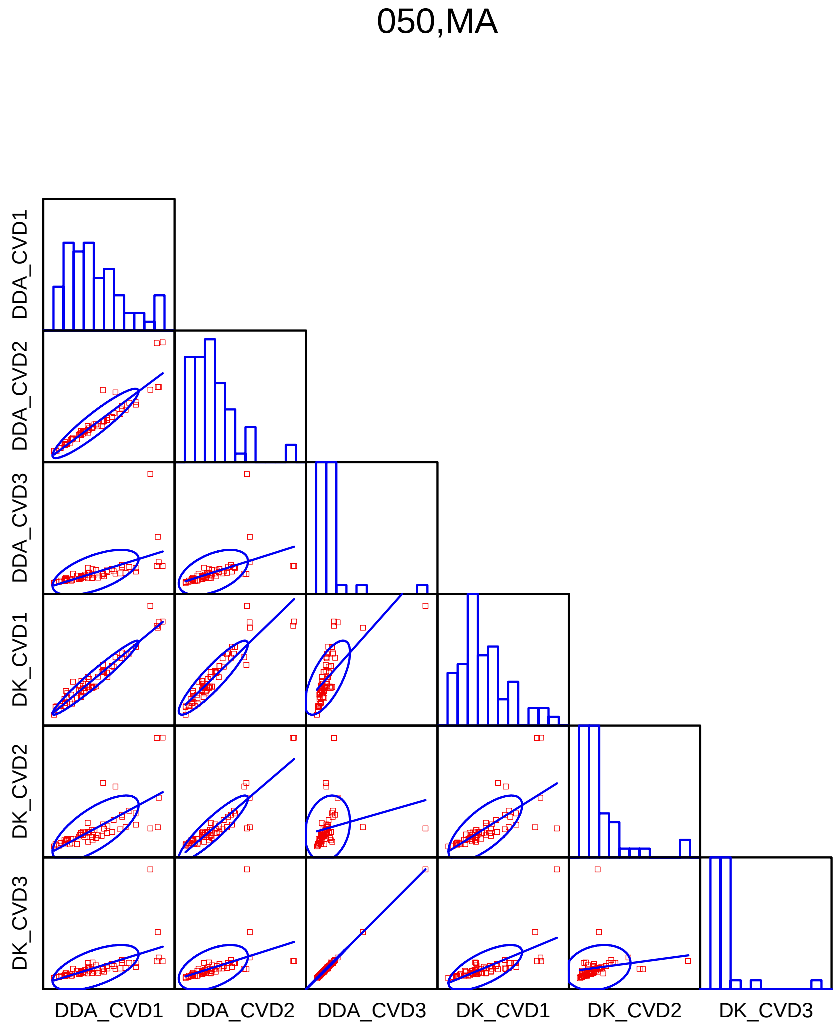


Figure B-5i. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

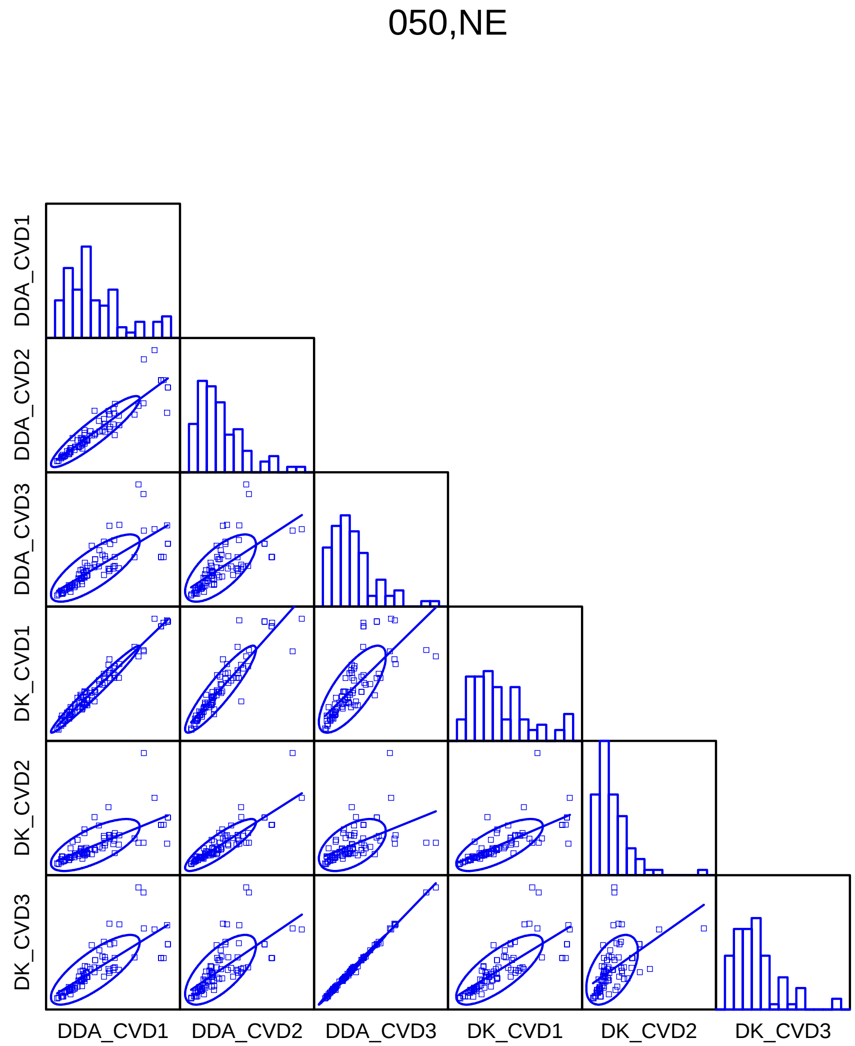


Figure B-5j Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England otter trawl; each dot represents a species group and mesh size.

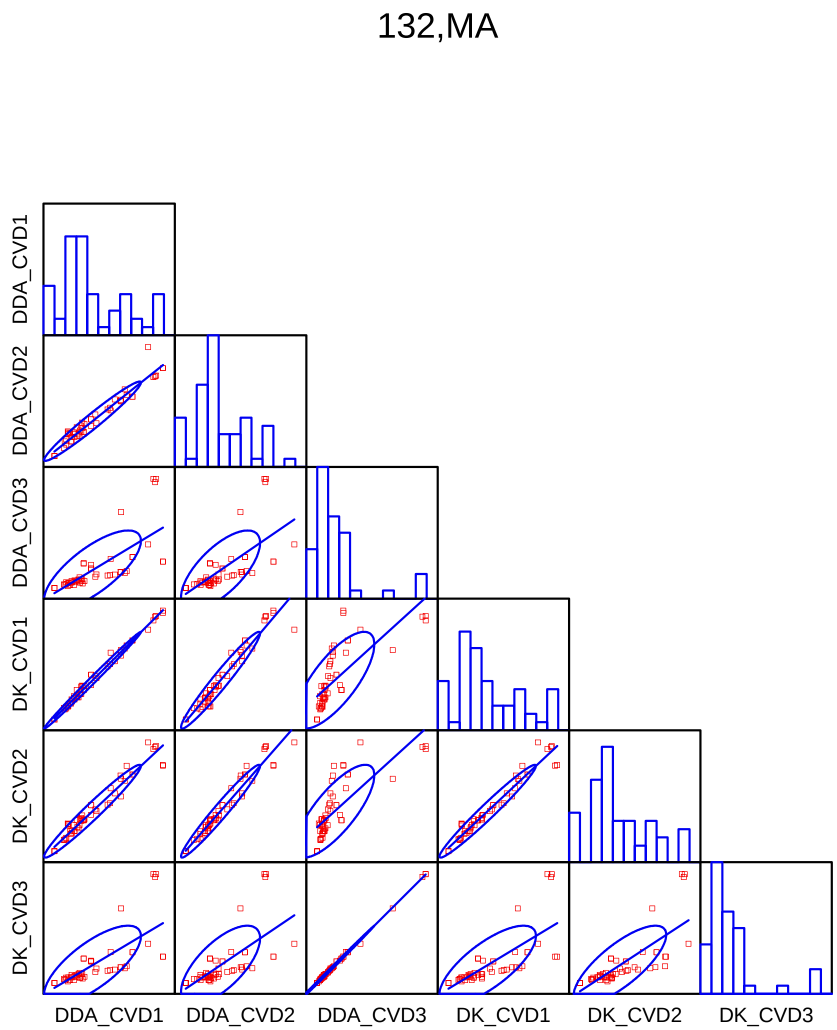


Figure B-5k. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic scallop dredge each dot represents a species group and mesh size

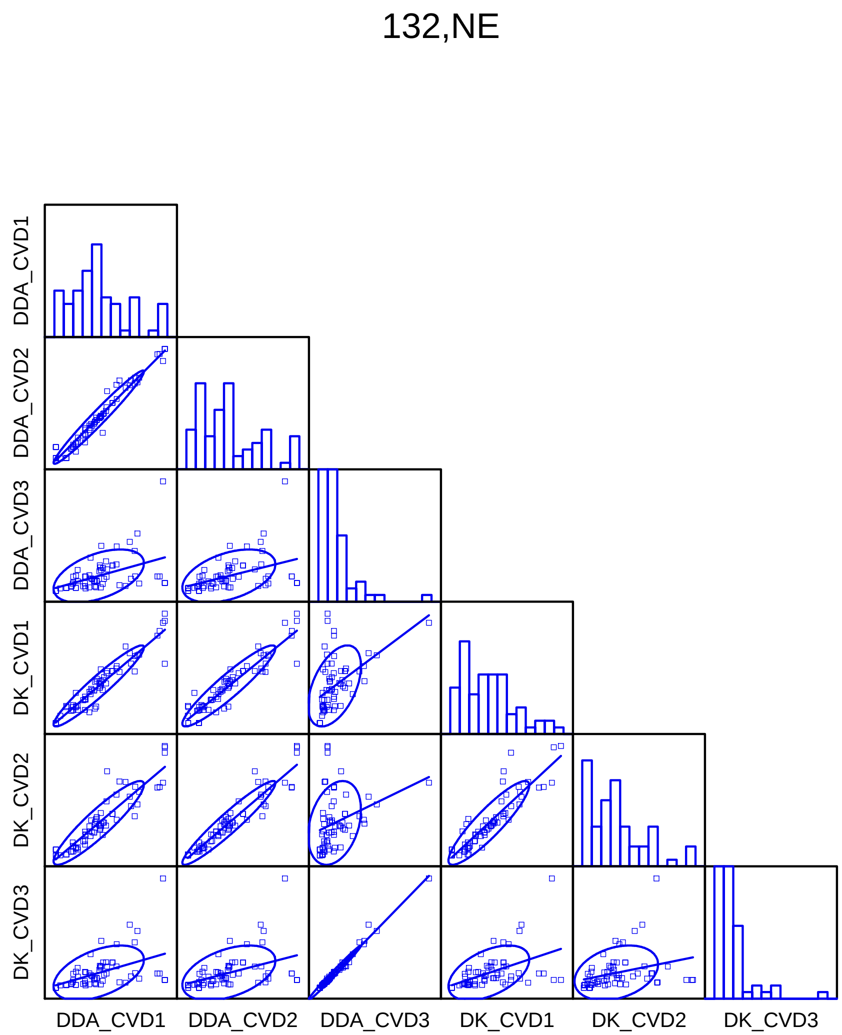


Figure B-5l. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England scallop dredge each dot represents a species group and mesh size

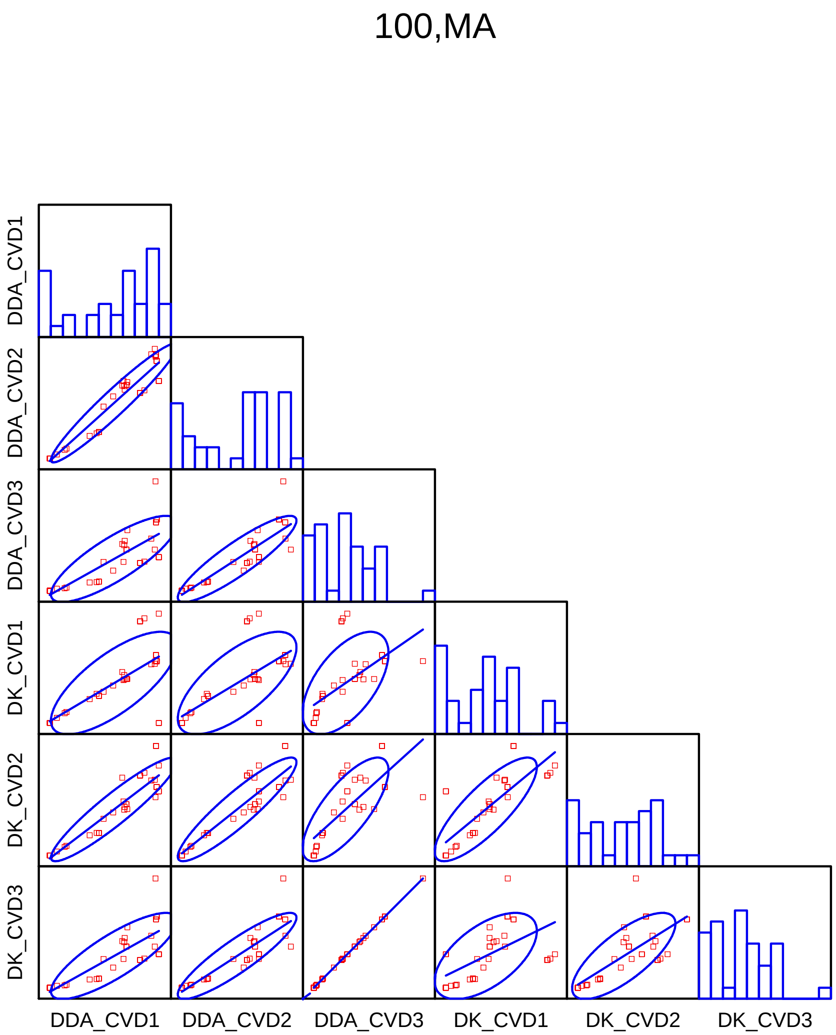


Figure B-5m. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for Mid-Atlantic gillnet each dot represents a species group and mesh size.

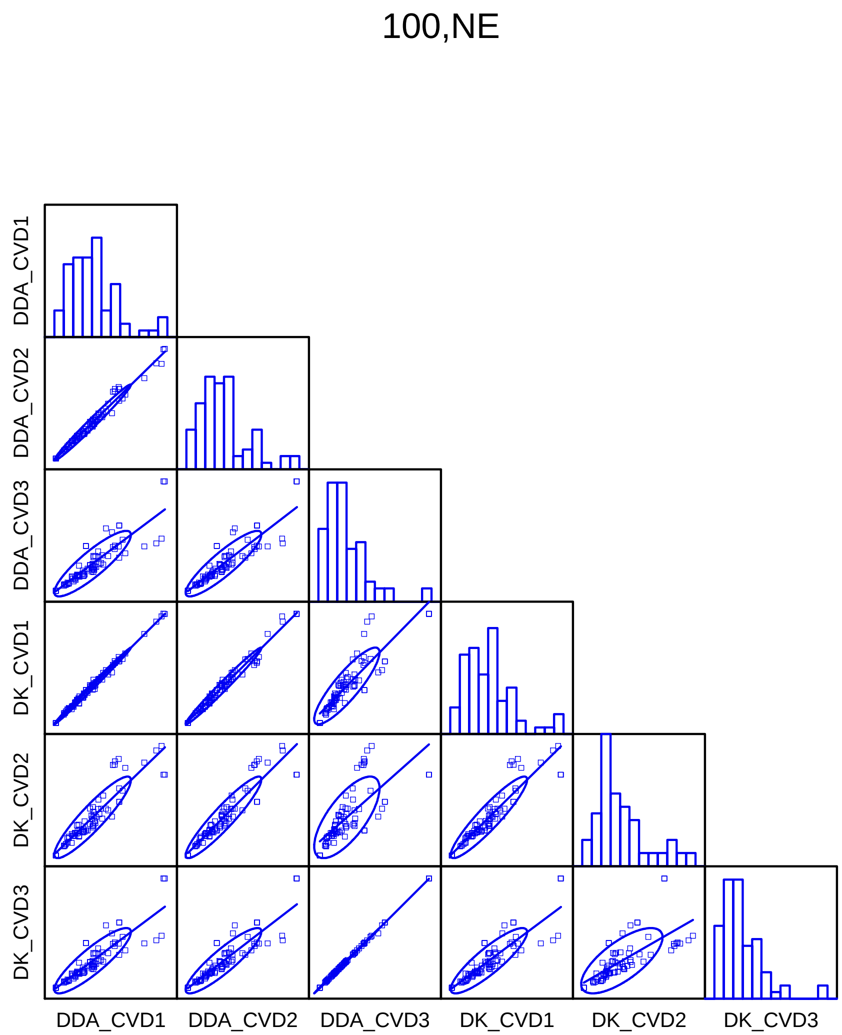
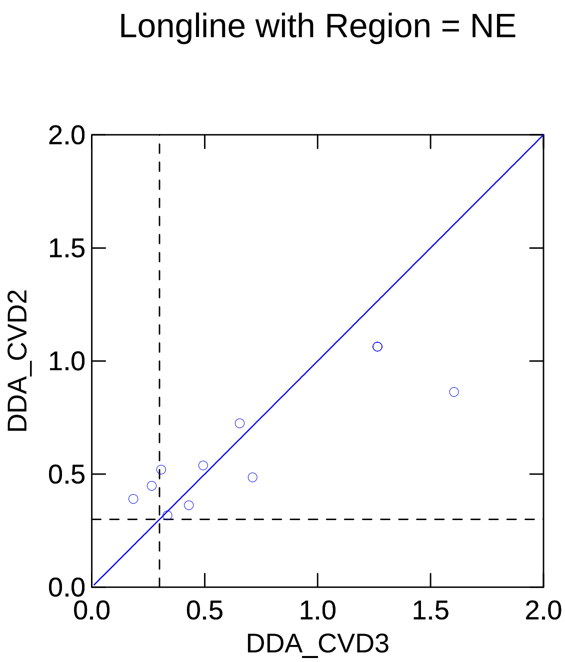


Figure B-5n. Comparisons of the CV of total discards derived by the two bycatch ratios (discard-to-days-absent [DDA] and discard-to-kept [DK]) and the three methods (separate ratio [D1], combined ratio [D2] and simple expansion [D3]) for New England gillnet each dot represents a species group and mesh size.



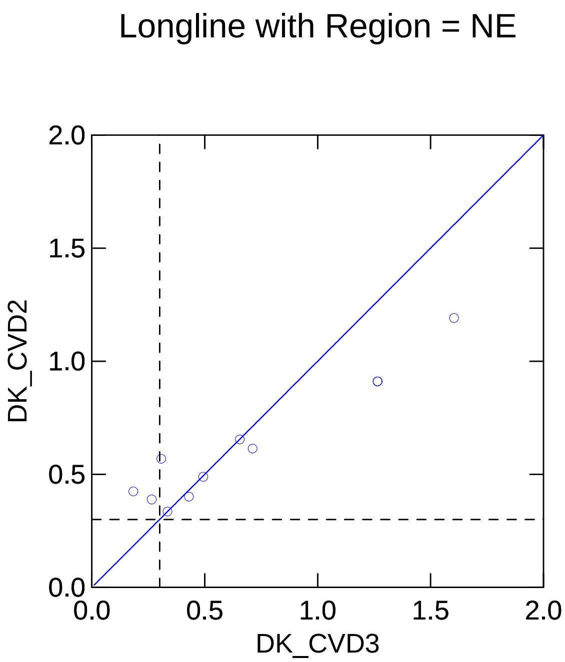


Figure B-6a. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England longline; each dot represents a species group and mesh size.

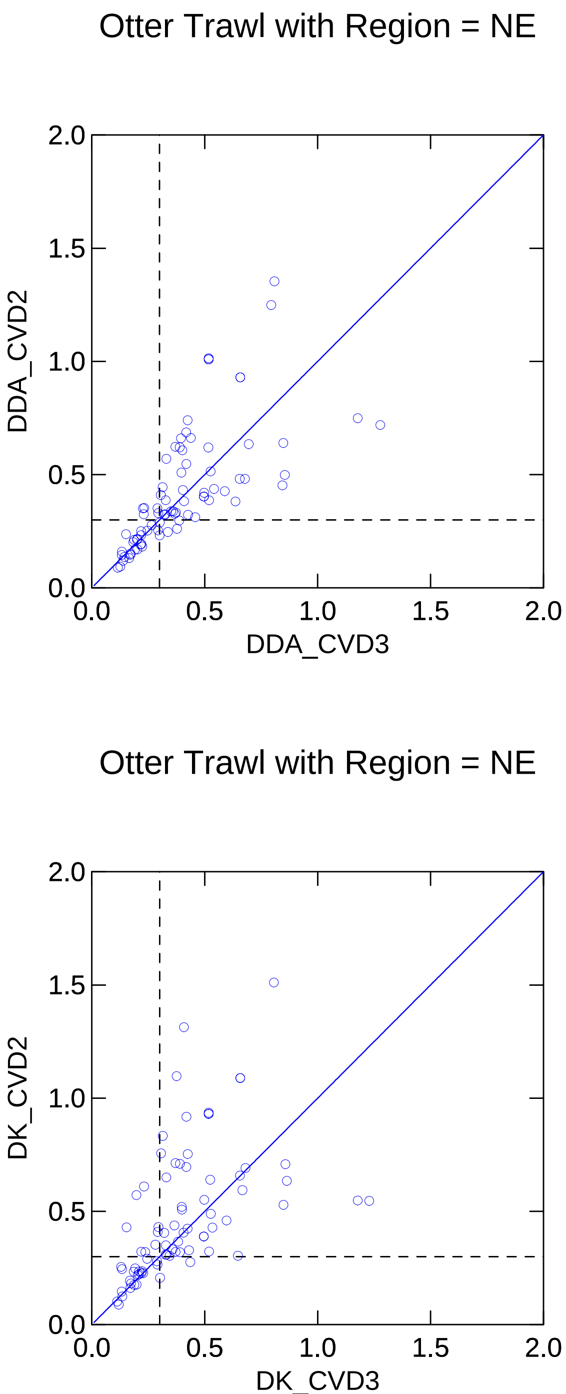


Figure B-6b. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3)for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England otter trawl; each dot represents a species group and mesh size.

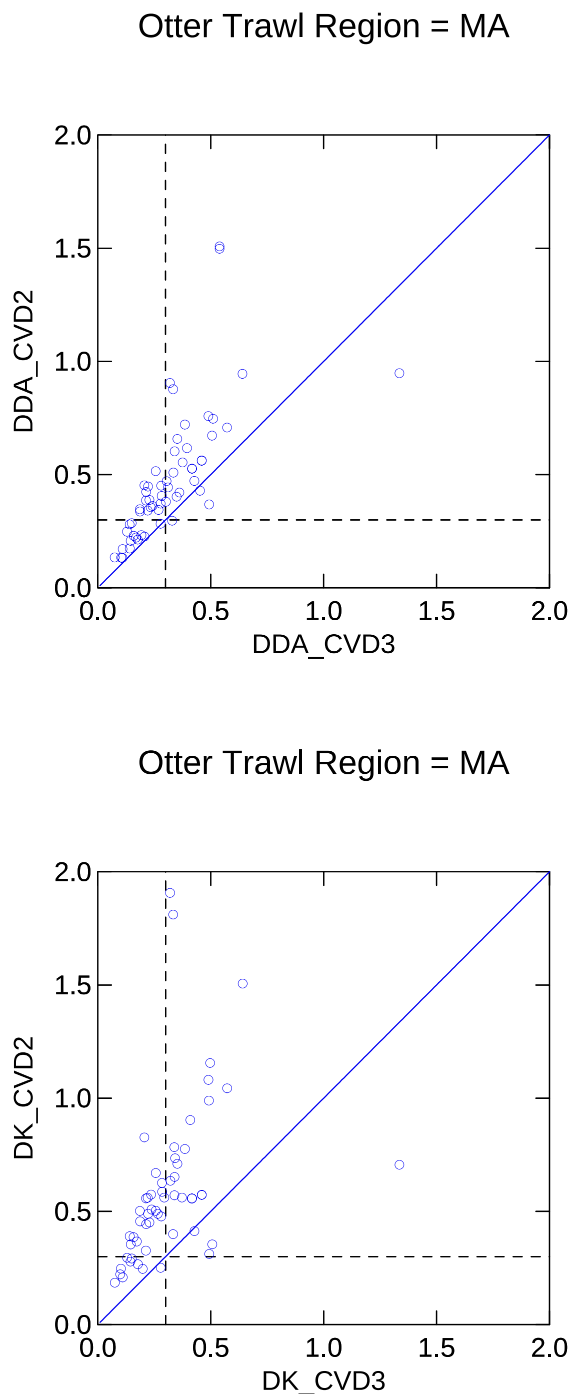


Figure B-6c. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3)for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

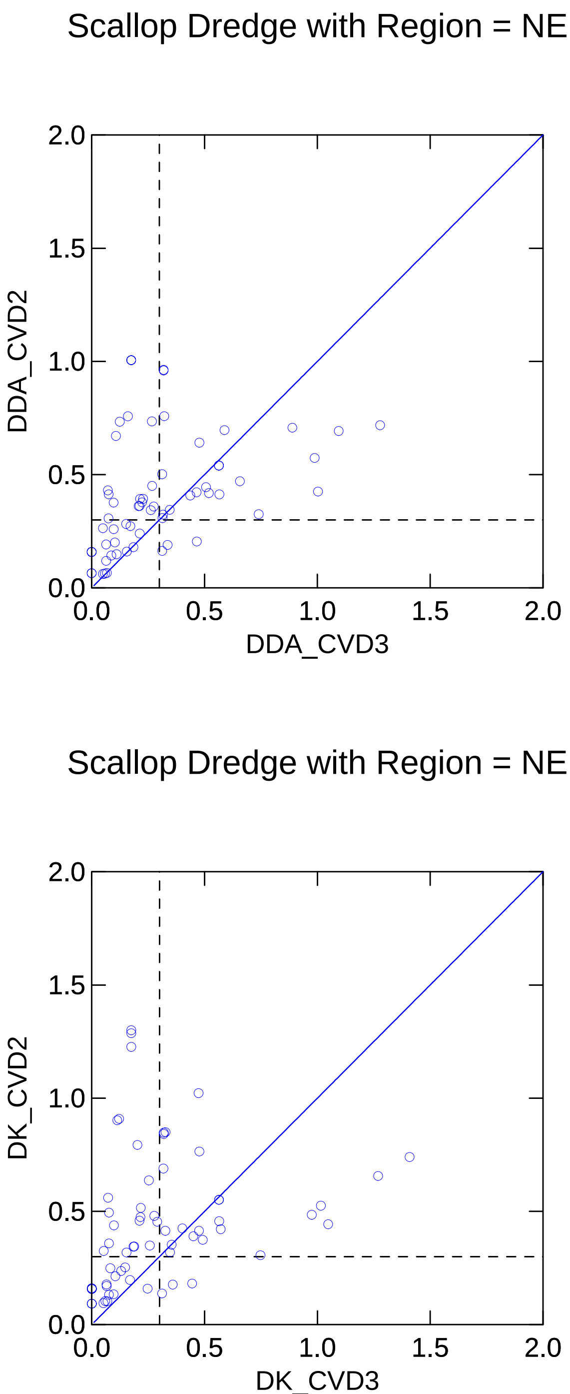


Figure B-6d. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England scallop dredge; each dot represents a species group and mesh size.

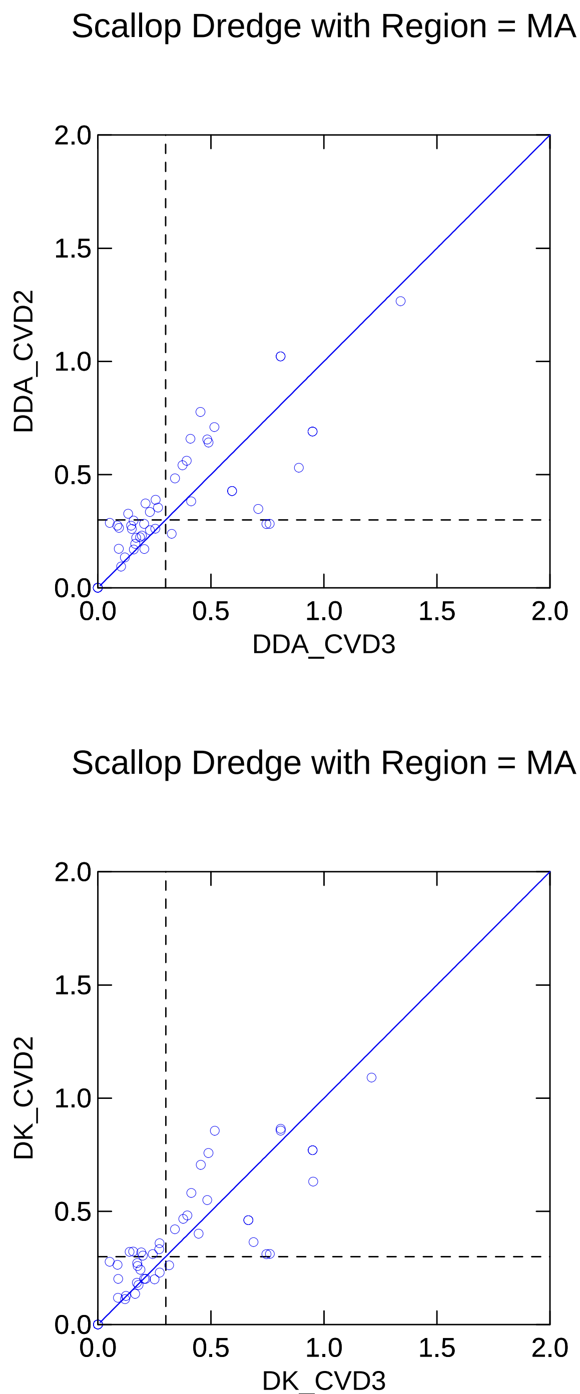


Figure B-6e. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic otter trawl; each dot represents a species group and mesh size.

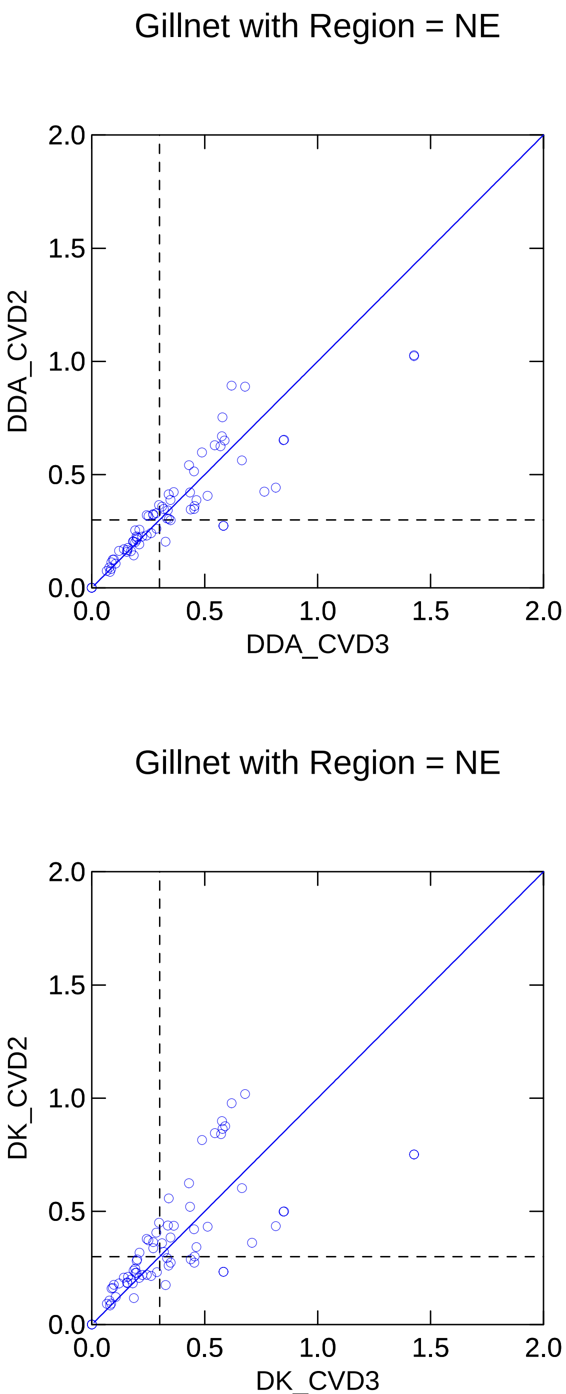


Figure B-6f. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for New England gillnet; each dot represents a species group and mesh size.

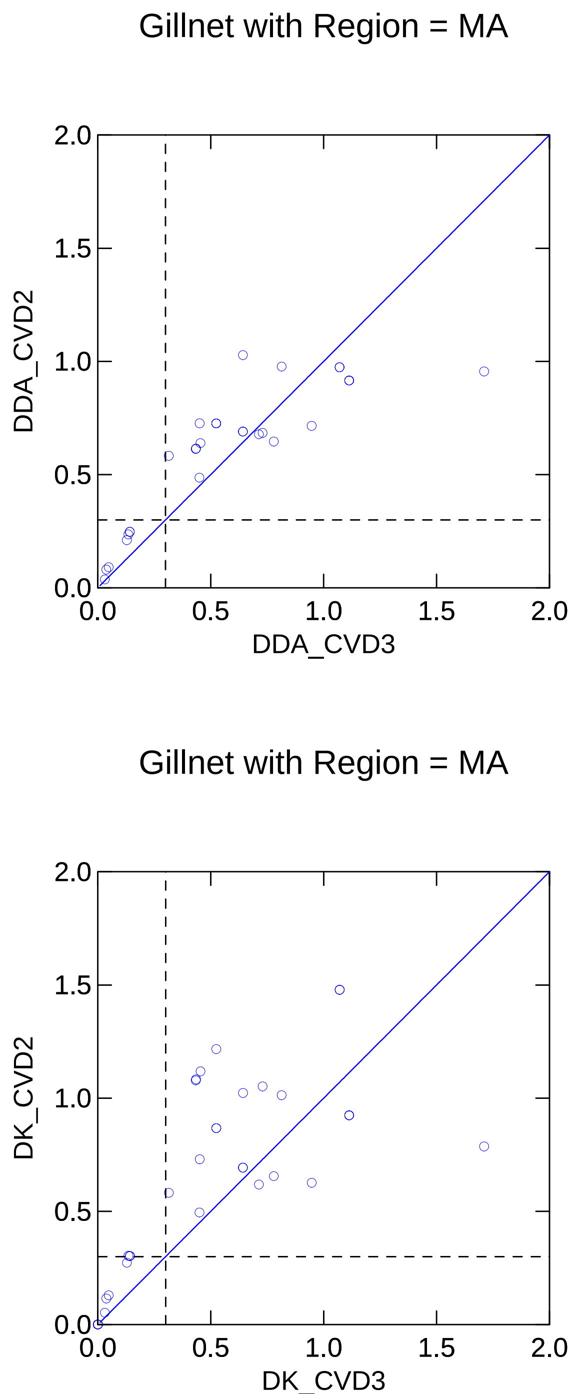
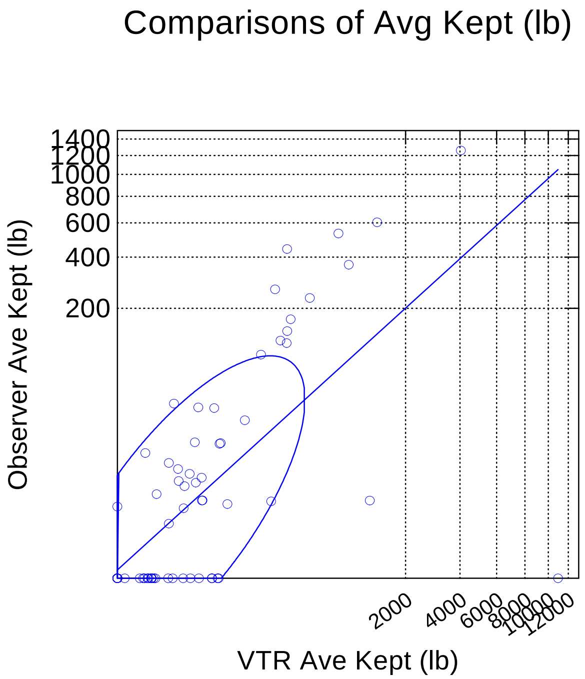
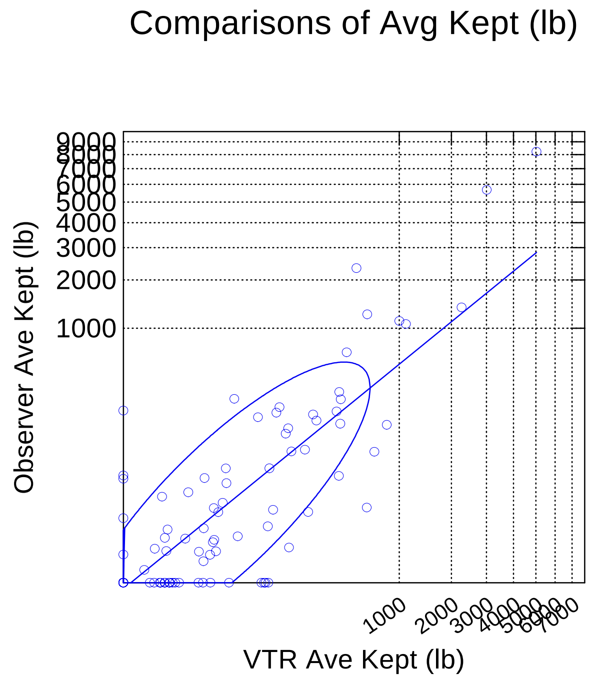


Figure B-6g. Comparisons of CV of total discards estimated via the combined ratio method (CVD2) and the simple expansion method (CVD3) for discard-to-days-absent (DDA), top panel, and discard-to-kept (DK), bottom panel, for Mid-Atlantic gillnet; each dot represents a species group and mesh size.

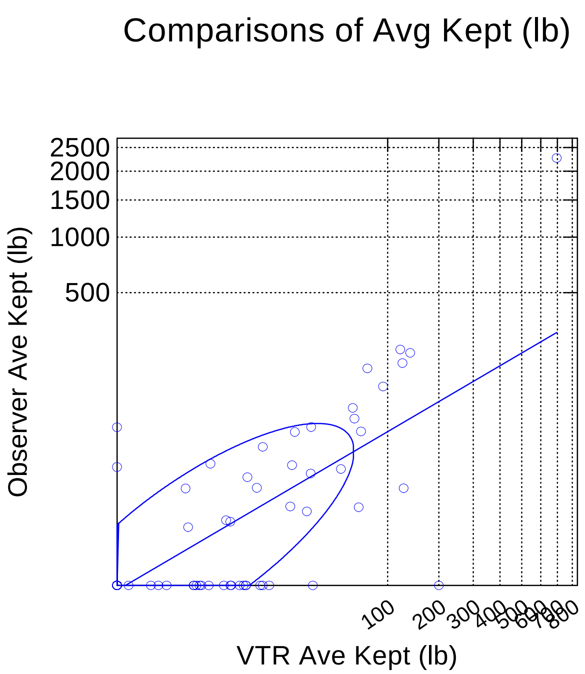
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

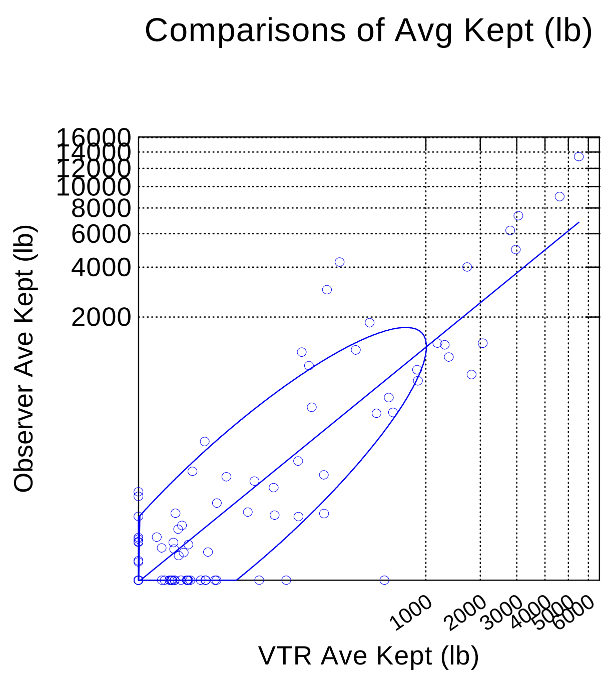
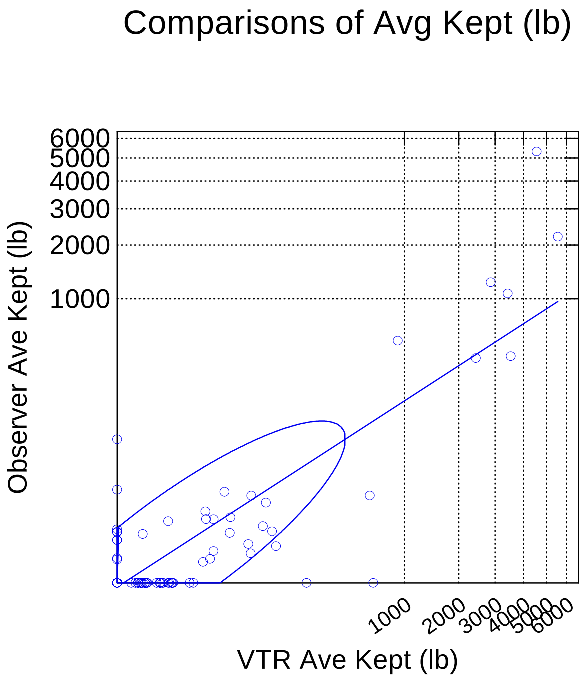
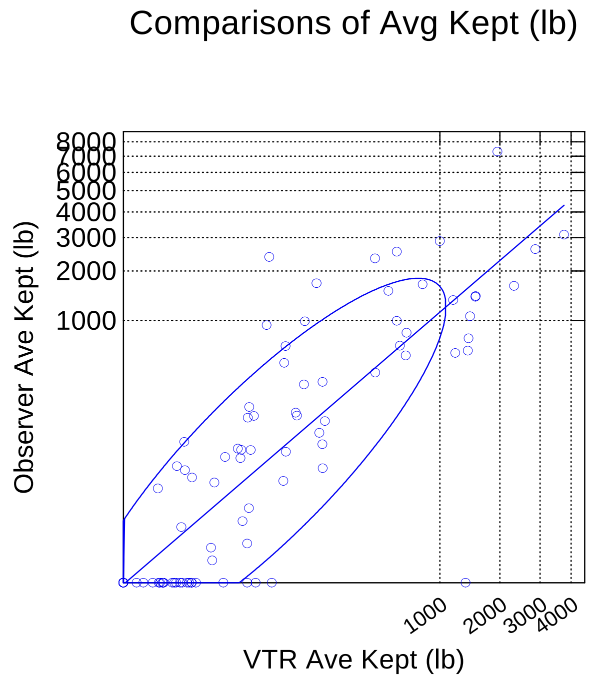


Figure B-7. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

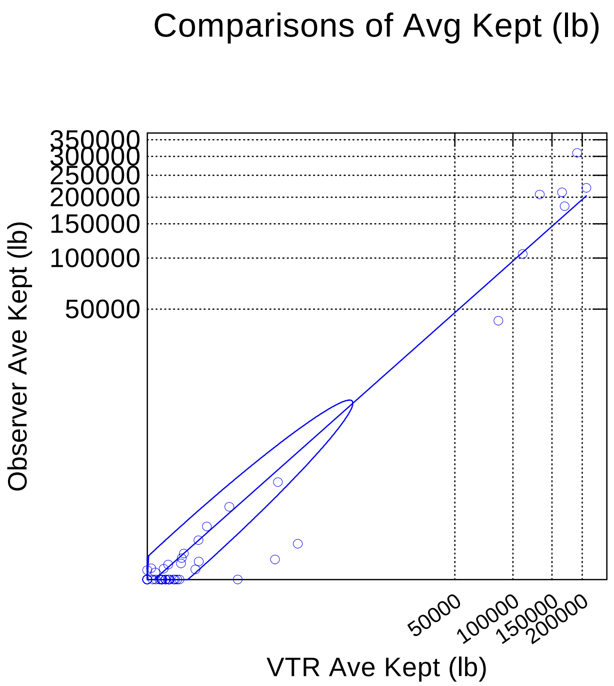
Northeast multispecies (Small-mesh)



Monkfish



Herring



Red Crab

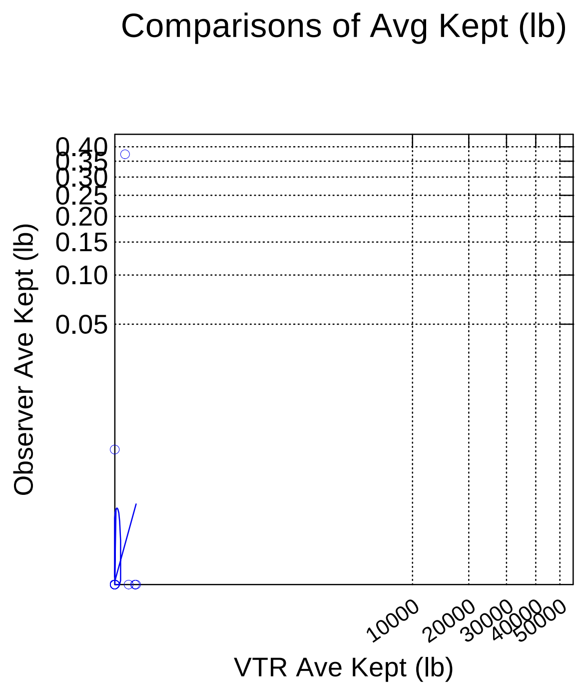
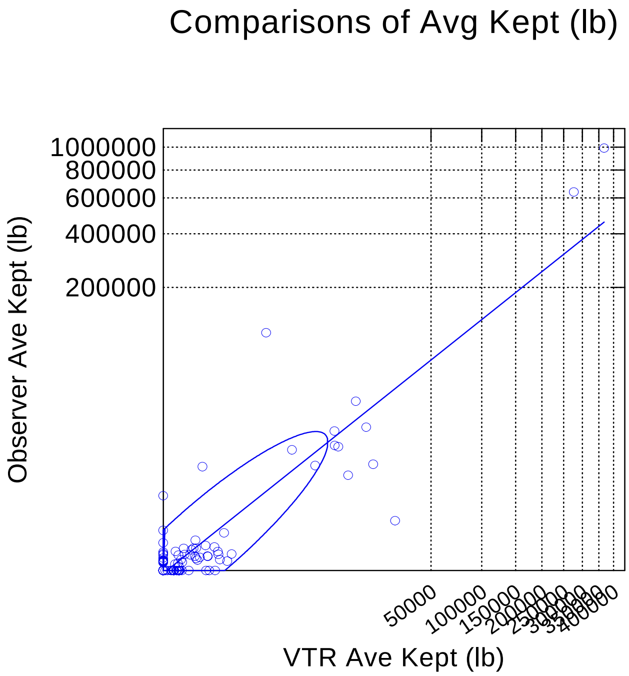
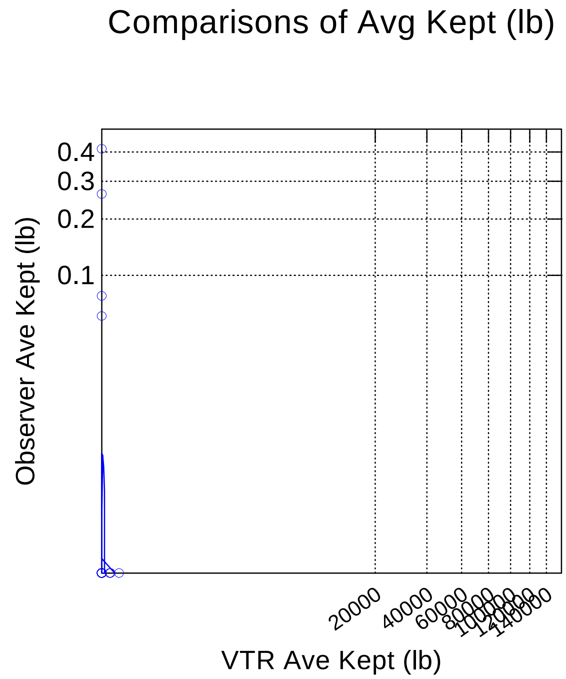


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

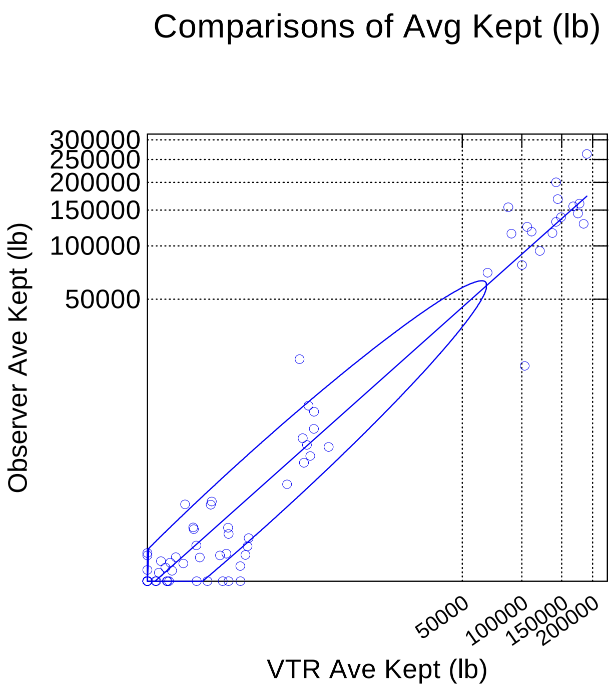
Mackerel-Squid-Butterfish



Surfclam – Ocean Quahog



Scallops



Skate Complex

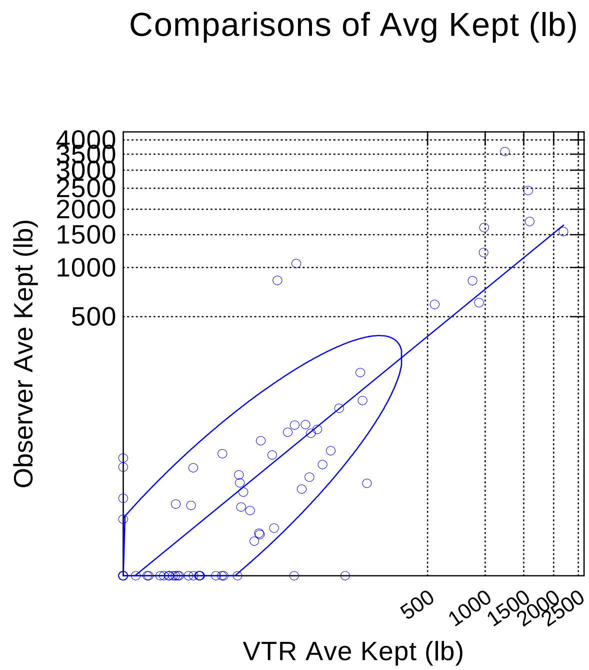
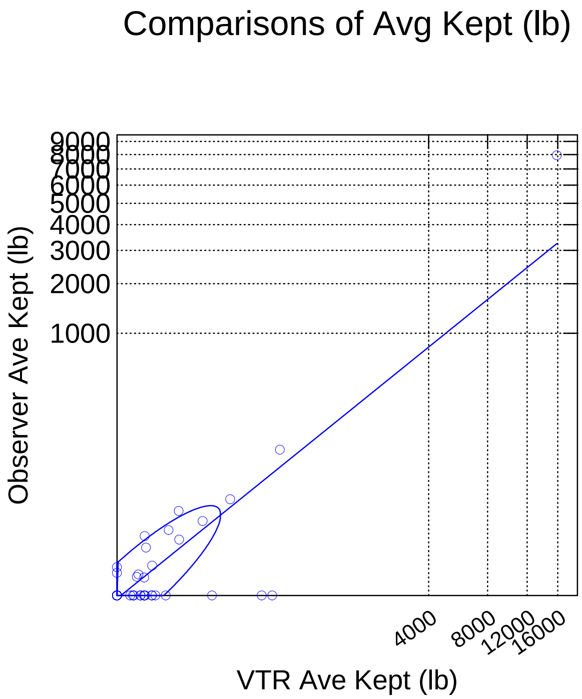


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

Tilefish



All Species

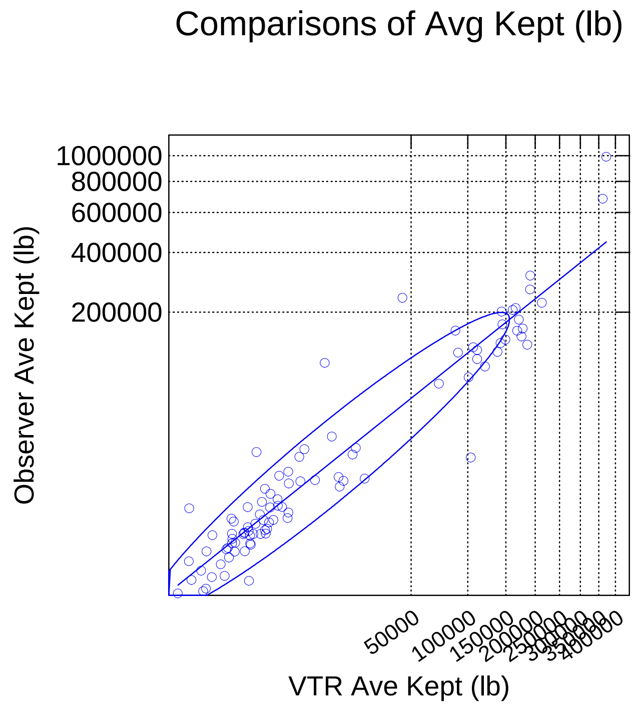
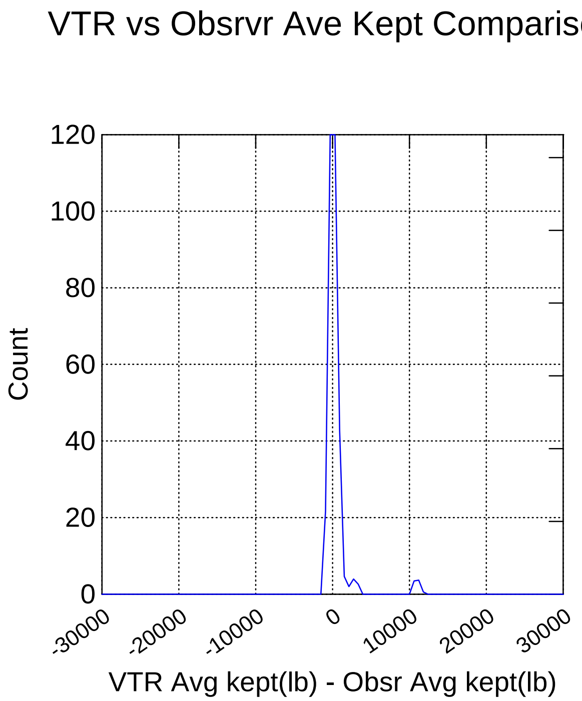
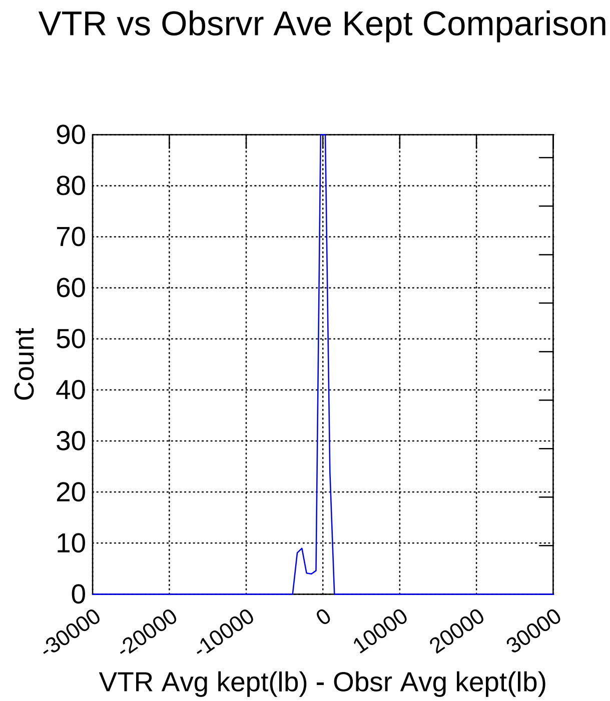


Figure B-7 continued. Comparisons of average kept pounds (fourth root transformation used), by species group, in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

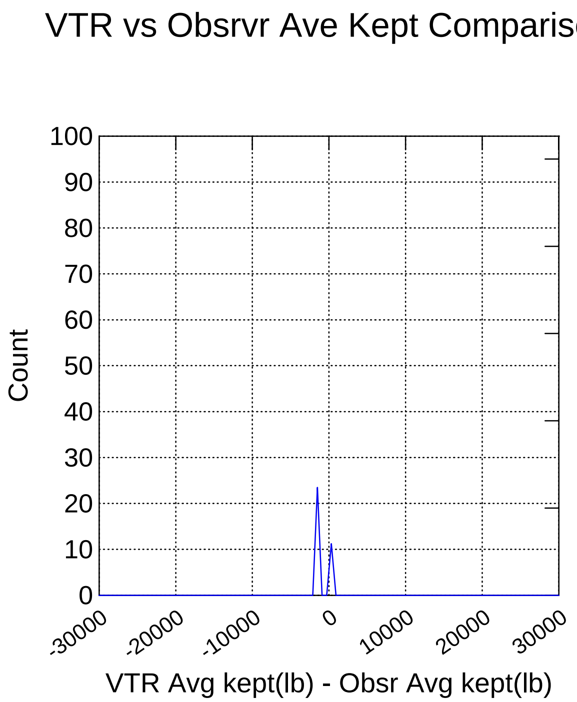
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

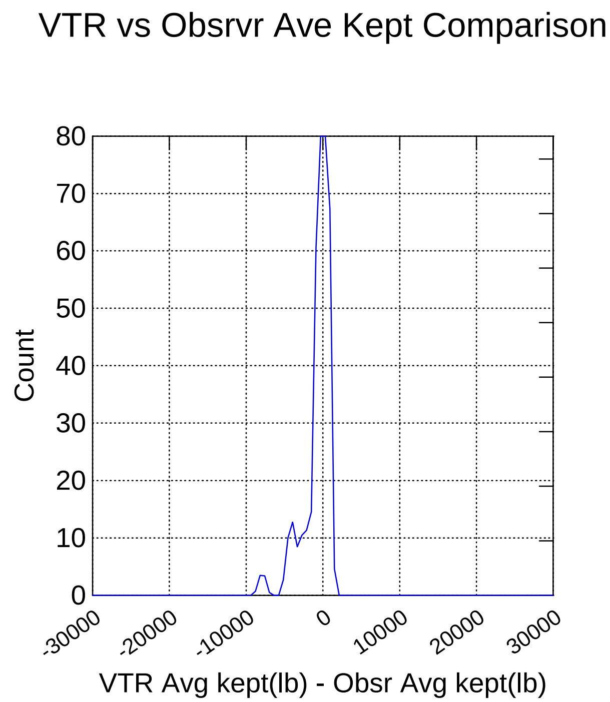
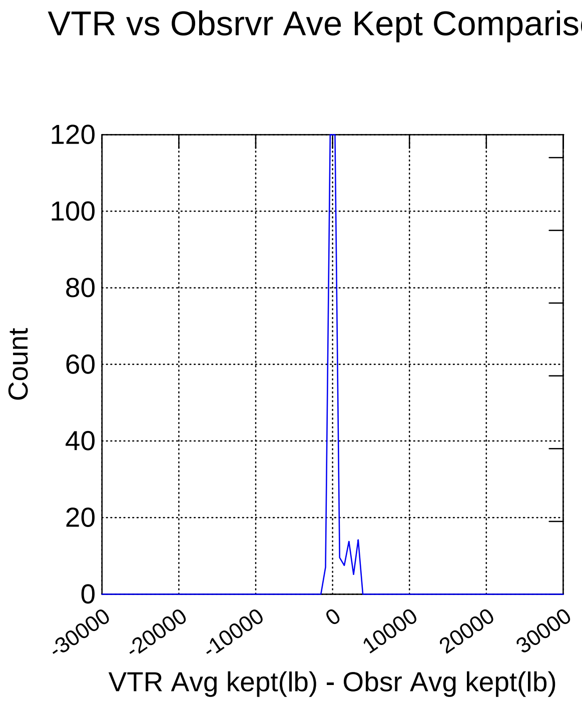
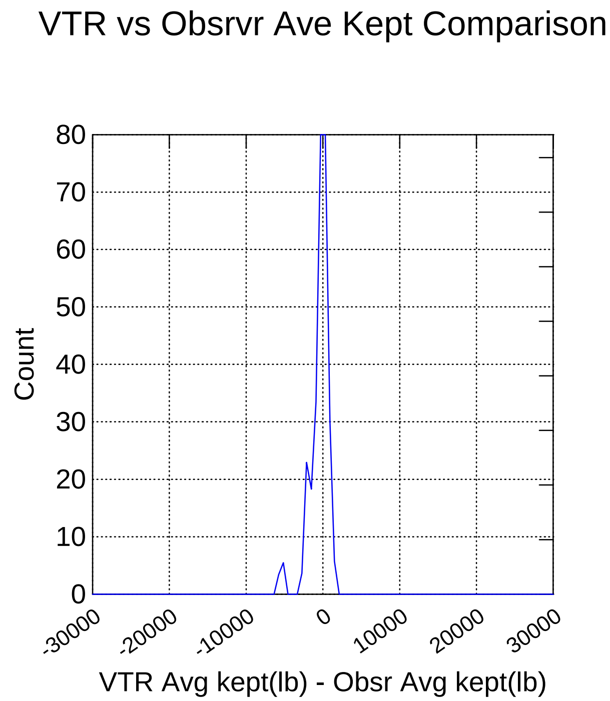


Figure B-8. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

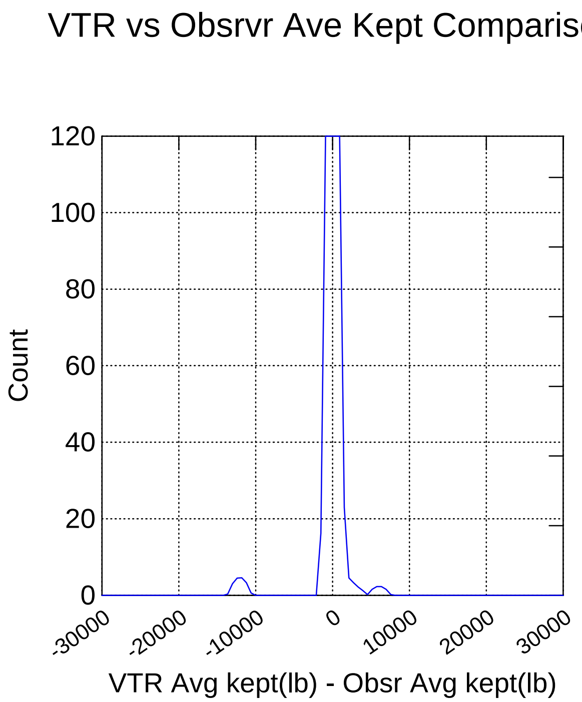
Northeast multispecies (Small-mesh)



Monkfish



Herring



Mackerel-Squid-Butterfish

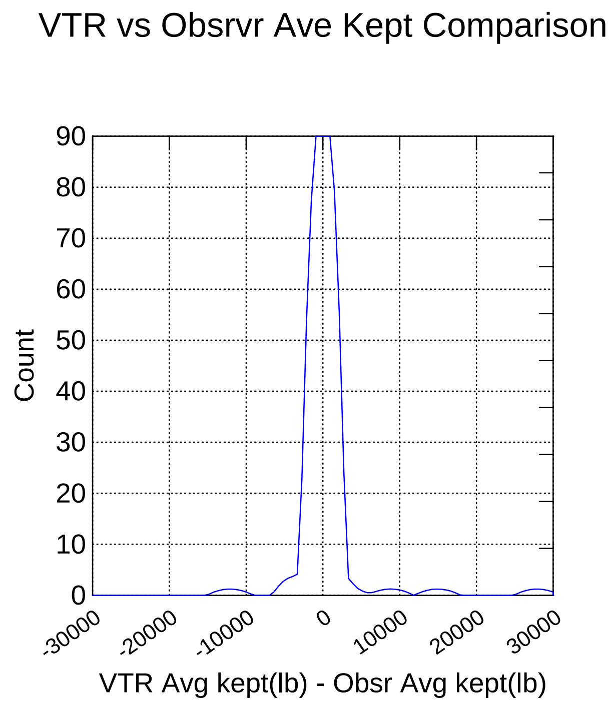
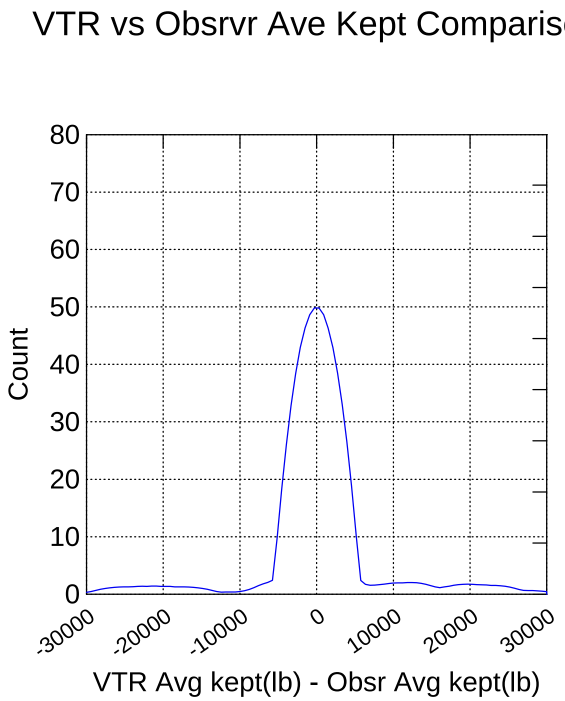
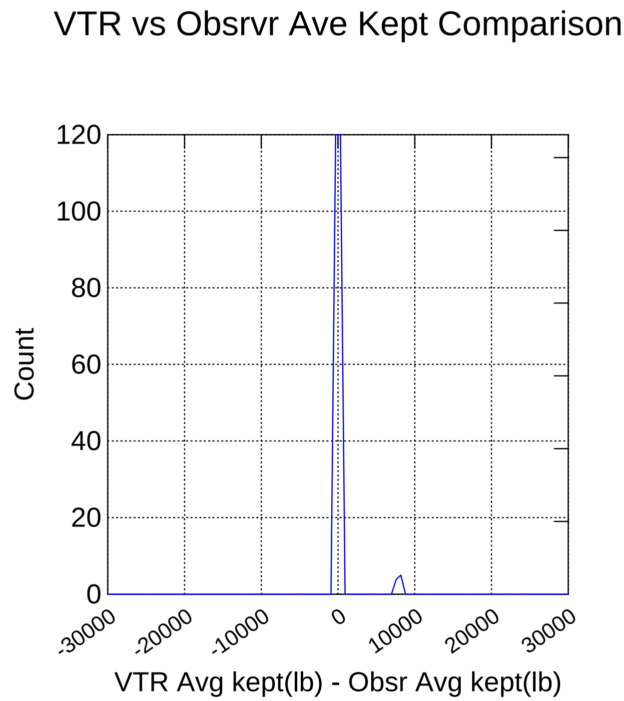


Figure B-8 continued. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

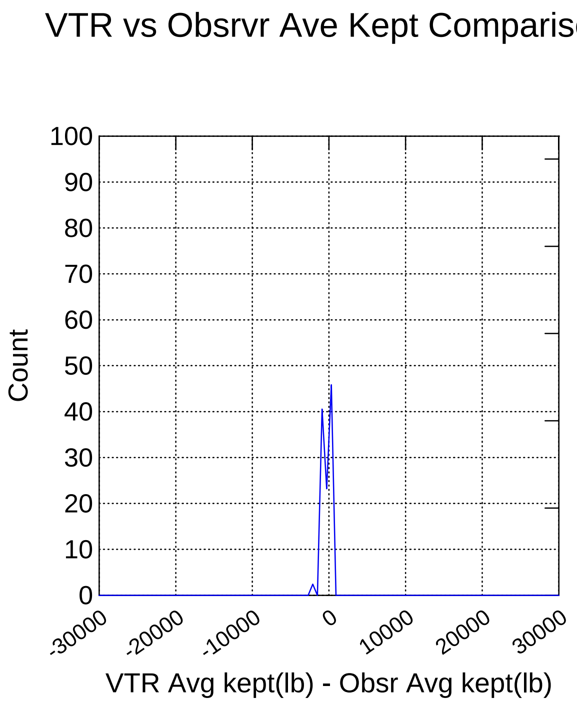
Scallops



Tilefish



Skate Complex



All species

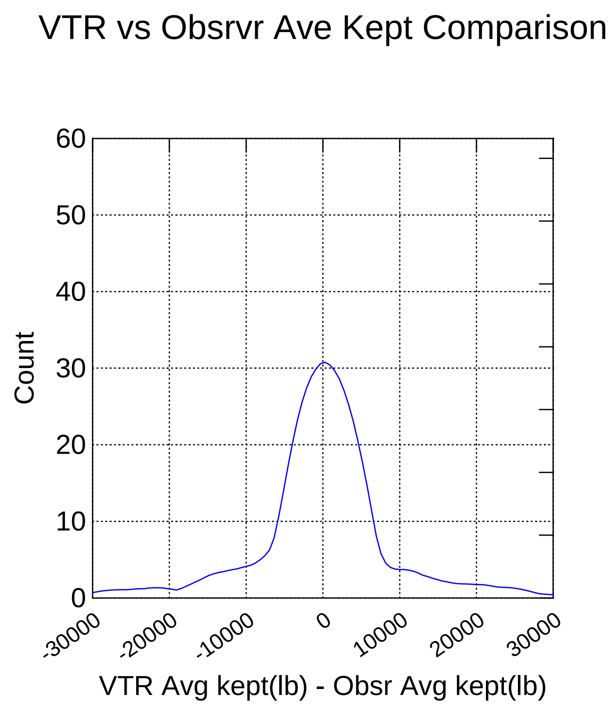
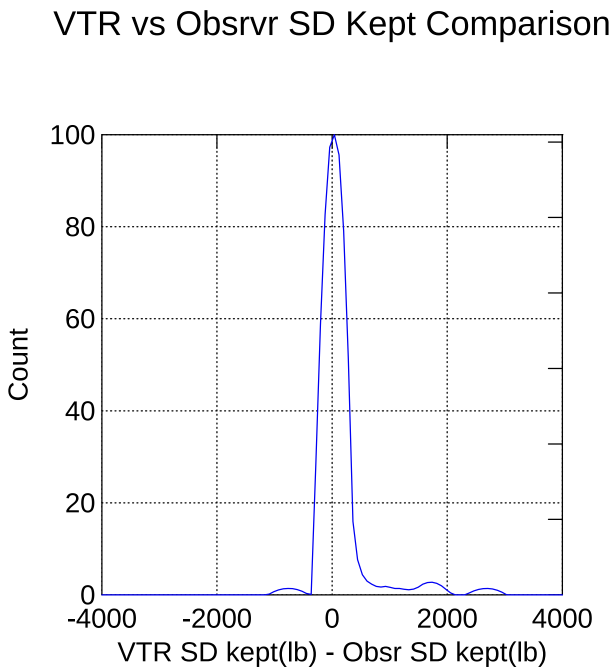
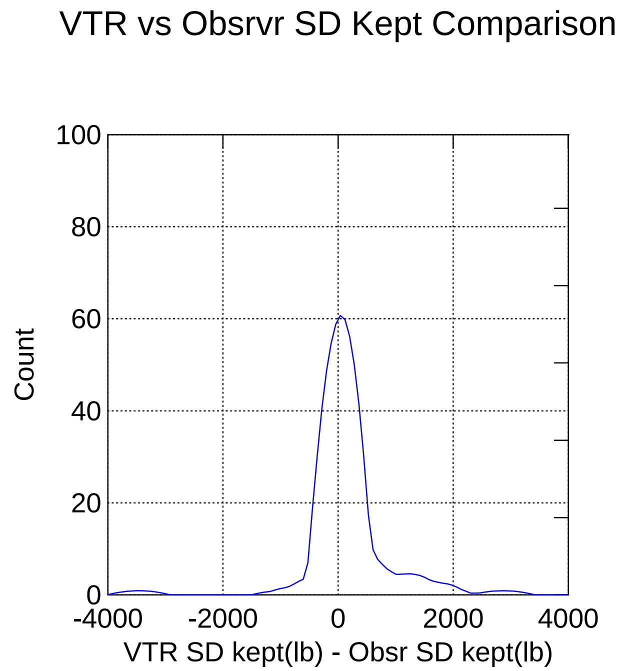


Figure B-8 continued. The distribution of differences in the average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

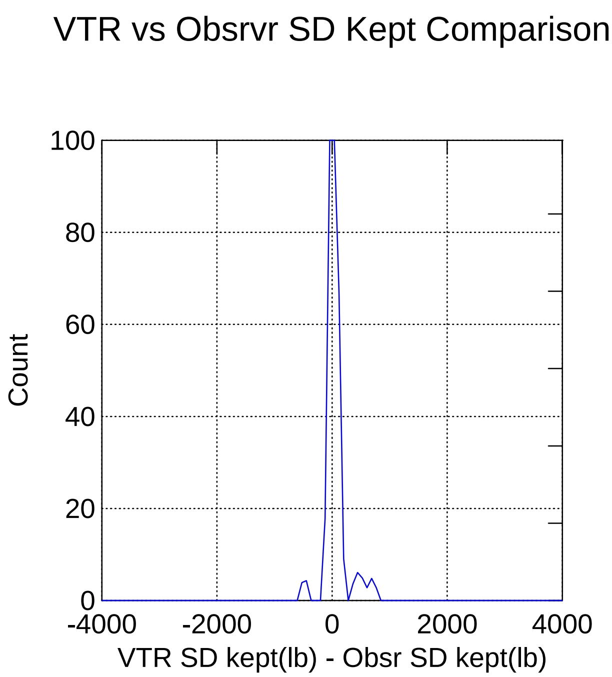
Bluefish



Fluke-Scup-Black Sea Bass



Spiny Dogfish



Northeast multispecies (Large-mesh)

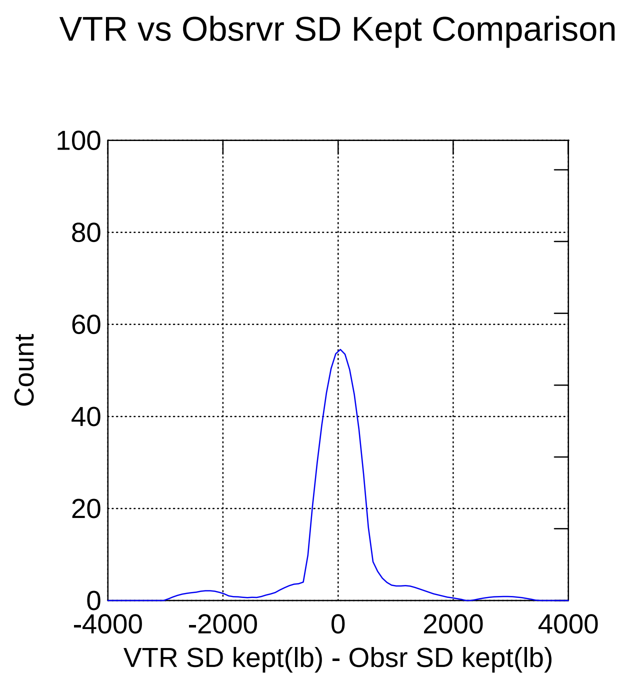
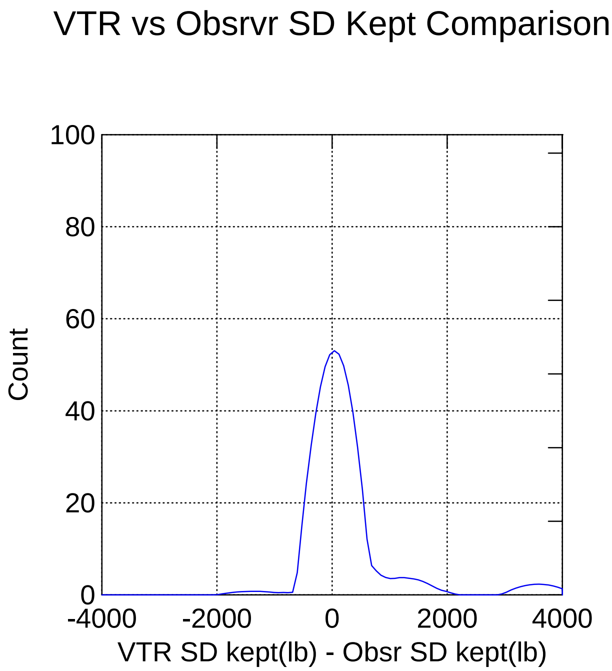
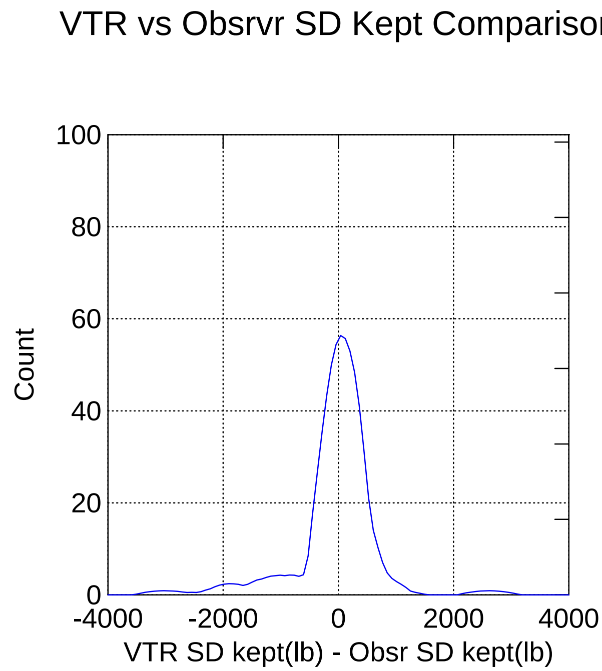


Figure B-9. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

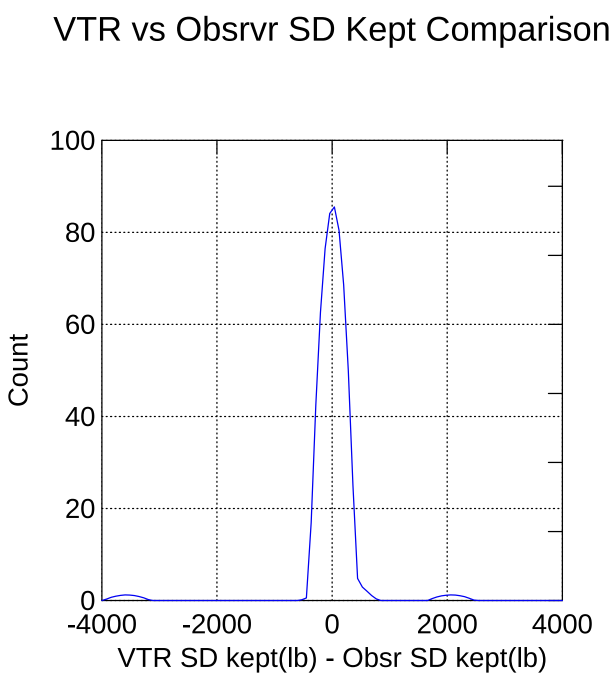
Northeast multispecies (small-mesh)



Monkfish



Herring



Mackerel-Squid-butterfish

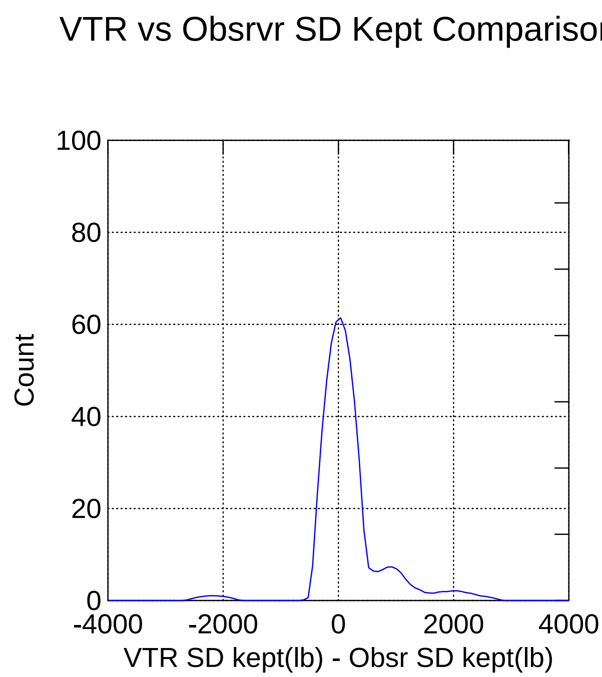
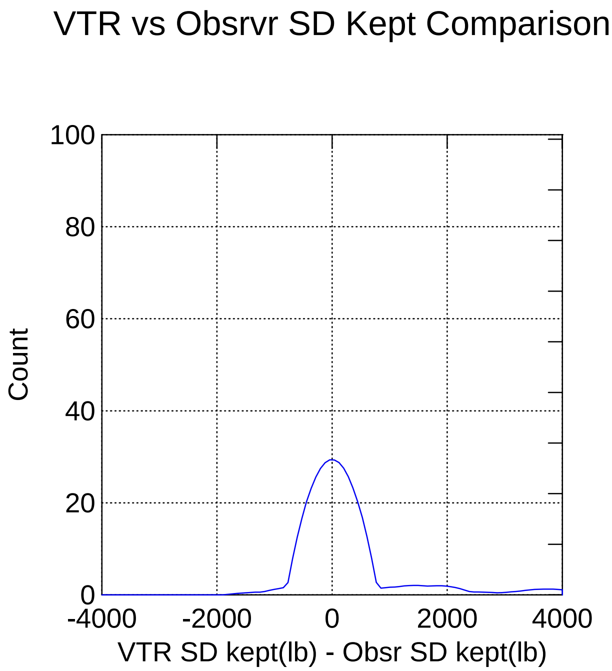
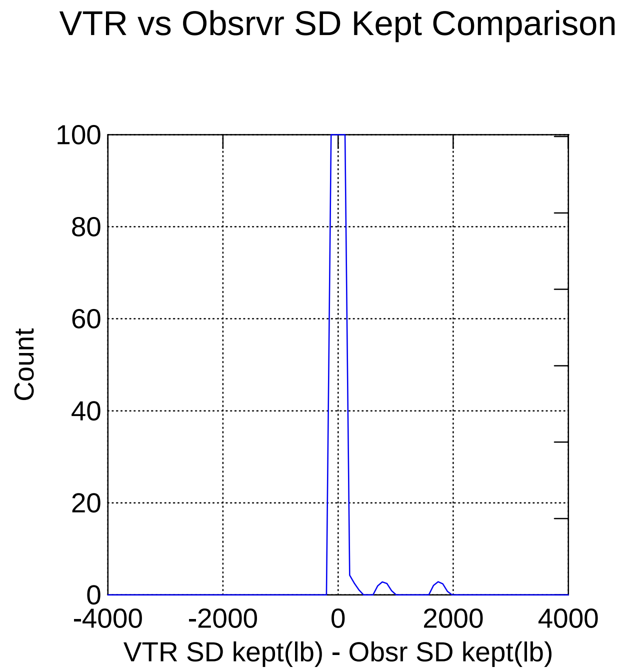


Figure B-9 continued. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

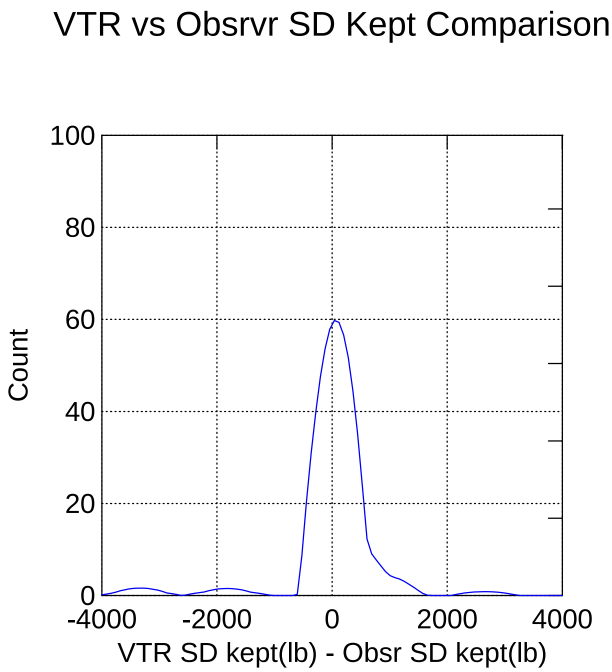
Scallop



Tilefish



Skate Complex



All Species

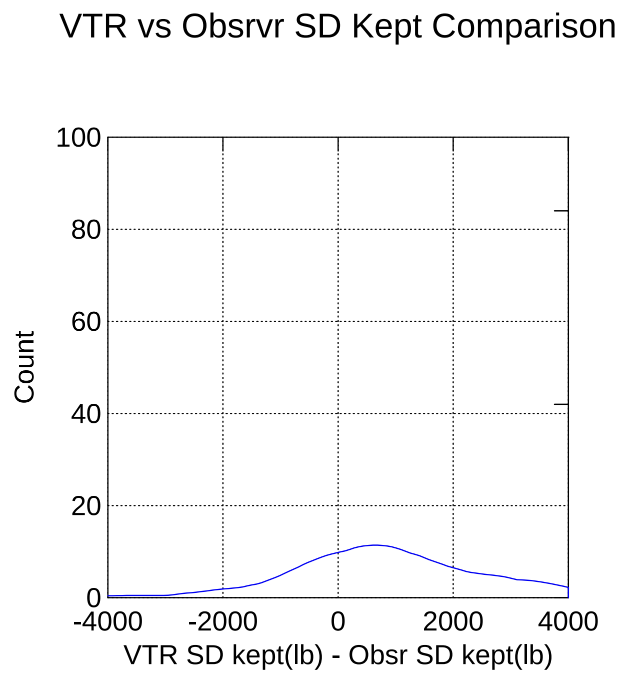


Figure B-9 continued. The distribution of difference between the standard deviation of average kept pounds of species groups in the Northeast Fisheries Observer Program and the FVTR data for 2004.

ALL TRIPS

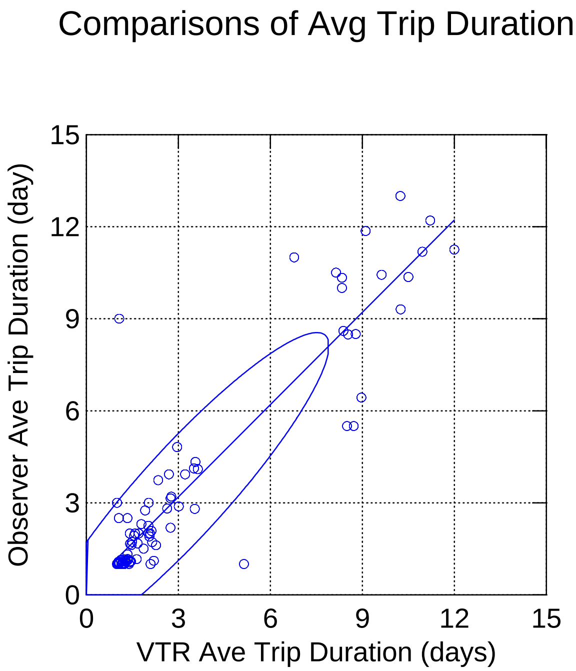
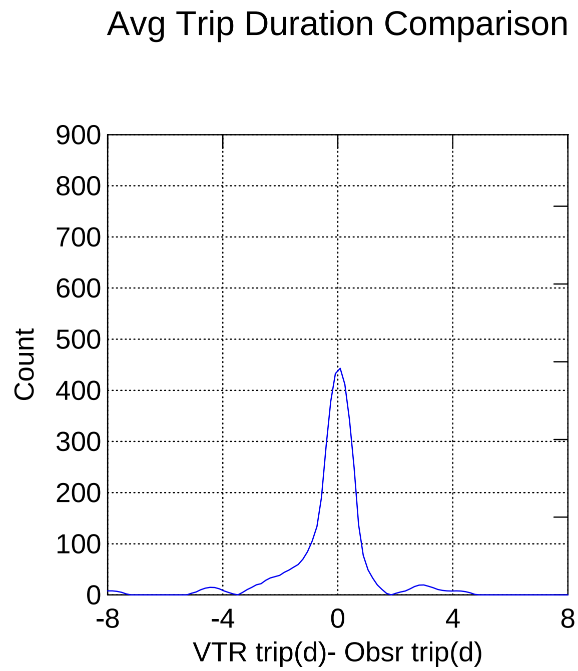


Figure B-10. Comparison of average trip duration (days) for all trips in the Northeast Fisheries Observer Program and FVTR data sets for 2004. Each dot represents the mean of an individual stratum (fleet).

ALL TRIPS



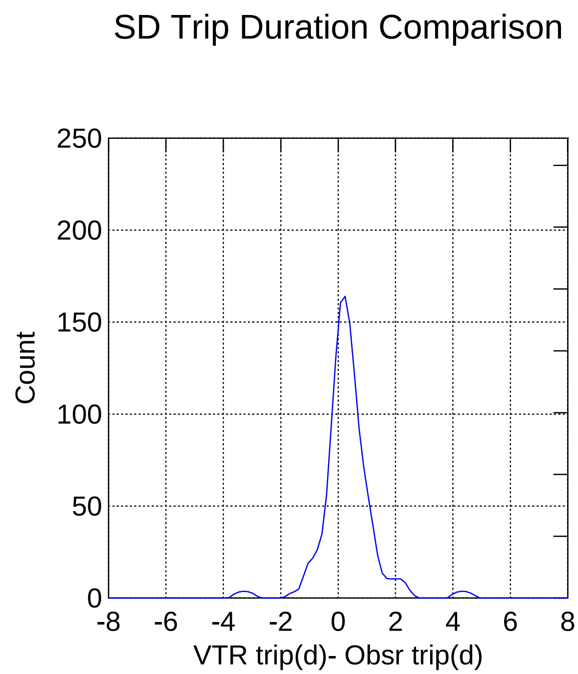


Figure B-11. The distribution of differences between the average trip duration (top), and standard deviation of average trip duration (bottom), for trips in the Northeast Fisheries Observer Program and the FVTR data for 2004

Table B-1. Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	0.508	0.437	*	0.428	0.710	**0.227**	0.634	0.320	0.309	0.366	0.405
Otter Trawl	all	all	NE	large	2.474	1.313	*	**0.280**	0.350	0.572	0.520	1.097	0.610	0.756	**0.088**
Otter Trawl	all	all	MA	small	0.903	0.784	*	1.394	0.574	0.561	1.044	0.635	0.735	0.571	0.354
Otter Trawl	all	all	MA	large	1.906	0.775	*	*	0.444	0.390	0.489	0.710	0.456	0.502	**0.295**
Scallop Trawl	open	limited	MA	all	*	*	*	*	**0.000**	**0.000**	*	*	**0.000**	*	**0.000**
Scallop Trawl	open	general	MA	all	1.141	*	*	0.640	**0.224**	0.354	*	0.343	**0.252**	0.976	**0.194**
Shrimp Trawl	all	all	NE	all	*	0.479	*	*	0.965	0.981	*	*	*	0.981	**0.235**
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	**0.000**	**0.000**	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.220**	**0.229**	*	0.625	0.969	0.841	0.876	1.067	*	1.520	**0.210**
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	**0.181**	0.378	*	0.998	0.421	0.498	0.500	*	*	0.906	**0.174**
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	**0.000**	*	*	*	**0.000**	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	1.216	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.304	*	*	*	0.587	*	*	*	*	*	**0.273**
Scallop Dredge	open	limited	NE	all	*	*	*	0.842	**0.159**	0.689	*	0.490	1.112	1.662	0.319
Scallop Dredge	open	limited	MA	all	*	*	*	1.304	**0.200**	0.305	1.304	0.514	0.383	0.620	**0.174**
Scallop Dredge	open	general	NE	all	*	*	*	*	**0.094**	1.274	*	1.274	*	*	0.560
Scallop Dredge	open	general	MA	all	*	*	*	*	0.359	0.865	*	*	0.865	*	**0.202**
Scallop Dredge	closed	limited	NE	all	1.077	**0.168**	*	0.482	**0.135**	0.421	**0.167**	**0.255**	0.468	**0.158**	**0.222**
Scallop Dredge	closed	limited	MA	all	1.208	0.660	*	0.357	**0.198**	0.310	0.648	0.338	0.638	0.303	**0.280**
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	*	*	*	*	**0.000**	*	*	*	*	*	**0.000**
Mid-water paired & single Trawl	all	all	NE	all	0.770	0.770	*	*	1.464	0.429	0.430	0.872	1.457	1.387	0.724
Mid-water paired & single Trawl	all	all	MA	all	0.539	0.982	*	*	*	0.545	0.539	0.546	0.539	0.539	1.048
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	0.408
Purse Seine	all	all	NE	all	*	0.981	*	*	*	0.935	*	0.935	*	*	*
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	0.335	0.401	0.389	*	*	*	*	1.191	*	*	*	*	0.569
Longline	all	all	MA	all													
Otter Trawl	all	all	NE	small	**0.233**	0.658	0.696	0.409	0.304	0.332	0.430	0.546	0.593	0.459	**0.291**	0.753	0.321
Otter Trawl	all	all	NE	large	**0.101**	**0.176**	**0.265**	**0.222**	**0.254**	**0.145**	0.429	0.640	**0.248**	**0.235**	**0.206**	0.424	**0.161**
Otter Trawl	all	all	MA	small	0.326	*	*	1.081	1.476	0.489	0.561	*	0.905	0.989	0.399	*	1.506
Otter Trawl	all	all	MA	large	**0.251**	3.122	*	0.669	*	**0.292**	0.413	3.122	0.974	3.133	0.312	*	0.477
Scallop Trawl	open	limited	MA	all	**0.000**	*	*	*	*	*	*	*	*	*	**0.000**	*	*
Scallop Trawl	open	general	MA	all	**0.170**	*	*	1.036	*	0.471	0.464	*	*	0.640	**0.237**	*	*
Shrimp Trawl	all	all	NE	all	**0.224**	0.352	0.659	0.552	0.305	0.928	**0.269**	0.473	0.374	**0.232**	**0.207**	*	0.960
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.092**	**0.121**	**0.186**	**0.198**	**0.281**	0.406	**0.288**	**0.182**	**0.261**	**0.231**	0.432	0.449	0.437
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	**0.159**	**0.175**	**0.246**	0.361	0.337	1.018	0.557	0.317	0.364	0.372	0.815	0.436	0.421
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	0.868	*	*	*	*	*	*	*	*	*	0.868	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	limited	NE	all	0.480	0.850	0.848	0.637	0.848	0.485	1.022	0.848	*	0.525	0.454	*	0.656
Scallop Dredge	open	limited	MA	all	**0.242**	*	*	0.705	0.809	0.496	0.581	*	*	0.521	0.323	*	1.091
Scallop Dredge	open	general	NE	all	0.358	1.226	*	0.494	0.908	0.902	**0.213**	*	*	*	0.438	*	1.287
Scallop Dredge	open	general	MA	all	0.311	*	*	0.865	0.857	0.650	0.421	*	*	0.653	0.333	*	*
Scallop Dredge	closed	limited	NE	all	**0.159**	0.510	0.423	**0.211**	0.829	**0.188**	**0.200**	*	*	0.478	0.355	**0.179**	0.427
Scallop Dredge	closed	limited	MA	all	0.712	*	*	1.256	0.320	0.350	1.269	*	*	0.602	0.886	*	1.239
Scallop Dredge	closed	general	NE	all													
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	0.669	1.198	0.951	*	1.155	1.203	1.298	0.967	0.996	1.604	*	*	*
Mid-water paired & single Trawl	all	all	MA	all	0.708	*	*	*	*	1.146	*	*	*	0.541	*	*	*
Fish Pots/ Traps	all	all	NE	all													
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	NE	all	0.973	*	*	*	*	*	*	*	0.973	*	*	*	*
Purse Seine	all	all	MA	all													
Hand Line	all	all	NE	all	4.030	4.030	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all													
Scottish Seine	all	all	NE	all	**0.289**	**0.279**	**0.279**	*	**0.279**	*	0.543	*	*	**0.279**	0.354	*	*
Clam Quahog Dredge	all	all	NE	all													
Clam Quahog Dredge	all	all	MA	all													
Crab Pots	all	all	NE	all													
Crab Pots	all	all	MA	all													
Lobster Pots	all	all	NE	all													
Lobster Pots	all	all	MA	all													

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	0.910	*	*	0.910	0.614	0.654	*	*	*	*	*	*
Longline	all	all	MA	all												
Otter Trawl	all	all	NE	small	**0.235**	**0.219**	1.511	0.406	0.691	0.322	0.309	**0.276**	0.551	0.708	1.028	0.304
Otter Trawl	all	all	NE	large	**0.182**	**0.227**	0.322	0.353	**0.175**	**0.245**	0.319	0.328	0.918	0.833	1.512	0.529
Otter Trawl	all	all	MA	small	0.508	0.625	0.683	0.587	**0.222**	0.367	0.386	**0.278**	0.560	0.502	0.464	1.155
Otter Trawl	all	all	MA	large	0.827	0.451	*	1.811	**0.209**	0.557	**0.246**	**0.266**	0.354	0.652	0.609	*
Scallop Trawl	open	limited	MA	all	*	*	*	*	**0.000**	*	**0.000**	**0.000**	*	**0.000**	*	*
Scallop Trawl	open	general	MA	all	0.496	0.508	*	1.141	0.347	0.675	0.505	0.608	0.731	0.638	*	*
Shrimp Trawl	all	all	NE	all	0.557	0.567	*	0.537	0.799	0.960	*	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	**0.000**	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	**0.183**	**0.238**	*	**0.219**	**0.228**	**0.106**	0.845	0.898	*	1.602	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	0.624	**0.207**	*	0.864	**0.117**	**0.162**	**0.233**	**0.233**	0.904	*	*	**0.256**
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	**0.000**	**0.000**	**0.000**	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	*	*	*	*	1.118	1.083	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	*	**0.115**	**0.129**	0.303	0.303	*	*	*	*
Scallop Dredge	open	limited	NE	all	0.414	0.764	1.173	0.352	**0.236**	0.515	0.458	0.474	0.322	0.622	0.391	*
Scallop Dredge	open	limited	MA	all	0.758	0.856	0.738	0.402	**0.126**	**0.230**	**0.259**	**0.272**	0.704	0.558	0.771	*
Scallop Dredge	open	general	NE	all	**0.104**	1.300	*	**0.103**	**0.177**	0.318	**0.092**	**0.092**	*	*	1.287	*
Scallop Dredge	open	general	MA	all	0.482	0.467	*	0.857	**0.202**	0.550	0.461	0.461	*	*	0.830	*
Scallop Dredge	closed	limited	NE	all	0.396	0.403	0.489	0.448	**0.126**	0.326	**0.291**	**0.293**	**0.218**	**0.161**	**0.198**	*
Scallop Dredge	closed	limited	MA	all	**0.268**	0.323	*	**0.282**	**0.142**	0.425	0.383	0.385	1.011	0.333	0.321	*
Scallop Dredge	closed	general	NE	all												
Scallop Dredge	closed	general	MA	all	*	*	*	*	**0.000**	*	**0.000**	**0.000**	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	0.994	1.000	*	0.748	1.177	0.418	0.628	*	0.671	1.626	*	*
Mid-water paired & single Trawl	all	all	MA	all	0.539	0.539	*	0.539	*	**0.246**	1.165	1.142	*	1.176	*	*
Fish Pots/ Traps	all	all	NE	all												
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	**0.161**	*	**0.163**	**0.161**	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*	0.972	*	*	*	*	*	*
Purse Seine	all	all	MA	all												
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all												
Scottish Seine	all	all	NE	all	**0.279**	**0.279**	*	**0.279**	0.319	*	**0.253**	**0.259**	0.808	0.808	*	*
Clam Quahog Dredge	all	all	NE	all												
Clam Quahog Dredge	all	all	MA	all												
Crab Pots	all	all	NE	all												
Crab Pots	all	all	MA	all												
Lobster Pots	all	all	NE	all												
Lobster Pots	all	all	MA	all												

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data .

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEALS	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK	WHALES
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Otter Trawl	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	0.931
Otter Trawl	all	all	NE	large	*	*	*	*	*	*	*	*	*	*	*	*	1.089
Otter Trawl	all	all	MA	small	0.573	*	*	0.573	*	*	*	*	*	*	*	*	*
Otter Trawl	all	all	MA	large	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Trawl	open	limited	MA	all	0.381	*	*	0.381	*	*	*	*	*	*	*	*	*
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	large	*	*	*	*	*	*	**0.206**	**0.293**	*	**0.273**	0.520	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	*	*	*	*	*	*	**0.215**	0.435	0.751	0.320	**0.273**	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	small	0.626	*	0.787	*	*	1.013	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	large	1.052	1.479	*	1.478	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	0.495	*	0.730	0.656	*	*	0.692	*	*	1.023	0.924	*	*
Scallop Dredge	open	limited	NE	all	0.551	*	*	0.551	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	limited	MA	all	0.770	*	*	0.770	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	limited	NE	all	**0.165**	*	*	**0.165**	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	closed	general	NE	all													
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Mid-water paired & single Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	1.114
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Fish Pots/ Traps	all	all	NE	all													
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Clam Quahog Dredge	all	all	NE	all													
Clam Quahog Dredge	all	all	MA	all													
Crab Pots	all	all	NE	all													
Crab Pots	all	all	MA	all													
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	*	*	*
Lobster Pots	all	all	MA	all													

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-1 *continued.* Precision (CV) of total composite discards, by species and fleet, based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/ PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES	PILOT coverage
Longline	all	all	NE	all	*	*	*	*	*	*	*	*	*	0.425	0.489	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Otter Trawl	all	all	NE	small	0.931	*	*	0.650	0.936	0.713	*	*	*	0.548	**0.193**	
Otter Trawl	all	all	NE	large	1.089	*	*	0.389	0.389	*	*	*	*	0.489	**0.124**	
Otter Trawl	all	all	MA	small	*	*	*	0.557	*	0.557	*	*	*	0.706	**0.247**	
Otter Trawl	all	all	MA	large	*	*	*	*	*	*	*	*	*	0.672	**0.185**	
Scallop Trawl	open	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.243**	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.310	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	**0.052**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	*	*	*	0.359	0.977	*	*	0.384	*	0.342	**0.092**	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	*	*	*	**0.288**	*	*	0.751	0.300	*	0.602	**0.085**	
Sink, Anchor, Drift Gillnet	all	all	MA	small	*	*	*	*	*	*	*	*	*	0.582	**0.000**	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	*	*	*	*	*	*	*	*	*	0.618	1.078	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	*	*	*	0.924	*	*	*	0.924	*	0.693	**0.052**	pilot for fish
Scallop Dredge	open	limited	NE	all	*	*	*	*	*	*	*	*	*	0.896	**0.197**	
Scallop Dredge	open	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.112**	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	0.325	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.184**	
Scallop Dredge	closed	limited	NE	all	*	*	*	*	*	*	*	*	*	**0.163**	**0.119**	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	**0.119**	
Scallop Dredge	closed	general	NE	all												pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	**0.000**	pilot
Mid-water paired & single Trawl	all	all	NE	all	1.114	*	*	0.786	0.786	*	*	*	*	0.554	0.317	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	0.408	
Fish Pots/ Traps	all	all	NE	all												pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	**0.137**	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.715	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	4.030	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*		pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	0.423	pilot
Clam Quahog Dredge	all	all	NE	all												pilot
Clam Quahog Dredge	all	all	MA	all												pilot
Crab Pots	all	all	NE	all												pilot
Crab Pots	all	all	MA	all												pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*		pilot
Lobster Pots	all	all	MA	all												pilot

Note: when discard ratio = 0, CV is null (*); Gray-shaded cells indicate unlikely species/gear combinations.

Table B-2. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	8	8	*	8	8	8	8	8	8	8
Longline	all	all	MA	all										
Otter Trawl	all	all	NE	small	16	12	*	25	29	6	5	8	4	7
Otter Trawl	all	all	NE	large	22	23	*	12	20	29	27	31	30	3
Otter Trawl	all	all	MA	small	14	22	*	26	15	5	7	11	4	13
Otter Trawl	all	all	MA	large	16	24	*	26	6	21	20	12	15	8
Scallop Trawl	open	limited	MA	all	8	8	*	8	1	8	8	6	8	4
Scallop Trawl	open	general	MA	all	15	20	*	12	2	20	16	9	11	4
Shrimp Trawl	all	all	NE	all	20	1	*	20	17	20	20	20	19	14
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	*	3	3	2	3	3	3	3
Sink, Anchor, Drift Gillnet	all	all	NE	large	9	15	*	22	24	12	23	27	25	8
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	6	19	*	21	18	8	27	27	23	3
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	*	4	4	4	4	4	2	4
Sink, Anchor, Drift Gillnet	all	all	MA	large	2	5	*	5	5	5	5	5	5	5
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	4	7	*	7	6	7	7	7	7	3
Scallop Dredge	open	limited	NE	all	26	26	*	24	1	26	17	16	18	3
Scallop Dredge	open	limited	MA	all	24	24	*	22	1	23	14	12	18	3
Scallop Dredge	open	general	NE	all	17	17	*	17	3	17	14	17	17	1
Scallop Dredge	open	general	MA	all	16	16	*	16	2	16	16	13	16	3
Scallop Dredge	closed	limited	NE	all	19	28	*	25	1	27	20	13	24	3
Scallop Dredge	closed	limited	MA	all	20	19	*	24	1	15	14	12	23	3
Scallop Dredge	closed	general	NE	all										
Scallop Dredge	closed	general	MA	all	5	5	*	5	1	5	5	5	5	3
Mid-water paired & single Trawl	all	all	NE	all	9	3	*	23	21	1	10	15	7	12
Mid-water paired & single Trawl	all	all	MA	all	11	10	*	15	15	14	2	7	9	3
Fish Pots/ Traps	all	all	NE	all										
Fish Pots/ Traps	all	all	MA	all	4	4	*	4	4	4	4	4	4	3
Purse Seine	all	all	NE	all	5	2	*	5	5	5	4	5	5	5
Purse Seine	all	all	MA	all										
Hand Line	all	all	NE	all	2	2	*	2	2	2	2	2	2	2
Hand Line	all	all	MA	all										
Scottish Seine	all	all	NE	all	13	13	*	13	13	13	13	13	13	13
Clam Quahog Dredge	all	all	NE	all										
Clam Quahog Dredge	all	all	MA	all										
Crab Pots	all	all	NE	all										
Crab Pots	all	all	MA	all										
Lobster Pots	all	all	NE	all										
Lobster Pots	all	all	MA	all										

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Cod	Had-dock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Window-pane	Halibut	Ocean pout	
Longline	all	all	NE	all	2	4	8	8	8	8	6	8	8	8	8	5	
Longline	all	all	MA	all													
Otter Trawl	all	all	NE	small	18	13	22	20	14	15	28	24	17	26	30	21	
Otter Trawl	all	all	NE	large	8	10	7	9	5	14	16	13	18	4	21	11	
Otter Trawl	all	all	MA	small	28	28	24	25	17	16	28	21	23	12	28	19	
Otter Trawl	all	all	MA	large	22	26	17	26	9	10	19	25	23	7	26	11	
Scallop Trawl	open	limited	MA	all	8	8	8	8	8	8	8	8	8	3	8	8	
Scallop Trawl	open	general	MA	all	20	20	18	20	17	8	20	20	13	5	20	20	
Shrimp Trawl	all	all	NE	all	8	15	7	3	13	5	6	12	11	9	20	16	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	3	3	3	3	3	3	3	3	3	3	
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	10	5	13	21	7	4	11	6	20	18	17	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	13	10	20	26	15	7	22	9	25	17	12	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	4	4	4	4	4	4	4	4	4	4	
Sink, Anchor, Drift Gillnet	all	all	MA	large	5	5	5	5	5	5	5	5	5	4	5	5	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	7	7	7	7	7	7	7	7	7	7	7	
Scallop Dredge	open	limited	NE	all	19	22	11	23	7	6	25	26	20	10	26	15	
Scallop Dredge	open	limited	MA	all	24	24	16	21	8	15	24	24	10	6	24	17	
Scallop Dredge	open	general	NE	all	13	17	4	12	10	5	17	17	17	8	17	14	
Scallop Dredge	open	general	MA	all	16	16	13	13	11	6	16	16	10	4	16	16	
Scallop Dredge	closed	limited	NE	all	15	14	4	10	11	9	29	29	16	6	26	21	
Scallop Dredge	closed	limited	MA	all	25	25	6	18	7	11	25	25	16	8	25	22	
Scallop Dredge	closed	general	NE	all													
Scallop Dredge	closed	general	MA	all	5	5	5	5	5	5	5	5	5	5	5	5	
Mid-water paired & single Trawl	all	all	NE	all	16	6	23	13	18	19	8	5	14	23	23	23	
Mid-water paired & single Trawl	all	all	MA	all	15	15	15	15	13	15	15	15	12	15	15	15	
Fish Pots/ Traps	all	all	NE	all													
Fish Pots/ Traps	all	all	MA	all	4	4	4	4	4	4	4	4	4	4	4	4	
Purse Seine	all	all	NE	all	5	5	5	5	5	5	5	3	5	5	5	5	
Purse Seine	all	all	MA	all													
Hand Line	all	all	NE	all	1	2	2	2	2	2	2	2	2	2	2	2	
Hand Line	all	all	MA	all													
Scottish Seine	all	all	NE	all	7	11	13	8	13	9	13	13	11	2	13	13	
Clam Quahog Dredge	all	all	NE	all													
Clam Quahog Dredge	all	all	MA	all													
Crab Pots	all	all	NE	all													
Crab Pots	all	all	MA	all													
Lobster Pots	all	all	NE	all													
Lobster Pots	all	all	MA	all													

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH	
Longline	all	all	NE	all	8	8	7	3	1	8	8	8	8	8	
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	2	23	9	1	3	10	11	19	31	27	
Otter Trawl	all	all	NE	large	15	26	19	1	2	6	17	24	28	25	
Otter Trawl	all	all	MA	small	6	20	8	1	2	10	3	9	18	27	
Otter Trawl	all	all	MA	large	14	26	18	1	2	3	4	5	13	26	
Scallop Trawl	open	limited	MA	all	8	8	8	2	8	5	8	7	8	8	
Scallop Trawl	open	general	MA	all	7	20	14	1	3	6	10	19	20	20	
Shrimp Trawl	all	all	NE	all	2	20	10	4	18	20	20	20	20	20	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	3	3	3	3	1	3	3	3	3	3	
Sink, Anchor, Drift Gillnet	all	all	NE	large	14	27	16	3	1	19	27	26	27	27	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	16	27	11	2	1	5	23	27	27	14	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	4	4	4	1	3	4	4	4	4	
Sink, Anchor, Drift Gillnet	all	all	MA	large	5	5	5	3	1	5	5	5	5	5	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	7	7	2	1	5	7	7	7	7	
Scallop Dredge	open	limited	NE	all	13	14	8	2	9	4	21	12	5	26	
Scallop Dredge	open	limited	MA	all	9	20	13	2	5	4	19	11	7	24	
Scallop Dredge	open	general	NE	all	16	17	9	2	6	7	17	17	11	17	
Scallop Dredge	open	general	MA	all	9	16	12	1	8	5	16	16	7	16	
Scallop Dredge	closed	limited	NE	all	12	22	7	2	8	5	23	17	18	29	
Scallop Dredge	closed	limited	MA	all	10	25	13	2	5	4	17	9	21	25	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	5	5	5	2	5	4	5	5	5	5	
Mid-water paired & single Trawl	all	all	NE	all	4	23	17	11	2	23	20	22	23	23	
Mid-water paired & single Trawl	all	all	MA	all	6	15	5	15	1	8	15	4	15	15	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	4	4	4	4	4	4	2	1	4	4	
Purse Seine	all	all	NE	all	5	5	5	5	1	5	5	5	5	5	
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	2	2	2	2	2	2	2	2	2	2	
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	5	13	3	4	13	1	10	6	13	13	
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK	
Longline	all	all	NE	all	2	2	2	*	2	2	2	2	2	*	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Otter Trawl	all	all	NE	small	5	5	5	*	5	5	5	5	5	*	
Otter Trawl	all	all	NE	large	4	4	4	*	4	4	4	4	4	*	
Otter Trawl	all	all	MA	small	4	4	2	*	4	4	4	4	4	*	
Otter Trawl	all	all	MA	large	2	2	2	*	2	2	2	2	2	*	
Scallop Trawl	open	limited	MA	all	2	2	1	*	2	2	2	2	2	*	
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	7	7	*	7	2	7	3	4	*	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	8	8	8	*	8	4	6	1	3	*	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	2	4	*	3	4	4	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	large	2	4	2	*	4	4	4	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	4	1	*	7	7	7	6	5	*	
Scallop Dredge	open	limited	NE	all	3	3	1	*	3	3	3	3	3	*	
Scallop Dredge	open	limited	MA	all	2	2	1	*	2	2	2	2	2	*	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	3	3	2	*	3	3	3	3	3	*	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Mid-water paired & single Trawl	all	all	NE	all	4	4	4	*	4	4	4	4	4	*	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-2 *continued*. Ranking of total discards within fleet (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN-BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/DOLPHIN, NK	SEA BIRDS (ALL)	PILOT coverage
Longline	all	all	NE	all	2	*	*	2	2	2	2	*	1	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Otter Trawl	all	all	NE	small	3	*	*	3	1	5	5	*	2	
Otter Trawl	all	all	NE	large	3	*	*	1	4	4	4	*	2	
Otter Trawl	all	all	MA	small	4	*	*	4	1	4	4	*	3	
Otter Trawl	all	all	MA	large	2	*	*	2	2	2	2	*	1	
Scallop Trawl	open	limited	MA	all	2	*	*	2	2	2	2	*	2	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	*	*	6	7	7	5	*	1	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	8	*	*	8	8	6	2	*	5	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	*	*	4	4	4	4	*	1	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	*	*	4	4	4	4	*	1	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	7	*	*	7	7	7	1	*	3	pilot for fish
Scallop Dredge	open	limited	NE	all	3	*	*	3	3	3	3	*	2	
Scallop Dredge	open	limited	MA	all	2	*	*	2	2	2	2	*	2	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	3	*	*	3	3	3	3	*	1	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all										pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Mid-water paired & single Trawl	all	all	NE	all	3	*	*	2	4	4	4	*	1	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all										pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	NE	all										pilot
Clam Quahog Dredge	all	all	MA	all										pilot
Crab Pots	all	all	NE	all										pilot
Crab Pots	all	all	MA	all										pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Lobster Pots	all	all	MA	all										pilot

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	Mackerel	Illex	Loligo	Butterfish	MONKFISH	
Longline	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	2	2	*	2	13	2	1	1	1	4	
Otter Trawl	all	all	NE	large	4	5	*	1	11	7	4	8	7	3	
Otter Trawl	all	all	MA	small	3	7	*	6	10	3	2	2	2	11	
Otter Trawl	all	all	MA	large	8	9	*	11	7	8	8	3	5	10	
Scallop Trawl	open	limited	MA	all	14	13	*	11	3	13	15	6	16	13	
Scallop Trawl	open	general	MA	all	11	13	*	3	8	13	13	9	8	14	
Shrimp Trawl	all	all	NE	all	14	3	*	11	16	13	15	14	12	19	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	14	13	*	11	19	6	15	14	16	21	
Sink, Anchor, Drift Gillnet	all	all	NE	large	7	6	*	4	17	5	10	14	11	15	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	5	8	*	5	15	4	15	14	13	5	
Sink, Anchor, Drift Gillnet	all	all	MA	small	14	13	*	11	19	13	15	14	3	21	
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	13	*	11	19	13	15	14	16	21	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	6	13	*	11	14	13	15	14	16	12	
Scallop Dredge	open	limited	NE	all	14	13	*	7	2	13	5	5	6	1	
Scallop Dredge	open	limited	MA	all	14	13	*	8	1	10	7	4	9	2	
Scallop Dredge	open	general	NE	all	14	13	*	11	9	13	12	14	16	6	
Scallop Dredge	open	general	MA	all	14	13	*	11	6	13	15	13	16	9	
Scallop Dredge	closed	limited	NE	all	10	12	*	9	4	12	14	7	14	7	
Scallop Dredge	closed	limited	MA	all	13	11	*	10	5	9	11	11	15	8	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	14	13	*	11	12	13	15	14	16	16	
Mid-water paired & single Trawl	all	all	NE	all	9	1	*	11	18	1	6	10	4	17	
Mid-water paired & single Trawl	all	all	MA	all	12	10	*	11	19	11	3	12	10	18	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	14	13	*	11	19	13	15	14	16	20	
Purse Seine	all	all	NE	all	14	4	*	11	19	13	9	14	16	21	
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	14	13	*	11	19	13	15	14	16	21	
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Cod	Had-dock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Window-pane	Halibut	Ocean pout
Longline	all	all	NE	all	3	3	15	15	17	17	8	10	17	18	6	5
Longline	all	all	MA	all												
Otter Trawl	all	all	NE	small	5	1	3	2	2	1	4	2	1	10	3	2
Otter Trawl	all	all	NE	large	1	2	1	1	1	2	1	1	2	1	1	1
Otter Trawl	all	all	MA	small	14	11	12	10	6	4	10	5	7	4	6	6
Otter Trawl	all	all	MA	large	10	11	9	15	4	5	7	9	13	3	6	3
Scallop Trawl	open	limited	MA	all	14	11	15	15	17	17	10	10	17	2	6	14
Scallop Trawl	open	general	MA	all	14	11	14	15	14	13	10	10	12	11	6	14
Shrimp Trawl	all	all	NE	all	7	8	7	3	10	7	5	6	6	14	6	10
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	all	all	NE	small	14	11	15	15	17	17	10	10	17	18	6	14
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	5	4	5	12	10	2	4	4	16	4	8
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	6	8	8	16	12	3	8	5	17	2	7
Sink, Anchor, Drift Gillnet	all	all	MA	small	14	11	15	15	17	17	10	10	17	18	6	14
Sink, Anchor, Drift Gillnet	all	all	MA	large	14	11	15	15	17	17	10	10	17	6	6	14
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	14	11	15	15	17	17	10	10	17	18	6	14
Scallop Dredge	open	limited	NE	all	8	9	5	13	3	3	9	10	9	9	6	4
Scallop Dredge	open	limited	MA	all	14	11	11	12	5	11	10	10	3	5	6	9
Scallop Dredge	open	general	NE	all	13	11	6	7	9	8	10	10	17	12	6	11
Scallop Dredge	open	general	MA	all	14	11	13	11	11	9	10	10	10	8	6	14
Scallop Dredge	closed	limited	NE	all	9	7	2	4	7	6	10	10	11	7	5	12
Scallop Dredge	closed	limited	MA	all	14	11	10	14	8	14	10	10	14	15	6	13
Scallop Dredge	closed	general	NE	all												
Scallop Dredge	closed	general	MA	all	14	11	15	15	17	17	10	10	17	18	6	14
Mid-water paired & single Trawl	all	all	NE	all	11	4	15	6	13	16	6	3	8	18	6	14
Mid-water paired & single Trawl	all	all	MA	all	14	11	15	15	15	17	10	10	15	18	6	14
Fish Pots/ Traps	all	all	NE	all												
Fish Pots/ Traps	all	all	MA	all	14	11	15	15	17	17	10	10	17	18	6	14
Purse Seine	all	all	NE	all	14	11	15	15	17	17	10	7	17	18	6	14
Purse Seine	all	all	MA	all												
Hand Line	all	all	NE	all	6	11	15	15	17	17	10	10	17	18	6	14
Hand Line	all	all	MA	all												
Scottish Seine	all	all	NE	all	12	10	15	9	17	15	10	10	16	13	6	14
Clam Quahog Dredge	all	all	NE	all												
Clam Quahog Dredge	all	all	MA	all												
Crab Pots	all	all	NE	all												
Crab Pots	all	all	MA	all												
Lobster Pots	all	all	NE	all												
Lobster Pots	all	all	MA	all												

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH	
Longline	all	all	NE	all	18	7	13	17	10	20	14	16	11	5	
Longline	all	all	MA	all											
Otter Trawl	all	all	NE	small	1	1	1	3	4	1	2	4	8	1	
Otter Trawl	all	all	NE	large	3	3	3	1	3	2	4	7	6	2	
Otter Trawl	all	all	MA	small	2	4	2	6	7	6	1	2	5	4	
Otter Trawl	all	all	MA	large	8	7	8	5	5	3	3	3	3	5	
Scallop Trawl	open	limited	MA	all	18	7	19	8	23	11	14	10	11	5	
Scallop Trawl	open	general	MA	all	11	7	16	10	13	16	5	14	11	5	
Shrimp Trawl	all	all	NE	all	4	7	10	18	22	20	14	16	11	5	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	18	7	19	22	20	20	14	16	11	5	
Sink, Anchor, Drift Gillnet	all	all	NE	large	9	7	11	15	2	17	14	13	11	5	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	13	7	9	11	8	9	13	16	11	3	
Sink, Anchor, Drift Gillnet	all	all	MA	small	18	7	19	22	6	13	14	16	11	5	
Sink, Anchor, Drift Gillnet	all	all	MA	large	18	7	19	16	1	20	14	16	11	5	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	18	7	19	14	12	15	14	16	11	5	
Scallop Dredge	open	limited	NE	all	7	2	4	2	16	4	7	5	1	5	
Scallop Dredge	open	limited	MA	all	6	5	6	4	14	5	8	6	2	5	
Scallop Dredge	open	general	NE	all	17	7	7	13	19	14	14	16	7	5	
Scallop Dredge	open	general	MA	all	12	7	15	7	21	10	14	16	4	5	
Scallop Dredge	closed	limited	NE	all	10	6	5	9	17	7	12	12	9	5	
Scallop Dredge	closed	limited	MA	all	15	7	18	12	18	8	11	8	10	5	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	18	7	19	19	23	18	14	16	11	5	
Mid-water paired & single Trawl	all	all	NE	all	5	7	14	20	9	20	10	15	11	5	
Mid-water paired & single Trawl	all	all	MA	all	16	7	17	22	15	19	14	11	11	5	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	18	7	19	22	23	20	6	1	11	5	
Purse Seine	all	all	NE	all	18	7	19	22	11	20	14	16	11	5	
Purse Seine	all	all	MA	all											
Hand Line	all	all	NE	all	18	7	19	22	23	20	14	16	11	5	
Hand Line	all	all	MA	all											
Scottish Seine	all	all	NE	all	14	7	12	21	23	12	9	9	11	5	
Clam Quahog Dredge	all	all	NE	all											
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all											
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK	
Longline	all	all	NE	all	2	3	8	*	2	3	2	4	4	*	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Otter Trawl	all	all	NE	small	2	3	8	*	2	3	2	4	4	*	
Otter Trawl	all	all	NE	large	2	3	8	*	2	3	2	4	4	*	
Otter Trawl	all	all	MA	small	2	3	4	*	2	3	2	4	4	*	
Otter Trawl	all	all	MA	large	2	3	8	*	2	3	2	4	4	*	
Scallop Trawl	open	limited	MA	all	2	3	1	*	2	3	2	4	4	*	
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	*	
Sink, Anchor, Drift Gillnet	all	all	NE	large	2	3	8	*	2	1	2	2	2	*	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	2	3	8	*	2	2	1	1	1	*	
Sink, Anchor, Drift Gillnet	all	all	MA	small	2	2	8	*	1	3	2	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	large	1	3	6	*	2	3	2	4	4	*	
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	2	1	5	*	2	3	2	3	3	*	
Scallop Dredge	open	limited	NE	all	2	3	2	*	2	3	2	4	4	*	
Scallop Dredge	open	limited	MA	all	2	3	3	*	2	3	2	4	4	*	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	2	3	7	*	2	3	2	4	4	*	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all											
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	*	
Mid-water paired & single Trawl	all	all	NE	all	2	3	8	*	2	3	2	4	4	*	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all											
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	*	
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Clam Quahog Dredge	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Clam Quahog Dredge	all	all	MA	all											
Crab Pots	all	all	NE	all											
Crab Pots	all	all	MA	all											
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	*	
Lobster Pots	all	all	MA	all											

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-3 *continued*. Ranking of total discards within species group (fish and protected species ranked separately) based on 2004 observer data.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN-BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/DOLPHIN, NK	SEA BIRDS (ALL)	PILOT coverage
Longline	all	all	NE	all	4	*	*	5	3	2	4	*	12	
Longline	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Otter Trawl	all	all	NE	small	1	*	*	3	1	2	4	*	6	
Otter Trawl	all	all	NE	large	2	*	*	1	3	2	4	*	5	
Otter Trawl	all	all	MA	small	4	*	*	5	2	2	4	*	11	
Otter Trawl	all	all	MA	large	4	*	*	5	3	2	4	*	3	
Scallop Trawl	open	limited	MA	all	4	*	*	5	3	2	4	*	14	pilot
Scallop Trawl	open	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Shrimp Trawl	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Shrimp Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	small	*	*	*	*	*	*	*	*	*	pilot
Sink, Anchor, Drift Gillnet	all	all	NE	large	4	*	*	4	3	2	2	*	1	
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	4	*	*	5	3	1	1	*	9	
Sink, Anchor, Drift Gillnet	all	all	MA	small	4	*	*	5	3	2	4	*	8	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	large	4	*	*	5	3	2	4	*	7	pilot for fish
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	4	*	*	5	3	2	3	*	10	pilot for fish
Scallop Dredge	open	limited	NE	all	4	*	*	5	3	2	4	*	4	
Scallop Dredge	open	limited	MA	all	4	*	*	5	3	2	4	*	14	
Scallop Dredge	open	general	NE	all	*	*	*	*	*	*	*	*	*	pilot
Scallop Dredge	open	general	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	limited	NE	all	4	*	*	5	3	2	4	*	13	
Scallop Dredge	closed	limited	MA	all	*	*	*	*	*	*	*	*	*	
Scallop Dredge	closed	general	NE	all										pilot
Scallop Dredge	closed	general	MA	all	*	*	*	*	*	*	*	*	*	pilot
Mid-water paired & single Trawl	all	all	NE	all	3	*	*	2	3	2	4	*	2	
Mid-water paired & single Trawl	all	all	MA	all	*	*	*	*	*	*	*	*	*	
Fish Pots/ Traps	all	all	NE	all										pilot
Fish Pots/ Traps	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Purse Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	
Purse Seine	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Hand Line	all	all	MA	all	*	*	*	*	*	*	*	*	*	pilot
Scottish Seine	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Clam Quahog Dredge	all	all	MA	all										pilot
Crab Pots	all	all	NE	all										pilot
Crab Pots	all	all	MA	all										pilot
Lobster Pots	all	all	NE	all	*	*	*	*	*	*	*	*	*	pilot
Lobster Pots	all	all	MA	all										pilot

Gray-shaded cells indicate unlikely combinations of species/gear; * indicate no discards of these species.

Table B-4. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	1103	882	211	848	1998	249	1748	487	454	633	757
Otter Trawl	all	all	NE	large	26644	12864	730	798	1233	3159	2582	9820	3561	5259	81
Otter Trawl	all	all	MA	small	2231	1869	196	5417	1162	1125	2841	1362	1697	1160	497
Otter Trawl	all	all	MA	large	3625	883	342	342	311	242	374	753	327	394	140
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	155	51	51	399	119	181	51	277	200	270	115
Shrimp Trawl	all	all	NE	all	42	92	42	42	353	364	42	42	42	364	22
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	443	486	141	2592	4357	3758	3929	5405	141	6119	408
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	267	1004	144	3266	1255	1701	1708	144	144	4216	238
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	105	29	29	29	29	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	131	68	68	68	301	68	68	68	68	68	104
Scallop Dredge	open	limited	NE	all	269	269	269	1596	80	1380	269	709	3260	6097	320
Scallop Dredge	open	limited	MA	all	329	329	329	8713	280	641	8713	1662	986	2528	213
Scallop Dredge	open	general	NE	all	92	92	92	92	204	176	92	176	92	92	117
Scallop Dredge	open	general	MA	all	96	96	96	96	54	293	96	96	293	96	17
Scallop Dredge	closed	limited	NE	all	3861	344	139	1473	167	1301	327	564	1531	273	429
Scallop Dredge	closed	limited	MA	all	1777	772	108	341	157	337	764	370	989	324	283
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	699	747	56	56	1793	346	347	829	1786	1712	718
Mid-water paired & single Trawl	all	all	MA	all	182	453	35	35	35	167	181	165	182	182	492
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	103
Purse Seine	all	all	NE	all	19	219	19	19	19	206	19	206	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					43,547	23,025	4,573	27,698	15,384	17,200	25,658	24,643	17,279	31,311	6,541
Total Sea Days excluding shaded cells					35,867	19,828	0	5,547	6,049	15,522	24,114	17,398	15,185	19,567	5,528

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	27	39	36	35	35	35	35	310	35	35	35	35	76
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	266	1861	1892	774	442	523	852	1351	1507	969	405	2129	490
Otter Trawl	all	all	NE	large	107	321	719	505	663	219	1837	3732	630	568	440	1793	268
Otter Trawl	all	all	MA	small	429	196	196	2763	3849	904	1172	196	2272	2580	633	196	3911
Otter Trawl	all	all	MA	large	101	5866	342	677	342	137	272	5866	1315	5882	156	342	358
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	85	51	51	505	51	255	423	51	51	399	170	51	51
Shrimp Trawl	all	all	NE	all	20	50	171	121	38	328	29	89	56	22	17	42	349
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	83	142	320	360	693	1325	724	315	607	488	1500	1532	1504
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	206	249	473	963	833	3315	1829	750	948	979	2892	1281	1245
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	19	29	29	29	29	29	29	29	29	29	19	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	68	68	68	68	68	68	68	68	68
Scallop Dredge	open	limited	NE	all	708	1855	1611	1077	1611	728	2851	1611	269	848	633	269	1298
Scallop Dredge	open	limited	MA	all	411	329	329	2708	3159	1660	2108	329	329	1687	715	329	6549
Scallop Dredge	open	general	NE	all	82	120	92	85	110	146	92	92	92	92	90	92	190
Scallop Dredge	open	general	MA	all	40	96	96	293	288	171	73	96	96	173	46	96	96
Scallop Dredge	closed	limited	NE	all	227	1735	1311	390	3105	315	355	139	139	1576	988	439	1332
Scallop Dredge	closed	limited	MA	all	1136	108	108	1819	333	404	1829	108	108	800	1409	108	1803
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	688	1451	855	56	1437	1037	1616	1217	1219	1128	56	56	56
Mid-water paired & single Trawl	all	all	MA	all	281	35	35	35	35	547	35	35	35	176	35	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	40	40
Purse Seine	all	all	NE	all	217	19	19	19	19	19	19	19	217	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	137	137	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	14	12	12	12	12	12	18	12	12	12	15	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					6,712	16,129	10,194	14,724	18,580	13,608	17,695	17,846	11,464	19,958	11,769	10,382	21,169
Total Sea Days excluding shaded cells					6,450	15,330	5,143	13,481	9,033	9,941	16,768	7,934	5,380	15,652	10,603	7,758	20,321

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	185	35	35	185	89	99	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	269	233	5131	762	2024	492	455	365	1344	2115	3822	441
Otter Trawl	all	all	NE	large	341	530	1053	1255	316	614	1034	1091	7275	6224	15593	2692
Otter Trawl	all	all	MA	small	944	1324	1690	1198	202	532	584	314	1120	952	836	3057
Otter Trawl	all	all	MA	large	998	321	342	3401	70	481	98	114	201	643	584	342
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	292	297	51	155	80	443	408	75	102	396	51	51
Shrimp Trawl	all	all	NE	all	123	128	42	115	247	349	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	313	514	141	439	482	109	3767	4020	141	6294	141	141
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	2059	345	144	2902	109	214	417	418	4204	144	144	502
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	29	29	29	29	99	96	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	55	58	120	120	68	68	68	68
Scallop Dredge	open	limited	NE	all	534	1706	3605	390	177	807	649	693	325	1172	478	269
Scallop Dredge	open	limited	MA	all	3080	3657	3443	1081	114	371	465	512	2642	2077	2958	329
Scallop Dredge	open	general	NE	all	135	204	92	148	120	120	92	92	92	92	190	92
Scallop Dredge	open	general	MA	all	96	90	96	288	17	124	88	88	96	96	271	96
Scallop Dredge	closed	limited	NE	all	1180	1214	1618	1434	145	857	703	712	452	252	375	139
Scallop Dredge	closed	limited	MA	all	287	339	108	298	88	567	481	485	1568	378	334	108
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	1218	1226	56	826	1034	316	697	56	797	1134	56	56
Mid-water paired & single Trawl	all	all	MA	all	182	182	35	182	35	43	557	544	35	563	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	73	40	40	40
Purse Seine	all	all	NE	all	19	19	19	19	19	217	19	19	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	30	30	30	30	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					13,792	13,902	19,241	16,616	6,965	8,351	12,200	11,286	22,079	24,187	27,502	9,984
Total Sea Days excluding shaded cells					12,562	12,637	6,272	15,136	4,901	6,943	9,850	9,591	10,416	10,673	133	6,703

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEALS	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	35	35
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	211	211	211	211	211	211	211	211	211	211	211	211
Otter Trawl	all	all	NE	large	730	730	730	730	730	730	730	730	730	730	730	730
Otter Trawl	all	all	MA	small	1229	196	196	1229	196	196	196	196	196	196	196	196
Otter Trawl	all	all	MA	large	342	342	342	342	342	342	342	342	342	342	342	342
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	51	51	51	51	51	51	51	51	51	51	51	51
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	141	141	141	141	141	141	531	1007	141	889	2518	141
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	144	144	144	144	144	144	470	1694	3812	973	731	144
Sink, Anchor, Drift Gillnet	all	all	MA	small	1259	62	1841	62	62	1757	62	62	62	62	62	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	653	913	29	913	29	29	29	29	29	29	29	29
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	468	68	799	764	68	68	804	68	68	1175	1272	68
Scallop Dredge	open	limited	NE	all	1261	269	269	1261	269	269	269	269	269	269	269	269
Scallop Dredge	open	limited	MA	all	3956	329	329	3956	329	329	329	329	329	329	329	329
Scallop Dredge	open	general	NE	all	92	92	92	92	92	92	92	92	92	92	92	92
Scallop Dredge	open	general	MA	all	96	96	96	96	96	96	96	96	96	96	96	96
Scallop Dredge	closed	limited	NE	all	414	139	139	414	139	139	139	139	139	139	139	139
Scallop Dredge	closed	limited	MA	all	108	108	108	108	108	108	108	108	108	108	108	108
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	56	56	56	56	56	56	56	56	56	56	56	56
Mid-water paired & single Trawl	all	all	MA	all	35	35	35	35	35	35	35	35	35	35	35	35
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	40
Purse Seine	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	72
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					12,721	5,457	7,083	12,079	4,573	6,269	6,025	6,990	8,241	7,257	8,741	4,573
Total Sea Days excluding shaded cells					12,721	3,082	6,142	12,079	3,632	6,269	4,742	5,706	5,319	5,436	6,920	3,290

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-4 *continued*. Number of sea days needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALES	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/-PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	35	35	35	35	35	35	35	35	35	35	267	57
Longline	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	76
Otter Trawl	all	all	NE	small	3082	3082	211	211	2265	3099	2594	211	211	211	1870	183
Otter Trawl	all	all	NE	large	10526	10526	730	730	2111	2111	730	730	730	730	3237	159
Otter Trawl	all	all	MA	small	196	196	196	196	1164	196	1164	196	196	196	1880	250
Otter Trawl	all	all	MA	large	342	342	342	342	342	342	342	342	342	342	727	55
Scallop Trawl	open	limited	MA	all	95	95	95	95	95	95	95	95	95	95	95	95
Scallop Trawl	open	general	MA	all	51	51	51	51	51	51	51	51	51	51	51	38
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	39
Shrimp Trawl	all	all	MA	all	76	76	76	76	76	76	76	76	76	76	76	55
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	141	141	141	141	1398	3642	141	141	1557	141	1306	82
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	144	144	144	144	806	144	144	3816	871	144	2661	59
Sink, Anchor, Drift Gillnet	all	all	MA	small	62	62	62	62	62	62	62	62	62	62	880	62
Sink, Anchor, Drift Gillnet	all	all	MA	large	29	29	29	29	29	29	29	29	29	29	311	95
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	68	68	68	68	1272	68	68	68	1272	68	806	51
Scallop Dredge	open	limited	NE	all	269	269	269	269	269	269	269	269	269	269	3194	123
Scallop Dredge	open	limited	MA	all	329	329	329	329	329	329	329	329	329	329	329	89
Scallop Dredge	open	general	NE	all	92	92	92	92	92	92	92	92	92	92	92	88
Scallop Dredge	open	general	MA	all	96	96	96	96	96	96	96	96	96	96	96	14
Scallop Dredge	closed	limited	NE	all	139	139	139	139	139	139	139	139	139	139	407	130
Scallop Dredge	closed	limited	MA	all	108	108	108	108	108	108	108	108	108	108	108	61
Scallop Dredge	closed	general	NE	all	24	24	24	24	24	24	24	24	24	24	24	24
Scallop Dredge	closed	general	MA	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	NE	all	1606	1606	56	56	1464	1464	56	56	56	56	808	193
Mid-water paired & single Trawl	all	all	MA	all	35	35	35	35	35	35	35	35	35	35	35	111
Fish Pots/ Traps	all	all	NE	all	20	20	20	20	20	20	20	20	20	20	20	20
Fish Pots/ Traps	all	all	MA	all	40	40	40	40	40	40	40	40	40	40	40	37
Purse Seine	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	143
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	72	72	72	72	72	72	72	72	72	72	72	137
Hand Line	all	all	MA	all	133	133	133	133	133	133	133	133	133	133	133	133
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	50	50	50	50	50	50	50	50	50	50	50	50
Clam Quahog Dredge	all	all	MA	all	84	84	84	84	84	84	84	84	84	84	84	84
Crab Pots	all	all	NE	all	101	101	101	101	101	101	101	101	101	101	101	101
Crab Pots	all	all	MA	all	28	28	28	28	28	28	28	28	28	28	28	28
Lobster Pots	all	all	NE	all	439	439	439	439	439	439	439	439	439	439	439	439
Lobster Pots	all	all	MA	all	89	89	89	89	89	89	89	89	89	89	89	89
Total Sea Days					18,791	18,791	4,573	4,573	13,507	13,752	7,923	8,245	7,920	4,573	20,503	3,513
Total Sea Days excluding shaded cells					17,714	17,714	2,593	3,497	13,507	13,752	7,923	7,708	7,829	4,573	20,503	3,513

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	BLUEFISH	HERRING	SALMON	RED CRAB	SCALLOP	MACK-/SQUID-/BUTTERFISH	Mackerel	Illex	Loligo	Butterfish	MONKFISH
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	364	291	70	280	659	82	576	161	150	209	250
Otter Trawl	all	all	NE	large	11227	5420	304	336	520	1331	1088	4138	1501	2216	34
Otter Trawl	all	all	MA	small	1189	995	104	2885	619	599	1513	725	904	618	265
Otter Trawl	all	all	MA	large	1879	458	177	177	161	125	194	390	170	204	72
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	72	25	25	196	56	85	25	132	94	129	54
Shrimp Trawl	all	all	NE	all	42	91	42	42	350	361	42	42	42	361	22
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	327	359	104	1913	3216	2774	2900	3990	104	4517	301
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	175	657	94	2139	822	1114	1119	94	94	2760	156
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	100	27	27	27	27	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	94	51	51	51	211	51	51	51	51	51	76
Scallop Dredge	open	limited	NE	all	25	25	25	146	7	126	25	65	298	558	29
Scallop Dredge	open	limited	MA	all	36	36	36	966	31	71	966	184	109	280	24
Scallop Dredge	open	general	NE	all	71	71	71	71	149	130	71	130	71	71	89
Scallop Dredge	open	general	MA	all	69	69	69	69	39	210	69	69	210	69	12
Scallop Dredge	closed	limited	NE	all	449	40	15	171	19	151	38	66	178	32	50
Scallop Dredge	closed	limited	MA	all	194	84	12	37	17	37	83	40	108	35	31
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	266	285	21	21	683	132	132	316	681	652	274
Mid-water paired & single Trawl	all	all	MA	all	52	130	12	12	12	48	52	47	52	52	141
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	97
Purse Seine	all	all	NE	all	10	108	10	10	10	102	10	102	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75
Total Trips					17,678	10,260	2,306	10,588	8,647	8,594	10,019	11,808	5,891	13,889	3,015
Total Trips excluding shaded cells					15,925	9,034	0	1,539	2,468	7,333	8,922	6,413	4,300	5,539	2,219

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (LARGE-MESH)	Cod	Haddock	Yellowtail fld	American plaice	Witch fld	Winter fld	Pollock	Redfish	White hake	Windowpane	Halibut	Ocean pout
Longline	all	all	NE	all	21	30	28	26	26	26	26	242	26	26	26	26	59
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	88	614	624	255	146	173	281	446	497	319	133	702	161
Otter Trawl	all	all	NE	large	45	135	303	213	279	92	774	1572	266	239	185	755	113
Otter Trawl	all	all	MA	small	229	104	104	1472	2050	481	624	104	1210	1374	337	104	2083
Otter Trawl	all	all	MA	large	52	3040	177	351	177	71	141	3040	681	3048	81	177	185
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	41	25	25	244	25	125	207	25	25	196	81	25	25
Shrimp Trawl	all	all	NE	all	20	49	169	120	37	325	29	89	56	22	17	42	346
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	61	105	236	266	512	978	534	232	448	360	1107	1131	1110
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	135	163	310	631	545	2171	1197	491	621	641	1893	839	815
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	17	27	27	27	27	27	27	27	27	27	17	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	51	51	51	51	51	51	51	51	51
Scallop Dredge	open	limited	NE	all	65	170	147	99	147	67	261	147	25	78	58	25	119
Scallop Dredge	open	limited	MA	all	46	36	36	300	350	184	234	36	36	187	79	36	726
Scallop Dredge	open	general	NE	all	64	91	71	66	84	109	71	71	71	71	70	71	140
Scallop Dredge	open	general	MA	all	29	69	69	210	206	123	53	69	69	124	33	69	69
Scallop Dredge	closed	limited	NE	all	26	202	152	45	361	37	41	15	15	183	115	51	155
Scallop Dredge	closed	limited	MA	all	124	12	12	199	36	44	200	12	12	87	154	12	197
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	262	553	326	21	548	395	616	464	465	430	21	21	21
Mid-water paired & single Trawl	all	all	MA	all	81	12	12	12	12	157	12	12	12	50	12	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	37	37
Purse Seine	all	all	NE	all	107	10	10	10	10	10	10	10	107	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	129	129	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	14	12	12	12	12	12	18	12	12	12	15	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					2,641	6,572	3,902	5,630	6,641	6,657	6,407	8,167	5,730	8,536	5,495	5,198	7,437
Total Trips excluding shaded cells					2,464	6,143	2,403	4,676	2,717	5,239	5,685	3,669	2,618	7,001	4,602	3,710	6,881

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	NE MULTI-SPP (SMALL-MESH)	Silver hake	Offshore hake	Red hake	SKATE	DOGFISH	FLUKE/-SCUP/-BLK SEA BASS	Fluke	Scup	Black sea bass	SURF CLAM/-OCEAN QUAHOG	TILEFISH
Longline	all	all	NE	all	144	26	26	144	69	78	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	89	77	1692	251	668	162	150	120	443	698	1260	146
Otter Trawl	all	all	NE	large	143	223	444	529	133	259	436	460	3065	2623	6570	1134
Otter Trawl	all	all	MA	small	503	705	900	638	108	283	311	167	596	507	445	1628
Otter Trawl	all	all	MA	large	517	166	177	1762	36	249	51	59	104	333	303	177
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	142	144	25	72	39	216	200	36	48	195	25	25
Shrimp Trawl	all	all	NE	all	122	127	42	114	245	346	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	231	380	104	324	356	81	2780	2967	104	4646	104	104
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	1348	226	94	1900	71	140	273	273	2753	94	94	329
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	27	27	27	27	95	91	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	42	44	87	87	51	51	51	51
Scallop Dredge	open	limited	NE	all	49	156	330	36	16	74	59	63	30	107	44	25
Scallop Dredge	open	limited	MA	all	342	406	382	120	13	41	52	57	293	230	328	36
Scallop Dredge	open	general	NE	all	102	149	71	111	91	91	71	71	71	71	140	71
Scallop Dredge	open	general	MA	all	69	65	69	206	12	89	63	63	69	69	194	69
Scallop Dredge	closed	limited	NE	all	137	141	188	167	17	100	82	83	52	29	44	15
Scallop Dredge	closed	limited	MA	all	31	37	12	33	10	62	53	53	171	41	37	12
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	464	467	21	315	394	121	266	21	304	432	21	21
Mid-water paired & single Trawl	all	all	MA	all	52	52	12	52	12	12	160	156	12	161	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	69	37	37	37
Purse Seine	all	all	NE	all	10	10	10	10	10	107	10	10	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	30	30	30	30	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					5,584	4,647	5,688	7,873	3,447	3,658	6,227	5,872	9,332	11,423	10,788	4,971
Total Trips excluding shaded cells					4,637	3,673	2,211	6,842	2,243	2,511	4,981	4,874	4,476	4,543	139	3,180

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	TURTLES	TURTLE, GREEN	TURTLE, LEATHERBACK	TURTLE, LOGGERHEAD	TURTLE, KEMP'S RIDLEY	TURTLE, NK	SEALS	SEAL, HARP	SEAL, HOODED	SEAL, HARBOR	SEAL, GRAY	SEAL, NK
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	26	26
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	70	70	70	70	70	70	70	70	70	70	70	70
Otter Trawl	all	all	NE	large	304	304	304	304	304	304	304	304	304	304	304	304
Otter Trawl	all	all	MA	small	654	104	104	654	104	104	104	104	104	104	104	104
Otter Trawl	all	all	MA	large	177	177	177	177	177	177	177	177	177	177	177	177
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	25	25	25	25	25	25	25	25	25	25	25	25
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	42
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	13
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	104	104	104	104	104	104	392	743	104	656	1859	104
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	94	94	94	94	94	94	308	1109	2496	637	479	94
Sink, Anchor, Drift Gillnet	all	all	MA	small	1195	58	1747	58	58	1668	58	58	58	58	58	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	604	845	27	845	27	27	27	27	27	27	27	27
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	351	51	600	573	51	51	604	51	51	882	955	51
Scallop Dredge	open	limited	NE	all	115	25	25	115	25	25	25	25	25	25	25	25
Scallop Dredge	open	limited	MA	all	439	36	36	439	36	36	36	36	36	36	36	36
Scallop Dredge	open	general	NE	all	71	71	71	71	71	71	71	71	71	71	71	71
Scallop Dredge	open	general	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Scallop Dredge	closed	limited	NE	all	48	15	15	48	15	15	15	15	15	15	15	15
Scallop Dredge	closed	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	21	21	21	21	21	21	21	21	21	21	21	21
Mid-water paired & single Trawl	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	37
Purse Seine	all	all	NE	all	10	10	10	10	10	10	10	10	10	10	10	10
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	68
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					5,397	3,124	4,543	4,722	2,306	3,916	3,360	3,961	4,708	4,232	5,349	2,306
Total Trips excluding shaded cells					5,397	2,096	4,169	4,722	1,933	3,916	3,023	3,623	3,579	3,613	4,730	1,969

Gray-shaded cells indicate unlikely combinations of species/gear.

Table B-5 *continued*. Number of trips needed to achieve a CV of 30 percent based on the total composite discards.

Gear Type	Access Area (Open-Closed)	Trip Category (General/ Limited)	Region	mesh groups	WHALES	WHALE, PILOT, LONG-FIN	WHALE, MINKE	WHALE, NK	DOLPHINS/-PORPOISE	DOLPHIN WHITE-SIDED	DOLPHIN-COMMON	DOLPHIN- BOTTLE-NOSE	PORPOISE, HARBOR	PORPOISE/ DOLPHIN, NK	SEA BIRDS (ALL)	ALL SPECIES
Longline	all	all	NE	all	26	26	26	26	26	26	26	26	26	26	208	44
Longline	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Otter Trawl	all	all	NE	small	1016	1016	70	70	747	1022	855	70	70	70	617	60
Otter Trawl	all	all	NE	large	4435	4435	304	304	890	890	304	304	304	304	1364	67
Otter Trawl	all	all	MA	small	104	104	104	104	620	104	620	104	104	104	1001	133
Otter Trawl	all	all	MA	large	177	177	177	177	177	177	177	177	177	177	377	29
Scallop Trawl	open	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Trawl	open	general	MA	all	25	25	25	25	25	25	25	25	25	25	25	18
Shrimp Trawl	all	all	NE	all	42	42	42	42	42	42	42	42	42	42	42	38
Shrimp Trawl	all	all	MA	all	13	13	13	13	13	13	13	13	13	13	13	9
Sink, Anchor, Drift Gillnet	all	all	NE	small	12	12	12	12	12	12	12	12	12	12	12	12
Sink, Anchor, Drift Gillnet	all	all	NE	large	104	104	104	104	1032	2688	104	104	1149	104	964	61
Sink, Anchor, Drift Gillnet	all	all	NE	xlg	94	94	94	94	528	94	94	2499	570	94	1742	38
Sink, Anchor, Drift Gillnet	all	all	MA	small	58	58	58	58	58	58	58	58	58	58	835	58
Sink, Anchor, Drift Gillnet	all	all	MA	large	27	27	27	27	27	27	27	27	27	27	288	91
Sink, Anchor, Drift Gillnet	all	all	MA	xlg	51	51	51	51	955	51	51	51	955	51	605	39
Scallop Dredge	open	limited	NE	all	25	25	25	25	25	25	25	25	25	25	292	11
Scallop Dredge	open	limited	MA	all	36	36	36	36	36	36	36	36	36	36	36	10
Scallop Dredge	open	general	NE	all	71	71	71	71	71	71	71	71	71	71	71	69
Scallop Dredge	open	general	MA	all	69	69	69	69	69	69	69	69	69	69	69	10
Scallop Dredge	closed	limited	NE	all	15	15	15	15	15	15	15	15	15	15	47	15
Scallop Dredge	closed	limited	MA	all	12	12	12	12	12	12	12	12	12	12	12	7
Scallop Dredge	closed	general	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Scallop Dredge	closed	general	MA	all	15	15	15	15	15	15	15	15	15	15	15	15
Mid-water paired & single Trawl	all	all	NE	all	612	612	21	21	558	558	21	21	21	21	308	73
Mid-water paired & single Trawl	all	all	MA	all	12	12	12	12	12	12	12	12	12	12	12	32
Fish Pots/ Traps	all	all	NE	all	19	19	19	19	19	19	19	19	19	19	19	19
Fish Pots/ Traps	all	all	MA	all	37	37	37	37	37	37	37	37	37	37	37	34
Purse Seine	all	all	NE	all	10	10	10	10	10	10	10	10	10	10	10	71
Purse Seine	all	all	MA	all	9	9	9	9	9	9	9	9	9	9	9	9
Hand Line	all	all	NE	all	68	68	68	68	68	68	68	68	68	68	68	129
Hand Line	all	all	MA	all	126	126	126	126	126	126	126	126	126	126	126	126
Scottish Seine	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	20
Clam Quahog Dredge	all	all	NE	all	69	69	69	69	69	69	69	69	69	69	69	69
Clam Quahog Dredge	all	all	MA	all	69	69	69	69	69	69	69	69	69	69	69	69
Crab Pots	all	all	NE	all	12	12	12	12	12	12	12	12	12	12	12	12
Crab Pots	all	all	MA	all	27	27	27	27	27	27	27	27	27	27	27	27
Lobster Pots	all	all	NE	all	353	353	353	353	353	353	353	353	353	353	353	353
Lobster Pots	all	all	MA	all	75	75	75	75	75	75	75	75	75	75	75	75
Total Trips					7,975	7,975	2,306	2,306	6,887	6,965	3,607	4,711	4,731	2,306	9,877	1,992
Total Trips excluding shaded cells					7,720	7,720	1,550	2,051	6,887	6,965	3,607	4,429	4,698	2,306	9,877	1,992

Gray-shaded cells indicate unlikely combinations of species/gear.

Appendix C
Importance Filter Worksheets for All Fishing Modes

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Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Clam Dredge

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,466	0%	Fish
0	0	3,466	0%	Protected Species

Top Species:	scallop	monkfish	surfclam quahog										sea turtles
Projected observer days needed:	***50***	***50***	***50***										***50***
Average trip length (days):	0.70												
Estimated % coverage level required:	2%	2%	2%										2%
Realized CV for 2004:	N/A	N/A	N/A										N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A										N/A
Encounter rate:	N/A	N/A	N/A										N/A
Rank of total discards (out of 13):	N/A	N/A	N/A										N/A
Observed discards (lb):	N/A	N/A	N/A										N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A										N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	101,717,000										N/A
2004 recreational landings (lb, all gears):	0	0	0										N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A										N/A
Discards as % of comm landings:	N/A	N/A	N/A										N/A
Discards as % ot total landings:	N/A	N/A	N/A										N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Clam Dredge

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,461	0%	Fish
0	0	3,461	0%	Protected Species

Top Species:	scallop	monkfish	surfclam quahog											sea turtles
Projected observer days needed:	***84***	***84***	***84***											***84***
Average trip length (days):	1.20													
Estimated % coverage level required:	2%	2%	2%											2%
Realized CV for 2004:	N/A	N/A	N/A											N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A											N/A
Encounter rate:	N/A	N/A	N/A											N/A
Rank of total discards (out of 13):	N/A	N/A	N/A											N/A
Observed discards (lb):	N/A	N/A	N/A											N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A											N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	101,717,000											N/A
2004 recreational landings (lb, all gears):	0	0	0											N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A											N/A
Discards as % of comm landings:	N/A	N/A	N/A											N/A
Discards as % ot total landings:	N/A	N/A	N/A											N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Crab Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	103	0%	Fish
0	0	103	0%	Protected Species

Top Species:	red crab												sea turtles
Projected observer days needed:	***101***												***101***
Average trip length (days):	6.00												
Estimated % coverage level required:	16%												16%
Realized CV for 2004:	N/A												N/A
Percent of trips w/ zero discard:	N/A												N/A
Encounter rate:	N/A												N/A
Rank of total discards (out of 13):	N/A												N/A
Observed discards (lb):	N/A												N/A
Obs. discard percent of all obs. discards:	N/A												N/A
2004 commercial landings (lb, all gears):	3,952,000												N/A
2004 recreational landings (lb, all gears):	0												N/A
Obs. discards as % of comm landings:	N/A												N/A
Discards as % of comm landings:	N/A												N/A
Discards as % ot total landings:	N/A												N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Crab Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	1,133	0%	Fish
0	0	1,133	0%	Protected Species

Top Species:	red crab	sea turtles
Projected observer days needed:	***28***	***28***
Average trip length (days):	0.30	
Estimated % coverage level required:	8%	8%
Realized CV for 2004:	N/A	N/A
Percent of trips w/ zero discard:	N/A	N/A
Encounter rate:	N/A	N/A
Rank of total discards (out of 13):	N/A	N/A
Observed discards (lb):	N/A	N/A
Obs. discard percent of all obs. discards:	N/A	N/A
2004 commercial landings (lb, all gears):	3,952,000	N/A
2004 recreational landings (lb, all gears):	0	N/A
Obs. discards as % of comm landings:	N/A	N/A
Discards as % of comm landings:	N/A	N/A
Discards as % ot total landings:	N/A	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Fish Pots/Traps

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	973	0%	Fish
0	0	973	0%	Protected Species

Top Species:	herring	red crab	large-mesh mults	small-mesh mults	skates	SF/S/BSB	tilefish						sea turtles
Projected observer days needed:	***20***	***20***	***20***	***20***	***20***	***20***	***20***						***20***
Average trip length (days):	0.40												
Estimated % coverage level required:	5%	5%	5%	5%	5%	5%	5%						5%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
2004 commercial landings (lb, all gears):	187,387,000	3,952,000	83,523,000	19,387,000	20,388,000	30,616,000	2,316,000						N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	35,000	0	17,982,000	0						N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Fish Pots/Traps

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
6	6	1,750	0%	Fish
9	8	1,750	0%	Protected Species

Top Species:	herring	red crab	large-mesh mults	small-mesh mults	skate	SF/S/BSB	tilefish						sea turtles
Projected observer days needed:	***40***	***40***	***40***	***40***	***40***	***40***	***40***						***40***
Average trip length (days):	0.60												
Estimated % coverage level required:	4%	4%	4%	4%	4%	4%	4%						4%
Realized CV for 2004:	*	*	*	*	*	16.1%	*						*
Percent of trips w/ zero discard:	100%	100%	100%	100%	100%	0%	100%						100%
Encounter rate:	0%	0%	0%	0%	0%	100%	0%						0%
Rank of total discards (out of 13):	3	3	3	3	3	1	3						N/A
Observed discards (lb):	0	0	0	0	0	7,031	0						0
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.00%	0.00%	0.00%	90.47%	0.00%						N/A
2004 commercial landings (lb, all gears):	187,387,000	3,952,000	83,523,000	19,387,000	20,388,000	30,616,000	2,316,000						N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	35,000	0	17,982,000	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%						N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	5.39%	0.00%						N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	3.40%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Small-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
1	1	42	2%	Fish
1	1	42	2%	Protected Species

Top Species:	bluefish	herring	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB				sea turtles
Projected observer days needed:	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***				***12***
Average trip length (days):	0.80												
Estimated % coverage level required:	36%	36%	36%	36%	36%	36%	36%	36%	36%				36%
Realized CV for 2004:	*	*	0.0%	*	*	*	*	0.0%	*				*
Percent of trips w/ zero discard:	100%	100%	0%	100%	100%	100%	100%	0%	100%				100%
Encounter rate:	0%	0%	100%	0%	0%	0%	0%	100%	0%				0%
Rank of total discards (out of 13):	3	3	2	3	3	3	3	1	3				N/A
Observed discards (lb):	0	0	47	0	0	0	0	97	0				0
Obs. discard percent of all obs. discards:	0.00%	0.00%	27.73%	0.00%	0.00%	0.00%	0.00%	57.23%	0.00%				N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000				N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	5,383,000	35,000	0	0	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
657	577	5,189	11%	Fish
876	772	5,189	15%	Protected Species

Top Species:	SF/S/BSB	S/M/B	herring	skates	bluefish	monkfish	small-mesh mults	dogfish	large-mesh mults				sea turtles
Projected observer days needed:	3,767	3,758	486	482	443	408	313	109	83				141
Average trip length (days):	0.90												
Estimated % coverage level required:	81%	80%	10%	10%	9%	9%	7%	2%	2%				3%
Realized CV for 2004:	84.5%	84.1%	22.9%	22.8%	22.0%	21.0%	18.3%	10.6%	9.2%				*
Percent of trips w/ zero discard:	98%	95%	93%	44%	93%	81%	81%	28%	22%				100%
Encounter rate:	2%	5%	7%	56%	7%	19%	19%	72%	78%				0%
Rank of total discards (out of 13):	9	7	8	3	5	4	6	1	2				N/A
Observed discards (lb):	3	346	208	11,989	849	878	495	460,442	41,669				0
Obs. discard percent of all obs. discards:	0.00%	0.06%	0.04%	2.16%	0.15%	0.16%	0.09%	82.83%	7.50%				N/A
2004 commercial landings (lb, all gears):	30,616,000	212,528,000	187,387,000	20,388,000	7,512,000	23,036,000	19,387,000	1,965,000	83,523,000				N/A
2004 recreational landings (lb, all gears):	17,982,000	1,134,000	27,000	0	15,146,000	0	35,000	0	5,383,000				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.06%	0.01%	0.00%	0.00%	23.43%	0.05%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.73%	0.14%	0.05%	0.03%	265.91%	0.63%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.73%	0.05%	0.05%	0.03%	265.91%	0.60%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A
New England Extra-Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
533	445	4,712	9%	Fish
701	569	4,712	12%	Protected Species

Top Species:	small-mesh mults	M/S/B	herring	SF/S/BSB	bluefish	dogfish	monkfish	large-mesh mults	skates				sea turtles
Projected observer days needed:	2,059	1,701	1,004	417	267	214	238	206	109				144
Average trip length (days):	0.40												
Estimated % coverage level required:	109%	90%	53%	22%	14%	11%	13%	11%	6%				8%
Realized CV for 2004:	62.4%	49.8%	37.8%	23.3%	18.1%	16.2%	17.4%	15.9%	11.7%				*
Percent of trips w/ zero discard:	88%	95%	96%	92%	85%	29%	57%	48%	30%				100%
Encounter rate:	12%	5%	4%	8%	15%	71%	43%	52%	70%				0%
Rank of total discards (out of 13):	8	7	11	5	6	1	3	4	2				N/A
Observed discards (lb):	373	0	46	0	1,935	100,388	29,933	16,705	36,016				0
Obs. discard percent of all obs. discards:	0.15%	0.00%	0.02%	0.00%	0.80%	41.55%	12.39%	6.91%	14.91%				N/A
2004 commercial landings (lb, all gears):	19,387,000	212,528,000	187,387,000	30,616,000	7,512,000	1,965,000	23,036,000	83,523,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	35,000	1,134,000	27,000	17,982,000	15,146,000	0	0	5,383,000	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.03%	5.11%	0.13%	0.02%	0.18%				N/A
Discards as % of comm landings:	0.02%	0.00%	0.00%	0.24%	0.32%	64.66%	2.76%	0.27%	3.34%				N/A
Discards as % ot total landings:	0.02%	0.00%	0.00%	0.15%	0.10%	64.66%	2.76%	0.26%	3.34%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A
Mid-Atlantic Small-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
3	3	2,924	0%	Fish
375	358	2,924	12%	Protected Species

Top Species:	bluefish	herring	M/S/B	monkfish	large-mesh mults	skates	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***62***	***62***	***62***	***62***	***62***	***62***	***62***	***62***					1,259
Average trip length (days):	1.10												
Estimated % coverage level required:	2%	2%	2%	2%	2%	2%	2%	2%					39%
Realized CV for 2004:	*	*	0.0%	*	*	*	0.0%	0.0%					62.6%
Percent of trips w/ zero discard:	100%	100%	67%	100%	100%	100%	33%	67%					99%
Encounter rate:	0%	0%	33%	0%	0%	0%	67%	33%					1%
Rank of total discards (out of 13):	4	4	2	4	4	4	1	3					N/A
Observed discards (lb):	0	0	1	0	0	0	64	0					Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	31.25%	0.15%					N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	23,036,000	83,523,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	5,383,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	99.70%	0.03%					N/A
Discards as % ot total landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	99.70%	0.02%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
4	4	1,293	0%	Fish
85	81	1,293	6%	Protected Species

Top Species:	bluefish	skate	dogfish	herring	M/S/B	monkfish	SF/S/BSB	large-mesh mults					sea turtles
Projected observer days needed:	105	99	96	***29***	***29***	***29***	***29***	19					653
Average trip length (days):	0.40												
Estimated % coverage level required:	20%	19%	19%	6%	6%	6%	6%	4%					126%
Realized CV for 2004:	121.6%	111.8%	108.3%	*	*	*	*	86.8%					105.2%
Percent of trips w/ zero discard:	75%	50%	25%	100%	100%	100%	100%	75%					98%
Encounter rate:	25%	50%	75%	0%	0%	0%	0%	25%					3%
Rank of total discards (out of 13):	2	3	1	5	5	5	5	4					N/A
Observed discards (lb):	102	11	2,302	0	0	0	0	6					Yes
Obs. discard percent of all obs. discards:	4.02%	0.43%	90.65%	0.00%	0.00%	0.00%	0.00%	0.24%					N/A
2004 commercial landings (lb, all gears):	7,512,000	20,388,000	1,965,000	187,387,000	212,528,000	23,036,000	30,616,000	83,523,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	0	0	27,000	1,134,000	0	17,982,000	5,383,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	8.93%	0.35%	770.42%	0.00%	0.00%	0.00%	0.00%	0.05%					N/A
Discards as % ot total landings:	2.96%	0.35%	770.42%	0.00%	0.00%	0.00%	0.00%	0.04%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Extra-Large-Mesh Gillnet

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
30	27	2,568	1%	Fish
152	142	2,568	6%	Protected Species

Top Species:	bluefish	SF/S/BSB	monkfish	herring	M/S/B	large-mesh mults	dogfish	skates					sea turtles
Projected observer days needed:	131	120	104	***68***	***68***	***68***	58	55					468
Average trip length (days):	0.60												
Estimated % coverage level required:	9%	8%	7%	4%	4%	4%	4%	4%					30%
Realized CV for 2004:	30.4%	30.3%	27.3%	*	*	*	12.9%	11.5%					49.5%
Percent of trips w/ zero discard:	56%	74%	37%	100%	100%	100%	11%	4%					97%
Encounter rate:	44%	26%	63%	0%	0%	0%	89%	96%					3%
Rank of total discards (out of 13):	4	5	3	7	7	7	1	2					N/A
Observed discards (lb):	328	113	1,712	0	0	0	3,620	2,500					Yes
Obs. discard percent of all obs. discards:	2.45%	0.84%	12.79%	0.00%	0.00%	0.00%	27.05%	18.68%					N/A
2004 commercial landings (lb, all gears):	7,512,000	30,616,000	23,036,000	187,387,000	212,528,000	83,523,000	1,965,000	20,388,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	17,982,000	0	27,000	1,134,000	5,383,000	0	0					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.18%	0.01%					N/A
Discards as % of comm landings:	0.26%	0.02%	0.45%	0.00%	0.00%	0.00%	11.19%	0.74%					N/A
Discards as % ot total landings:	0.09%	0.01%	0.45%	0.00%	0.00%	0.00%	11.19%	0.74%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Handline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
6	6	3,378	0%	Fish
18	9	3,378	0%	Protected Species

Top Species:	large-mesh mults	bluefish	dogfish	SF/S/BSB	sea turtles
Projected observer days needed:	137	***72***	***72***	***72***	***72***
Average trip length (days):	0.40				
Estimated % coverage level required:	10%	5%	5%	5%	5%
Realized CV for 2004:	403.0%	*	*	*	*
Percent of trips w/ zero discard:	67%	100%	100%	100%	100%
Encounter rate:	33%	0%	0%	0%	0%
Rank of total discards (out of 13):	1	2	2	2	N/A
Observed discards (lb):	8	0	0	0	0
Obs. discard percent of all obs. discards:	100.00%	0.00%	0.00%	0.00%	N/A
2004 commercial landings (lb, all gears):	83,523,000	7,512,000	1,965,000	30,616,000	N/A
2004 recreational landings (lb, all gears):	5,383,000	15,416,000	0	17,982,000	N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % of comm landings:	0.01%	0.00%	0.00%	0.00%	N/A
Discards as % ot total landings:	0.01%	0.00%	0.00%	0.00%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Handline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	6,283	0%	Fish
11	3	6,283	0%	Protected Species

Top Species:	large-mesh mults	sea turtles
Projected observer days needed:	***133***	133
Average trip length (days):	0.30	
Estimated % coverage level required:	7%	7%
Realized CV for 2004:	N/A	*
Percent of trips w/ zero discard:	N/A	100%
Encounter rate:	N/A	0%
Rank of total discards (out of 13):	N/A	N/A
Observed discards (lb):	N/A	0
Obs. discard percent of all obs. discards:	N/A	N/A
2004 commercial landings (lb, all gears):	83,523,000	N/A
2004 recreational landings (lb, all gears):	5,383,000	N/A
Obs. discards as % of comm landings:	N/A	N/A
Discards as % of comm landings:	N/A	N/A
Discards as % ot total landings:	N/A	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Lobster Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	34,101	0%	Fish
3	3	34,101	0%	Protected Species

Top Species:	red crab	large-mesh mults											sea turtles
Projected observer days needed:	***439***	***439***											***439***
Average trip length (days):	0.60												
Estimated % coverage level required:	2%	2%											2%
Realized CV for 2004:	N/A	N/A											*
Percent of trips w/ zero discard:	N/A	N/A											100%
Encounter rate:	N/A	N/A											0%
Rank of total discards (out of 13):	N/A	N/A											N/A
Observed discards (lb):	N/A	N/A											0
Obs. discard percent of all obs. discards:	N/A	N/A											N/A
2004 commercial landings (lb, all gears):	3,952,000	83,523,000											N/A
2004 recreational landings (lb, all gears):	0	5,383,000											N/A
Obs. discards as % of comm landings:	N/A	N/A											N/A
Discards as % of comm landings:	0.00%	0.00%											N/A
Discards as % ot total landings:	0.00%	0.00%											N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Lobster Pots

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	3,750	0%	Fish
0	0	3,750	0%	Protected Species

Top Species:	red crab	large-mesh mults											sea turtles
Projected observer days needed:	***89***	***89***											***89***
Average trip length (days):	0.60												
Estimated % coverage level required:	4%	4%											4%
Realized CV for 2004:	N/A	N/A											N/A
Percent of trips w/ zero discard:	N/A	N/A											N/A
Encounter rate:	N/A	N/A											N/A
Rank of total discards (out of 13):	N/A	N/A											N/A
Observed discards (lb):	N/A	N/A											0
Obs. discard percent of all obs. discards:	N/A	N/A											N/A
2004 commercial landings (lb, all gears):	3,952,000	83,523,000											N/A
2004 recreational landings (lb, all gears):	0	5,383,000											N/A
Obs. discards as % of comm landings:	N/A	N/A											N/A
Discards as % of comm landings:	N/A	N/A											N/A
Discards as % ot total landings:	N/A	N/A											N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Longline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
12	12	1,234	1%	Fish
133	119	1,234	10%	Protected Species

Top Species:	small-mesh mults	dogfish	skates	monkfish	tilefish	large-mesh mults							sea turtles
Projected observer days needed:	185	99	89	35	35	27							35
Average trip length (days):	0.80												
Estimated % coverage level required:	6%	10%	9%	4%	4%	7%							4%
Realized CV for 2004:	91.0%	65.4%	61.4%	*	*	33.5%							*
Percent of trips w/ zero discard:	92%	33%	25%	100%	100%	0%							100%
Encounter rate:	8%	67%	75%	0%	0%	100%							0%
Rank of total discards (out of 13):	4	1	3	5	5	2							N/A
Observed discards (lb):	7	8,270	0	0	0	1,667							0
Obs. discard percent of all obs. discards:	0.07%	77.04%	0.00%	0.00%	0.00%	15.53%							N/A
2004 commercial landings (lb, all gears):	19,387,000	1,965,000	20,388,000	23,036,000	2,316,000	83,523,000							N/A
2004 recreational landings (lb, all gears):	35,000	0	0	0	0	5,383,000							N/A
Obs. discards as % of comm landings:	0.00%	0.42%	0.00%	0.00%	0.00%	0.00%							N/A
Discards as % of comm landings:	0.00%	42.71%	0.35%	0.00%	0.00%	0.28%							N/A
Discards as % ot total landings:	0.00%	42.71%	0.35%	0.00%	0.00%	0.27%							N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Longline

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	205	0%	Fish
11	2	205	1%	Protected Species

Top Species:	monkfish	large-mesh mults	skate	dogfish	tilefish								sea turtles
Projected observer days needed:	***76***	***76***	***76***	***76***	***76***								***76***
Average trip length (days):	5.40												
Estimated % coverage level required:	7%	7%	7%	7%	7%								7%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A								*
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A								100%
Encounter rate:	N/A	N/A	N/A	N/A	N/A								0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A								N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A								0
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A								N/A
2004 commercial landings (lb, all gears):	23,036,000	83,523,000	20,388,000	1,965,000	2,316,000								N/A
2004 recreational landings (lb, all gears):	0	5,383,000	0	0	0								N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A								N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A								N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A								N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Mid-Water Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
165	66	1,061	6%	Fish
242	99	1,061	9%	Protected Species

Top Species:	small-mesh mults	herring	monkfish	bluefish	large-mesh mults	M/S/B	dogfish						sea turtles
Projected observer days needed:	1,218	747	718	699	688	346	316						56
Average trip length (days):	1.50												
Estimated % coverage level required:	77%	47%	45%	44%	43%	22%	20%						4%
Realized CV for 2004:	99.4%	77.0%	72.4%	77.0%	66.9%	42.9%	41.8%						*
Percent of trips w/ zero discard:	79%	86%	85%	89%	73%	62%	30%						100%
Encounter rate:	21%	14%	15%	11%	27%	38%	70%						0%
Rank of total discards (out of 11):	5	3	8	6	4	1	2						N/A
Observed discards (lb):	4,080	97,352	269	611	0	0	131,699						0
Obs. discard percent of all obs. discards:	1.01%	24.20%	0.07%	0.15%	0.00%	0.00%	32.74%						N/A
2004 commercial landings (lb, all gears):	19,387,000	187,387,000	23,036,000	7,512,000	83,523,000	212,528,000	1,965,000						0
2004 recreational landings (lb, all gears):	35,000	27,000	0	15,146,000	5,383,000	1,134,000	266,657						N/A
Obs. discards as % of comm landings:	0.02%	0.05%	0.00%	0.01%	0.00%	0.00%	6.70%						N/A
Discards as % of comm landings:	0.23%	0.37%	0.01%	0.05%	0.06%	2.43%	58.04%						N/A
Discards as % ot total landings:	0.23%	0.37%	0.01%	0.02%	0.06%	2.41%	51.10%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Mid-Water Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
39	13	121	11%	Fish
42	14	121	12%	Protected Species

Top Species:	monkfish	herring	large-mesh mults	bluefish	small-mesh mults	M/S/B	dogfish						sea turtles
Projected observer days needed:	492	453	281	182	182	167	43						35
Average trip length (days):	3												
Estimated % coverage level required:	116%	92%	116%	11%	14%	14%	16%						11%
Realized CV for 2004:	104.8%	98.2%	70.8%	53.9%	53.9%	54.5%	24.6%						*
Percent of trips w/ zero discard:	77%	92%	38%	92%	77%	69%	54%						100%
Encounter rate:	23%	8%	62%	8%	23%	31%	46%						0%
Rank of total discards (out of 13):	3	6	7	8	5	2	1						N/A
Observed discards (lb):	94	5	43	100	1,024	11,794	2,716						0
Obs. discard percent of all obs. discards:	0.50%	0.03%	0.23%	0.54%	5.49%	63.28%	14.57%						N/A
2004 commercial landings (lb, all gears):	23,036,000	187,387,000	83,523,000	7,512,000	19,387,000	212,528,000	1,965,000						N/A
2004 recreational landings (lb, all gears):	0	27,000	5,383,000	15,146,000	35,000	1,134,000	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.14%						N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.18%						N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.18%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Small-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
449	142	3,484	4%	Fish
577	200	3,484	6%	Protected Species

Top Species:	skates	scallop	bluefish	herring	red crab	monkfish	dogfish	SF/S/BSB	tilefish	small-mesh mults	large-mesh mults	M/S/B	sea turtles
Projected observer days needed:	2,024	1,998	1,103	882	848	757	492	455	441	269	266	249	211
Average trip length (days):	1.90												
Estimated % coverage level required:	31%	30%	17%	13%	13%	11%	7%	7%	7%	4%	4%	4%	3%
Realized CV for 2004:	69.1%	71.0%	50.8%	43.7%	42.8%	40.5%	32.2%	30.9%	30.4%	23.5%	23.3%	22.7%	*
Percent of trips w/ zero discard:	14%	89%	85%	74%	90%	36%	21%	41%	87%	34%	4%	35%	100%
Encounter rate:	86%	11%	15%	26%	10%	64%	79%	59%	13%	66%	96%	65%	0%
Rank of total discards (out of 13):	2	12	9	8	10	7	4	5	11	3	6	1	N/A
Observed discards (lb):	178,362	180	7,934	13,687	1,143	26,577	93,129	37,034	316	0	41,122	229,443	0
Obs. discard percent of all obs. discards:	16.10%	0.02%	0.72%	1.24%	0.10%	2.40%	8.40%	3.34%	0.03%	0.00%	3.71%	20.71%	N/A
2004 commercial landings (lb, all gears):	20,388,000	64,506,000	7,512,000	187,387,000	3,952,000	23,036,000	1,965,000	30,616,000	2,316,000	19,387,000	83,523,000	212,528,000	0
2004 recreational landings (lb, all gears):	35,405	0	15,146,000	27,000	0	0	266,657	17,982,000	0	35,000	5,383,000	1,134,000	N/A
Obs. discards as % of comm landings:	0.87%	0.00%	0.11%	0.01%	0.03%	0.12%	4.74%	0.12%	0.01%	0.00%	0.05%	0.11%	N/A
Discards as % of comm landings:	38.71%	0.01%	2.56%	0.28%	1.14%	4.93%	160.90%	5.54%	0.81%	26.55%	1.81%	4.28%	N/A
Discards as % ot total landings:	38.64%	0.01%	0.85%	0.28%	1.14%	4.93%	141.67%	3.49%	0.81%	26.50%	1.70%	4.25%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A
Mid-Atlantic Small-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
471	194	5,222	4%	Fish
499	205	5,222	4%	Protected Species

Top Species:	tilefish	bluefish	herring	scallop	M/S/B	small-mesh mults	SF/S/BSB	dogfish	monkfish	large-mesh mults	skate		sea turtles
Projected observer days needed:	3,057	2,231	1,869	1,162	1,125	944	584	532	497	429	202		1,229
Average trip length (days):	0.90												
Estimated % coverage level required:	65%	47%	40%	25%	24%	20%	12%	11%	11%	9%	4%		26%
Realized CV for 2004:	115.5%	90.3%	78.4%	57.4%	56.1%	50.8%	38.6%	36.7%	35.4%	32.6%	22.2%		57.3%
Percent of trips w/ zero discard:	99%	90%	96%	90%	55%	73%	28%	37%	67%	44%	23%		99%
Encounter rate:	1%	10%	4%	10%	45%	27%	72%	63%	33%	56%	77%		2%
Rank of total discards (out of 13):	13	8	11	9	2	5	4	3	7	6	1		N/A
Observed discards (lb):	6	6,645	144	6,303	119,995	75,491	bsb	94,574	7,744	7,560	110,445		Yes
Obs. discard percent of all obs. discards:	0.00%	0.86%	0.02%	0.81%	15.45%	9.72%	#VALUE!	12.18%	1.00%	0.97%	14.22%		N/A
2004 commercial landings (lb, all gears):	2,316,000	7,512,000	187,387,000	64,506,000	#########	19,387,000	30,616,000	1,965,000	23,036,000	83,523,000	20,388,000		N/A
2004 recreational landings (lb, all gears):	0	15,146,000	27,000	0	1,134,000	35,000	17,982,000	0	0	5,383,000	0		NA
Obs. discards as % of comm landings:	7.25%	7.82%	0.00%	7.56%	6.22%	7.48%	#VALUE!	6.20%	7.02%	3.98%	5.29%		N/A
Discards as % of comm landings:	0.00%	1.13%	0.00%	0.13%	0.91%	5.20%	4.56%	77.63%	0.48%	0.23%	10.24%		N/A
Discards as % ot total landings:	0.00%	0.38%	0.00%	0.13%	0.90%	5.19%	2.87%	77.63%	0.48%	0.21%	10.24%		N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Large-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
1,076	386	16,156	2%	Fish
1,947	539	16,156	3%	Protected Species

Top Species:	bluefish	herring	M/S/B	tilefish	scallop	SF/S/BSB	red crab	dogfish	small-mesh mults	skates	large-mesh mults	monkfish	sea turtles
Projected observer days needed:	26,644	12,864	3,159	2,692	1,233	1,034	798	614	341	316	107	81	730
Average trip length (days):	1.90												
Estimated % coverage level required:	87%	42%	10%	9%	4%	3%	3%	2%	1%	1%	0%	0%	2%
Realized CV for 2004:	247.4%	131.3%	57.2%	52.9%	35.0%	31.9%	28.0%	24.5%	18.2%	17.5%	10.1%	8.8%	*
Percent of trips w/ zero discard:	98%	90%	70%	99%	88%	72%	82%	28%	53%	6%	5%	49%	100%
Encounter rate:	2%	10%	30%	1%	12%	28%	18%	72%	47%	94%	95%	51%	0%
Rank of total discards (out of 13):	9	10	11	12	8	5	6	2	7	1	3	4	N/A
Observed discards (lb):	854	563	357	285	1,191	0	6,660	149,701	0	0	124,760	41,061	0
Obs. discard percent of all obs. discards:	0.06%	0.04%	0.02%	0.02%	0.08%	0.00%	0.43%	9.69%	0.00%	0.00%	8.07%	2.66%	N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	2,316,000	64,506,000	30,616,000	3,952,000	1,965,000	19,387,000	20,388,000	83,523,000	23,036,000	0
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	0	0	17,982,000	0	266,657	35,000	35,405	5,383,000	0	N/A
Obs. discards as % of comm landings:	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%	0.17%	7.62%	0.00%	0.00%	0.15%	0.18%	N/A
Discards as % of comm landings:	0.42%	0.01%	0.01%	0.38%	0.06%	2.35%	5.58%	244.01%	0.90%	167.01%	4.79%	5.70%	N/A
Discards as % ot total landings:	0.14%	0.01%	0.01%	0.38%	0.06%	1.48%	5.58%	214.85%	0.90%	166.72%	4.50%	5.70%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Large-Mesh Otter Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
183	75	8,850	1%	Fish
186	76	8,850	1%	Protected Species

Top Species:	bluefish	small-mesh mults	herring	dogfish	tilefish	scallop	M/S/B	monkfish	large-mesh mults	SF/S/BSB	skate		sea turtles
Projected observer days needed:	3,625	998	883	481	342	311	242	140	101	98	70		342
Average trip length (days):	0.90												
Estimated % coverage level required:	46%	13%	11%	6%	4%	4%	3%	2%	1%	1%	1%		4%
Realized CV for 2004:	190.6%	82.7%	77.5%	55.7%	*	44.4%	39.0%	29.5%	25.1%	24.6%	20.9%		*
Percent of trips w/ zero discard:	92%	77%	96%	31%	100%	80%	59%	44%	35%	20%	5%		100%
Encounter rate:	8%	23%	4%	69%	0%	20%	41%	56%	65%	80%	95%		0%
Rank of total discards (out of 13):	10	8	11	2	12	5	7	6	4	3	1		N/A
Observed discards (lb):	102	0	5	44,140	0	7,202	407	3,629	3,523	0	88,540		0
Obs. discard percent of all obs. discards:	0.05%	0.00%	0.00%	21.21%	0.00%	3.46%	0.20%	1.74%	1.69%	0.00%	42.54%		N/A
2004 commercial landings (lb, all gears):	7,512,000	19,387,000	187,387,000	1,965,000	2,316,000	64,506,000	212,528,000	23,036,000	83,523,000	30,616,000	20,388,000		N/A
2004 recreational landings (lb, all gears):	15,146,000	35,000	27,000	0	0	0	1,134,000	0	5,385,000	17,982,000	0		N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	2.25%	0.00%	0.01%	0.00%	0.02%	0.00%	0.00%	0.43%		N/A
Discards as % of comm landings:	0.06%	0.05%	0.00%	106.69%	0.00%	0.46%	0.01%	0.72%	0.37%	3.76%	29.24%		N/A
Discards as % ot total landings:	0.02%	0.05%	0.00%	106.69%	0.00%	0.46%	0.01%	0.72%	0.35%	2.37%	29.24%		N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Purse Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
33	16	264	6%	Fish
53	26	264	10%	Protected Species

Top Species:	herring	dogfish	large-mesh mults	M/S/B	bluefish	small-mesh mults	skates	sea turtles
Projected observer days needed:	219	217	217	206	19	19	19	19
Average trip length (days):	0.80							
Estimated % coverage level required:	104%	103%	103%	98%	9%	9%	9%	9%
Realized CV for 2004:	98.1%	97.2%	97.3%	93.5%	*	*	*	*
Percent of trips w/ zero discard:	88%	44%	94%	88%	100%	100%	100%	100%
Encounter rate:	12%	56%	6%	12%	0%	0%	0%	0%
Rank of total discards (out of 13):	2	1	3	4	5	5	5	N/A
Observed discards (lb):	5,200	11,817	20	14	0	0	0	0
Obs. discard percent of all obs. discards:	29.55%	67.15%	0.11%	0.08%	0.00%	0.00%	0.00%	N/A
2004 commercial landings (lb, all gears):	187,387,000	1,965,000	83,523,000	212,528,000	7,512,000	35,000	20,388,000	N/A
2004 recreational landings (lb, all gears):	27,000	0	5,383,000	1,134,000	15,146,000	19,387,000	0	N/A
Obs. discards as % of comm landings:	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % of comm landings:	0.06%	13.86%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % ot total landings:	0.06%	13.86%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A
Mid-Atlantic Purse Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	76	0%	Fish
2	2	76	3%	Protected Species

Top Species:	bluefish	herring	M/S/B	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***9***	***9***	***9***	***9***	***9***	***9***	***9***	***9***					***9***
Average trip length (days):	0.40												
Estimated % coverage level required:	30%	30%	30%	30%	30%	30%	30%	30%					30%
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					*
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					100%
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					0
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
2004 commercial landings (lb, all gears):	7,512,000	187,387,000	212,528,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	15,146,000	27,000	1,134,000	5,383,000	35,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Open Access Area, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
344	26	1,229	2%	Fish
457	36	1,229	3%	Protected Species

Top Species:	red crab	M/S/B	dogfish	large-mesh mults	SF/S/BSB	small mesh mults	monkfish	skate	scallop				sea turtles
Projected observer days needed:	1,596	1,380	807	708	649	534	320	177	80				N/A
Average trip length (days):	10.90												
Estimated % coverage level required:	12%	10%	6%	5%	5%	4%	2%	1%	1%				N/A
Realized CV for 2004:	84.2%	68.9%	51.5%	48.0%	45.8%	41.4%	31.9%	23.6%	15.9%				55.1%
Percent of trips w/ zero discard:	96%	50%	46%	0%	35%	38%	8%	0%	19%				89%
Encounter rate:	4%	50%	54%	100%	65%	62%	92%	100%	81%				11%
Rank of total discards (out of 13):	10	9	8	5	4	7	3	2	1				N/A
Observed discards (lb):	3	0	871	0	0	817	37,877	28,515	270,249				Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.11%	0.00%	0.00%	0.10%	4.69%	3.53%	33.50%				N/A
2004 commercial landings (lb, all gears):	3,952,000	212,528,000	1,965,000	83,823,000	30,616,000	19,387,000	23,036,000	20,388,000	64,506,000				N/A
2004 recreational landings (lb, all gears):	0	1,134,000	0	5,383,000	17,982,000	35,000	0	0	0				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.16%	0.14%	0.42%				N/A
Discards as % of comm landings:	0.00%	0.01%	1.66%	0.27%	1.57%	0.32%	12.58%	64.85%	28.58%				N/A
Discards as % ot total landings:	0.00%	0.01%	1.66%	0.25%	0.99%	0.32%	12.58%	64.85%	28.58%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Open Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
591	69	1,822	4%	Fish
675	78	1,822	4%	Protected Species

Top Species:	small-mesh mults	M/S/B	SF/S/BSB	large-mesh mults	dogfish	scallop	monkfish	skates					sea turtles
Projected observer days needed:	3,080	641	465	411	371	280	213	114					N/A
Average trip length (days):	9.00												
Estimated % coverage level required:	19%	4%	3%	3%	2%	2%	1%	1%					N/A
Realized CV for 2004:	75.8%	30.5%	25.9%	24.2%	23.0%	20.0%	17.4%	12.6%					77.0%
Percent of trips w/ zero discard:	57%	42%	33%	25%	62%	26%	1%	0%					97%
Encounter rate:	43%	58%	67%	75%	38%	74%	99%	100%					3%
Rank of total discards (out of 11):	8	9	4	5	2	1	3	2					N/A
Observed discards (lb):	869	0	0	0	2,037	367,166	45,211	156,844					Yes
Obs. discard percent of all obs. discards:	0.11%	0.00%	0.00%	0.00%	0.26%	46.65%	5.74%	19.93%					N/A
2004 commercial landings (lb, all gears):	19,387,000	212,528,000	30,616,000	83,523,000	1,965,000	64,506,000	23,036,000	20,388,000					0
2004 recreational landings (lb, all gears):	35,000	1,134,000	17,982,000	5,383,000	266,657	0	0	35,405					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.000%	0.10%	0.57%	0.20%	0.77%					N/A
Discards as % of comm landings:	0.15%	0.00%	1.42%	0.12%	4.68%	29.66%	8.80%	31.32%					N/A
Discards as % ot total landings:	0.15%	0.00%	0.90%	0.12%	4.12%	29.66%	8.80%	31.27%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Closed Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
805	86	292	29%	Fish
805	86	292	29%	Protected Species

Top Species:	red crab	M/S/B	small-mesh mults	dogfish	SF/S/BSB	monkfish	large-mesh mults	scallop	skates				sea turtles
Projected observer days needed:	1,473	1,301	1,180	857	703	429	227	167	145				N/A
Average trip length (days):	9.70												
Estimated % coverage level required:	52%	46%	42%	30%	25%	15%	8%	6%	5%				N/A
Realized CV for 2004:	48.2%	42.1%	39.6%	32.6%	29.1%	22.2%	15.9%	13.5%	12.6%				16.5%
Percent of trips w/ zero discard:	98%	43%	16%	51%	26%	5%	1%	20%	0%				99%
Encounter rate:	2%	57%	84%	49%	74%	95%	99%	80%	100%				1%
Rank of total discards (out of 13):	11	8	6	7	5	3	4	1	2				N/A
Observed discards (lb):	5	0	0	3,948	36,678	123,827	0	706,435	331,549				Yes
Obs. discard percent of all obs. discards:	0.00%	0.00%	0.00%	0.27%	2.48%	8.38%	0.00%	47.81%	22.44%				N/A
2004 commercial landings (lb, all gears):	3,952,000	212,528,000	19,387,000	1,965,000	30,616,000	23,036,000	83,523,000	64,506,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	0	1,134,000	35,000	266,657	17,982,000	0	5,383,000	0	35,405				N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.20%	0.12%	0.54%	0.00%	1.10%	1.63%				N/A
Discards as % of comm landings:	0.00%	0.00%	0.12%	0.77%	0.33%	1.64%	0.26%	2.09%	6.16%				N/A
Discards as % ot total landings:	0.00%	0.00%	0.12%	0.68%	0.21%	1.64%	0.24%	2.09%	6.15%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Closed Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
373	35	78	45%	Fish
373	35	78	45%	Protected Species

Top Species:	large-mesh mults	dogfish	SF/S/BSB	M/S/B	small-mesh mults	monkfish	scallop	skates	sea turtles
Projected observer days needed:	1,136	567	481	337	287	283	157	88	N/A
Average trip length (days):	9.00								
Estimated % coverage level required:	162%	81%	69%	48%	41%	40%	22%	13%	N/A
Realized CV for 2004:	71.2%	42.5%	38.3%	31.0%	26.8%	28.0%	19.8%	14.2%	*
Percent of trips w/ zero discard:	9%	46%	29%	26%	23%	0%	17%	0%	100%
Encounter rate:	91%	54%	71%	74%	77%	100%	83%	100%	0%
Rank of total discards (out of 13):	6	5	4	8	7	3	1	2	N/A
Observed discards (lb):	1,213	2,019	0	164	317	67,163	631,764	159,899	0
Obs. discard percent of all obs. discards:	0.13%	0.21%	0.00%	0.02%	0.03%	6.99%	65.77%	16.65%	N/A
2004 commercial landings (lb, all gears):	83,523,000	1,965,000	30,616,000	212,528,000	19,387,000	23,036,000	64,506,000	20,388,000	N/A
2004 recreational landings (lb, all gears):	5,383,000	0	17,982,000	1,134,000	35,000	0	0	0	N/A
Obs. discards as % of comm landings:	0.00%	0.10%	0.00%	0.00%	0.00%	0.29%	0.98%	0.78%	N/A
Discards as % of comm landings:	0.01%	0.66%	0.24%	0.00%	0.00%	1.07%	1.88%	2.74%	N/A
Discards as % ot total landings:	0.01%	0.66%	0.15%	0.00%	0.00%	1.07%	1.88%	2.74%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Open Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
11	9	3,566	0%	Fish
24	20	3,566	1%	Protected Species

Top Species:	scallop	small-mesh mults	skate	dogfish	monkfish	red crab	SF/S/BSB	large-mesh mults					sea turtles
Projected observer days needed:	204	135	120	120	117	***92***	***92***	82					N/A
Average trip length (days):	1.30												
Estimated % coverage level required:	4%	3%	3%	3%	3%	2%	2%	2%					N/A
Realized CV for 2004:	9.4%	10.4%	17.7%	31.8%	56.0%	*	9.2%	35.8%					*
Percent of trips w/ zero discard:	67%	56%	11%	78%	33%	100%	89%	0%					100%
Encounter rate:	33%	44%	89%	22%	67%	0%	11%	100%					0%
Rank of total discards (out of 13):	3	7	2	5	1	10	6	4					N/A
Observed discards (lb):	114	6	1,123	33	3,330	0	4	225					0
Obs. discard percent of all obs. discards:	1.15%	0.06%	11.32%	0.33%	33.57%	0.00%	0.04%	2.27%					N/A
2004 commercial landings (lb, all gears):	64,506,000	19,387,000	20,388,000	1,965,000	23,036,000	3,952,000	30,616,000	83,523,000					N/A
2004 recreational landings (lb, all gears):	0	35,000	0	0	0	0	17,982,000	5,383,000					N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%					N/A
Discards as % of comm landings:	0.22%	0.02%	1.80%	0.50%	1.75%	0.00%	0.02%	0.04%					N/A
Discards as % ot total landings:	0.22%	0.02%	1.80%	0.50%	1.75%	0.00%	0.01%	0.04%					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Open Access Area, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
33	22	3,433	1%	Fish
55	39	3,433	1%	Protected Species

Top Species:	dogfish	small-mesh mults	SF/S/BSB	scallop	large-mesh mults	skates	monkfish						sea turtles
Projected observer days needed:	124	96	88	54	40	17	17						N/A
Average trip length (days):	1.40												
Estimated % coverage level required:	3%	2%	2%	1%	1%	0%	0%						N/A
Realized CV for 2004:	55.0%	48.2%	46.1%	35.9%	31.1%	20.2%	20.2%						*
Percent of trips w/ zero discard:	86%	77%	73%	41%	41%	9%	18%						100%
Encounter rate:	14%	23%	27%	59%	59%	91%	82%						0%
Rank of total discards (out of 13):	7	8	5	2	4	1	3						N/A
Observed discards (lb):	18	0	0	6,039	0	2,284	1,307						0
Obs. discard percent of all obs. discards:	0.05%	0.00%	0.00%	18.08%	0.00%	6.84%	3.91%						N/A
2004 commercial landings (lb, all gears):	1,965,000	19,387,000	30,616,000	64,506,000	83,523,000	20,388,000	23,036,000						N/A
2004 recreational landings (lb, all gears):	0	35,000	17,982,000	0	5,383,000	0	0						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.01%						N/A
Discards as % of comm landings:	0.12%	0.01%	0.08%	1.30%	0.05%	8.30%	0.91%						N/A
Discards as % ot total landings:	0.12%	0.01%	0.05%	1.30%	0.05%	8.30%	0.91%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Scallop Dredge, Closed Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
0	0	50	0%	Fish
0	0	50	0%	Protected Species

Top Species:	red crab	scallop	monkfish	large-mesh mults	small-mesh mults	skate	dogfish	SF/S/BSB					sea turtles
Projected observer days needed:	***24***	***24***	***24***	***24***	***24***	***24***	***24***	***24***					N/A
Average trip length (days):	2.00												
Estimated % coverage level required:	24%	24%	24%	24%	24%	24%	24%	24%					N/A
Realized CV for 2004:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Percent of trips w/ zero discard:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Encounter rate:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Observed discards (lb):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
2004 commercial landings (lb, all gears):	3,952,000	64,506,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000					N/A
2004 recreational landings (lb, all gears):	0	0	0	5,383,000	35,000	0	0	17,982,000					N/A
Obs. discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % of comm landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A
Discards as % ot total landings:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Dredge, Closed Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
2	1	546	0%	Fish
2	1	546	0%	Protected Species

Top Species:	scallop	monkfish	large-mesh mults	small-mesh mults	skate	dogfish	SF/S/BSB						sea turtles
Projected observer days needed:	***21***	***21***	***21***	***21***	***21***	***21***	***21***						N/A
Average trip length (days):	1.30												
Estimated % coverage level required:	3%	3%	3%	3%	3%	3%	3%						N/A
Realized CV for 2004:	0.0%	0.0%	*	*	0.0%	*	0.0%						*
Percent of trips w/ zero discard:	0%	0%	100%	100%	0%	100%	0%						100%
Encounter rate:	100%	100%	0%	0%	100%	0%	100%						0%
Rank of total discards (out of 13):	1	3	5	5	2	5	4						N/A
Observed discards (lb):	70	11	0	0	21	0	1						0
Obs. discard percent of all obs. discards:	17.77%	2.79%	0.00%	0.00%	5.33%	0.00%	0.25%						N/A
2004 commercial landings (lb, all gears):	64,506,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000						N/A
2004 recreational landings (lb, all gears):	0	0	5,383,000	35,000	0	0	17,982,000						N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%						N/A
Discards as % of comm landings:	0.06%	0.03%	0.00%	0.00%	0.06%	0.00%	0.00%						N/A
Discards as % ot total landings:	0.06%	0.03%	0.00%	0.00%	0.06%	0.00%	0.00%						N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Trawl, Open Area Access, Limited Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
11	1	198	1%	Fish
22	3	198	2%	Protected Species

Top Species:	bluefish	scallop	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	dogfish	SF/S/BSB				sea turtles
Projected observer days needed:	***95***	***95***	***95***	***95***	***95***	***95***	***95***	***95***	***95***				***95***
Average trip length (days):	7.90												
Estimated % coverage level required:	6%	6%	6%	6%	6%	6%	6%	6%	6%				6%
Realized CV for 2004:	*	0.0%	0.0%	0.0%	0.0%	*	0.0%	*	0.0%				38.1%
Percent of trips w/ zero discard:	100%	0%	0%	0%	0%	100%	0%	100%	0%				67%
Encounter rate:	0%	100%	100%	100%	100%	0%	100%	0%	100%				33%
Rank of total discards (out of 13):	7	1	6	4	3	7	2	7	5				N/A
Observed discards (lb):	0	7,280	9	275	979	0	5,790	0	82				Yes
Obs. discard percent of all obs. discards:	0.00%	45.45%	0.06%	1.72%	6.11%	0.00%	36.14%	0.00%	0.51%				N/A
2004 commercial landings (lb, all gears):	7,512,000	64,506,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	1,965,000	30,616,000				N/A
2004 recreational landings (lb, all gears):	15,146,000	0	1,134,000	0	5,383,000	35,000	0	0	17,982,000				N/A
Obs. discards as % of comm landings:	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%				N/A
Discards as % of comm landings:	0.00%	3.12%	0.00%	0.33%	0.32%	0.00%	7.86%	0.00%	0.07%				N/A
Discards as % ot total landings:	0.00%	3.12%	0.00%	0.33%	0.30%	0.00%	7.86%	0.00%	0.05%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Mid-Atlantic Scallop Trawl, Open Area Access, General Trip Category

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
56	31	1,088	3%	Fish
71	39	1,088	4%	Protected Species

Top Species:	dogfish	SF/S/BSB	small-mesh mults	M/S/B	bluefish	scallop	monkfish	large-mesh mults	skates				sea turtles
Projected observer days needed:	443	408	292	181	155	119	115	85	80				51
Average trip length (days):	2.10												
Estimated % coverage level required:	19%	18%	13%	8%	7%	5%	5%	4%	4%				2%
Realized CV for 2004:	67.5%	50.5%	49.6%	35.4%	114.1%	22.4%	19.4%	17.0%	34.7%				*
Percent of trips w/ zero discard:	77%	74%	77%	58%	97%	35%	29%	32%	3%				100%
Encounter rate:	23%	26%	23%	42%	3%	65%	71%	68%	97%				0%
Rank of total discards (out of 13):	3	6	7	8	10	2	4	5	1				N/A
Observed discards (lb):	3,201	106	64	30	2	4,672	585	160	17,773				0
Obs. discard percent of all obs. discards:	8.45%	0.28%	0.17%	0.08%	0.01%	12.33%	1.54%	0.42%	46.90%				N/A
2004 commercial landings (lb, all gears):	1,965,000	30,616,000	19,387,000	212,528,000	7,512,000	64,506,000	23,036,000	83,523,000	20,388,000				N/A
2004 recreational landings (lb, all gears):	0	17,982,000	35,000	1,134,000	15,146,000	0	0	5,383,000	0				N/A
Obs. discards as % of comm landings:	0.16%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.09%				N/A
Discards as % of comm landings:	7.52%	0.02%	0.02%	0.00%	0.00%	0.35%	0.12%	0.01%	4.06%				N/A
Discards as % ot total landings:	7.52%	0.01%	0.02%	0.00%	0.00%	0.35%	0.12%	0.01%	4.06%				N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

Scottish Seine

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
5	5	95	5%	Fish
8	8	95	8%	Protected Species

Top Species:	SF/S/BSB	large-mesh mults	bluefish	herring	scallop	M/S/B	monkfish	small-mesh mults	skates	dogfish			sea turtles
Projected observer days needed:	30	14	***12***	***12***	***12***	***12***	***12***	***12***	***12***	***12***			***12***
Average trip length (days):	0.30												
Estimated % coverage level required:	105%	49%	42%	42%	42%	42%	42%	42%	42%	42%			42%
Realized CV for 2004:	25.3%	28.9%	*	*	*	*	*	27.9%	31.9%	*			*
Percent of trips w/ zero discard:	60%	0%	100%	100%	100%	100%	100%	80%	40%	100%			100%
Encounter rate:	40%	100%	0%	0%	0%	0%	0%	20%	60%	0%			0%
Rank of total discards (out of 13):	1	2	5	5	5	5	5	3	4	5			N/A
Observed discards (lb):	269	218	0	0	0	0	0	130	32	0			0
Obs. discard percent of all obs. discards:	3.39%	2.74%	0.00%	0.00%	0.00%	0.00%	0.00%	1.64%	0.40%	0.00%			N/A
2004 commercial landings (lb, all gears):	30,616,000	83,523,000	7,512,000	187,387,000	64,506,000	212,528,000	23,036,000	19,387,000	20,388,000	1,965,000			N/A
2004 recreational landings (lb, all gears):	17,982,000	5,383,000	15,146,000	27,000	0	1,134,000	0	35,000	0	0			N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			N/A
Discards as % of comm landings:	0.04%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%			N/A
Discards as % ot total landings:	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%			N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A

New England Shrimp Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
12	12	1,968	1%	Fish
12	12	1,968	1%	Protected Species

Top Species:	M/S/B	skate	small-mesh mults	herring	monkfish	large-mesh mults	sea turtles
Projected observer days needed:	364	247	123	92	22	20	42
Average trip length (days):	1.00						
Estimated % coverage level required:	18%	13%	6%	5%	1%	1%	2%
Realized CV for 2004:	98.1%	79.9%	55.7%	47.9%	23.5%	22.4%	*
Percent of trips w/ zero discard:	92%	50%	50%	0%	17%	0%	100%
Encounter rate:	8%	50%	50%	100%	83%	100%	0%
Rank of total discards (out of 13):	8	4	3	1	5	2	N/A
Observed discards (lb):	0	84	285	1,072	2	299	0
Obs. discard percent of all obs. discards:	0.01%	3.85%	13.10%	49.28%	0.10%	13.73%	N/A
2004 commercial landings (lb, all gears):	212,528,000	20,388,000	19,387,000	187,387,000	23,036,000	83,523,000	N/A
2004 recreational landings (lb, all gears):	1,134,000	0	35,000	27,000	0	5,383,000	N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % of comm landings:	0.00%	0.08%	0.29%	0.11%	0.00%	0.07%	N/A
Discards as % ot total landings:	0.00%	0.08%	0.29%	0.11%	0.00%	0.07%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Northeast Region SBRM Importance Filter Worksheet -- Option A
Mid-Atlantic Shrimp Trawl

2004 Observed Sea Days	2004 Observed Trips	2004 FVTR Trips	Percent Covered	
2	2	334	1%	Fish
2	2	334	1%	Protected Species

Top Species:	herring	M/S/B	monkfish	large-mesh mults	small-mesh mults	skates	SF/S/BSB	sea turtles
Projected observer days needed:	***76***	***76***	***76***	***76***	***76***	***76***	***76***	***76***
Average trip length (days):	5.80							
Estimated % coverage level required:	4%	4%	4%	4%	4%	4%	4%	4%
Realized CV for 2004:	*	*	*	*	*	*	*	*
Percent of trips w/ zero discard:	100%	100%	100%	100%	100%	100%	100%	100%
Encounter rate:	0%	0%	0%	0%	0%	0%	0%	0%
Rank of total discards (out of 13):	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Observed discards (lb):	0	0	0	0	0	0	0	N/A
Obs. discard percent of all obs. discards:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2004 commercial landings (lb, all gears):	187,387,000	212,528,000	23,036,000	83,523,000	19,387,000	20,388,000	30,616,000	N/A
2004 recreational landings (lb, all gears):	27,000	1,134,000	0	5,383,000	35,000	0	17,982,000	N/A
Obs. discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % of comm landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A
Discards as % ot total landings:	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	N/A

N/A = No observations in 2004.

* = Zero (0) discards observed in 2004.

Note: Projected observer days needed in ***bold/italics*** represent PILOT LEVEL coverage, rather than the level calculated to achieve a CV of 30 percent.

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	CV-Target Met Filter	Discard % of Discards Filter			Discard % of Catch Filter		
				0.5%	1.0%	3.0%	0.5%	1.0%	3.0%
NE Clam Dredge	50	50	50	50	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84	84	84	84	84
NE Crab Pot	101	101	101	101	101	101	101	101	101
MA Crab Pot	28	28	28	28	28	28	28	28	28
NE Fish Pot	20	20	20	20	20	20	20	20	20
MA Fish Pot	103	40	40	40	40	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	3,767	482	482	141	482	141	141
MA Large-mesh Gillnet	653	653	653	653	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	2,059	267	214	214	214	214	214
MA X-Large-mesh Gillnet	468	468	468	468	468	468	468	468	468
NE Handline	137	137	137	137	137	137	72	72	72
MA Handline	133	133	133	133	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89	89	89	89	89
NE Longline	185	185	185	99	99	99	99	99	99
MA Longline	76	76	76	76	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	1,218	1,218	1,218	747	346	346	346
MA Mid-Water Trawl	557	492	492	492	182	182	43	43	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	3,057	2,231	1,229	1,229	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	26,644	730	730	730	730	730	730
MA Large-mesh Trawl	3,625	3,625	3,625	481	481	481	481	481	481
NE Purse Seine	219	219	219	219	219	219	217	217	217
MA Purse Seine	9	9	9	9	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	1,596	320	320	320	320	320	320
MA Scallop Dredge OL	8,713	3,080	3,080	280	280	280	280	280	280
NE Scallop Dredge CL	3,861	1,473	1,473	703	703	429	703	429	145
MA Scallop Dredge CL	1,777	1,136	1,136	283	283	283	283	283	88
NE Scallop Dredge OG	204	204	120	117	117	117	117	117	92
MA Scallop Dredge OG	293	124	124	54	54	54	54	54	17
NE Scallop Dredge CG	24	24	24	24	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95	95	95	95	95
MA Scallop Trawl OG	443	443	443	443	443	443	443	443	443
NE Scottish Seine	30	30	12	12	12	12	12	12	12
NE Shrimp Trawl	364	364	364	247	247	247	42	42	42
MA Shrimp Trawl	76	76	76	76	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**55,452**	**14,516**	**13,151**	**12,065**	**11,868**	**11,253**	**10,704**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters (Option A) to the 39 fishing modes subject to the Northeast Region SBRM.

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	Discard % of Discards Filter			Discard % of Mortality Filter		
			99.0%	95.0%	90.0%	99.0%	95.0%	90.0%
NE Clam Dredge	50	50	50	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84	84	84	84
NE Crab Pot	101	101	101	101	101	101	101	101
MA Crab Pot	28	28	28	28	28	28	28	28
NE Fish Pot	20	20	20	20	20	20	20	20
MA Fish Pot	103	40	40	40	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	443	141	141	141	141	141
MA Large-mesh Gillnet	653	653	653	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	417	267	238	214	214	144
MA X-Large-mesh Gillnet	468	468	468	468	468	468	468	468
NE Handline	137	137	72	72	72	72	72	72
MA Handline	133	133	133	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89	89	89	89
NE Longline	185	185	99	35	35	99	35	35
MA Longline	76	76	76	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	1,218	747	747	316	316	56
MA Mid-Water Trawl	557	492	35	35	35	35	35	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	2,231	2,231	2,231	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	26,644	26,644	2,692	798	730	730
MA Large-mesh Trawl	3,625	3,625	481	481	481	481	481	481
NE Purse Seine	219	219	219	219	19	217	19	19
MA Purse Seine	9	9	9	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	708	708	708	320	177	177
MA Scallop Dredge OL	8,713	3,080	3,080	465	280	280	114	114
NE Scallop Dredge CL	3,861	1,473	703	429	429	145	139	139
MA Scallop Dredge CL	1,777	1,136	481	283	108	108	108	108
NE Scallop Dredge OG	204	204	120	117	117	92	92	92
MA Scallop Dredge OG	293	124	88	17	17	17	17	17
NE Scallop Dredge CG	24	24	24	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95	95	95	95
MA Scallop Trawl OG	443	443	119	51	51	80	51	51
NE Scottish Seine	30	30	12	12	12	12	12	12
NE Shrimp Trawl	364	364	123	92	92	42	42	42
MA Shrimp Trawl	76	76	76	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**42,995**	**38,749**	**14,208**	**10,400**	**9,726**	**9,395**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters (Option B) to the 39 fishing modes subject to the Northeast Region SBRM. Note that in this option, there is no "CV-met filter."

Fishing Mode	Baseline Levels (No Filters)	Grey-Cell Filter	95% of Discards & 98% of Mortality	95% of Discards & 99% of Mortality	98% of Discards & 99% of Mortality
NE Clam Dredge	50	50	50	50	50
MA Clam Dredge	84	84	84	84	84
NE Crab Pot	101	101	101	101	101
MA Crab Pot	28	28	28	28	28
NE Fish Pot	20	20	20	20	20
MA Fish Pot	103	40	40	40	40
NE Small-mesh Gillnet	12	12	12	12	12
MA Small-mesh Gillnet	1,259	1,259	1,259	1,259	1,259
NE Large-mesh Gillnet	4,357	3,767	141	141	141
MA Large-mesh Gillnet	653	653	653	653	653
NE X-Large-mesh Gillnet	3,266	2,059	214	214	214
MA X-Large-mesh Gillnet	468	468	468	468	468
NE Handline	137	137	72	72	72
MA Handline	133	133	133	133	133
NE Lobster Pot	439	439	439	439	439
MA Lobster Pot	89	89	89	89	89
NE Longline	185	185	35	35	99
MA Longline	76	76	76	76	76
NE Mid-Water Trawl	1,793	1,218	316	316	316
MA Mid-Water Trawl	557	492	35	35	35
NE Small-mesh Trawl	3,822	2,024	2,024	2,024	2,024
MA Small-mesh Trawl	5,417	3,057	1,229	1,229	1,229
NE Large-mesh Trawl	26,644	26,644	730	798	798
MA Large-mesh Trawl	3,625	3,625	481	481	481
NE Purse Seine	219	219	19	19	217
MA Purse Seine	9	9	9	9	9
NE Scallop Dredge OL	1,596	1,596	320	320	320
MA Scallop Dredge OL	8,713	3,080	114	280	280
NE Scallop Dredge CL	3,861	1,473	145	145	145
MA Scallop Dredge CL	1,777	1,136	108	108	108
NE Scallop Dredge OG	204	204	92	92	92
MA Scallop Dredge OG	293	124	17	17	17
NE Scallop Dredge CG	24	24	24	24	24
MA Scallop Dredge CG	21	21	21	21	21
MA Scallop Trawl OL	95	95	95	95	95
MA Scallop Trawl OG	443	443	51	51	80
NE Scottish Seine	30	30	12	12	12
NE Shrimp Trawl	364	364	42	42	42
MA Shrimp Trawl	76	76	76	76	76
Total Sea Days Needed:	**71,043**	**55,554**	**9,874**	**10,108**	**10,400**

Summary results (at-sea fisheries observer sea days needed) of applying the proposed importance filters to the 39 fishing modes subject to the Northeast Region SBRM (continued). This table indicates the specific combinations of filter thresholds considered, after refining the broader threshold levels identified on the previous table. The recommendation of the SBRM FMAT is to set the filters at 95% of discards and 98% of mortality.

Appendix D
Northeast Region Fishery Observer Program
Data Flow Process

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Summary of
Northeast Fisheries Observer Program
DATA FLOW

The Northeast Fisheries Observer Program collects, maintains, and distributes data to be used for scientific and management purposes. The flow of data can be very complex as it migrates from various sources before it is loaded to the main database. Since 1989, the Northeast Fisheries Observer Program has deployed an average of 35 observers a year in various commercial fisheries. These observers completed an average of 2300 days at sea annually. Due to new regulations, the observer program now deploys an average of 100 observers on about 12,000 days at sea annually. This, in turn, has increased the number of trips received on a daily basis by the observer program. The Fisheries Sampling Branch now receive an average of 40 trips per day, up from eight trips per day in the recent past. Trips can range from 1 to 15 days. The trips consist of data logs containing a variety of information including but not limited to:

- Trip information (target species, dates, primary species landed, etc.)
- Economic information (insurance costs, repair costs, engine type, etc.)
- Haul information (times, dates, weather, water depth, location, etc.)
- Species information (species, disposition, weights, etc.)
- Sampling information (lengths, weights, # of age structures collected, etc.)
- Incidental Take information (species, samples collected, lengths, weights, etc.)
- Safety information (EPRB on board, Coast Guard Doc sticker, etc.)

Not every trip includes all of the above mentioned information, however, a typical trip does include most of these variables. The outline below describes what happens to these data once an observer returns to port from an observed trip.

1. OBSERVER COMPLETES DATA – The observer verifies that the data sheets are filled out completely and accurately, calls in the data to the OBSCON system, and sends the data sheets to NEFSC.

2. OBSCON – This program consists of a total of 44 crucial fields (port, dates, target species, incidental takes, etc.) that provide users with real-time data. The data in OBSCON are called in by the observer working with the area coordinator and entered into an ORACLE-based table.

3. DATA LOGS – Before the data are entered, they go through a series of review and editing steps. There are three separate reviews conducted by data analysts and data editors once the data are appropriately logged in. These: (1) Verify the correct program code has been recorded for each trip and calculate the average mesh size of each trip; (2) review each individual trip against OBSCON and

verify all fields called in to OBSCON match up with actual data logs; and (3) verify all logs are as complete and accurate as possible, all errors are corrected throughout the trip, all age structures for that trip have been logged in, and no new errors have occurred.

4. AUDIT CHECKS – Before the data are loaded into the database, they go through a series of audit checks to verify certain fields or values are entered properly. Preliminary audit is handed over to staff fishery biologists who review audit or pass on to data editors for review. The audit continues until it is as clean as possible before the data are uploaded to entry tables. A second round of audits is performed and fishery biologist/data editor verifies all errors and has entry staff make corrections as necessary. Once complete, the fishery biologist signs off on audit as "Approved to Load." Data are loaded to the main database and confirmation is sent that data have been uploaded to main database. Once all gear types for a month have been loaded to the main database, the appropriate personnel are notified that an entire month has been loaded to the database.

***** At this point the data have been loaded in the database and are accessible to end users*****

5. FINAL CHECK – Once data have gone through the final audit process they go through a series of data checks one last time before being filed.

6. DATA ERROR REPORTS – If errors are found after data has been loaded to the main database, error reports are generated, and the appropriate changes are made directly to the main database.

7. DATA ARCHIVING PROJECT – All data collected from the Fisheries Sampling Branch are scanned in order to alleviate space and enable observer data to be viewed on a computer screen by end users. To identify logs, a uniquely identified bar code is attached to every single sheet that is scanned.

Note: ***This is not a complete description of the data flow process used by the Northeast Fisheries Observer Program, but is instead a summary intended to provide an overview for how the data are reviewed, edited, and processed. More detail is available in the "Fisheries Observer Program Manual."***

Appendix E
Comments and Responses on the Draft Amendment

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Summary of Comments Received on the Draft Amendment

Comment Period: October 31-December 29, 2006

NOAA's National Marine Fisheries Service (NMFS), on behalf of the Mid-Atlantic and New England Fishery Management Councils, published a Federal Register notice on October 31, 2006, to announce the availability of the draft SBRM Amendment and associated environmental assessment (EA) for review and to solicit comments on the document. The Federal Register notice announced two public hearings held on November 14, 2006, in Gloucester, MA, and on December 13, 2006, in New York, NY. Written comments were accepted through December 29, 2006.

A total of 48 individuals attended the public hearings, and 9 individuals offered public testimony on the amendment. In addition to those speaking at the public hearings, NMFS received seven comment letters. Several of these letters restated opinions voiced at the public hearings. One letter was submitted on behalf of six fishing industry organizations, with a second letter endorsing the first. Three of the letters were from conservation organizations, two of which endorsed the more detailed comments of the third. The two remaining letters were submitted by private citizens.

Several comment letters recognized the considerable effort expended to date on the development of the amendment and applauded the progress that has been made. However, with the exception of two letters, one focused entirely on the cost estimates for electronic monitoring and one on the state of fisheries in general and recommending improved enforcement, the comment letters indicated dissatisfaction with a variety of elements of the draft amendment and several expressed doubt that the amendment would satisfy the Court orders stemming from the Amendment 10 and Amendment 13 lawsuits. The following summarizes all comments provided during testimony at the public hearings and in the written letters; however, in cases where the same individual or organization provided the same comment more than once (e.g., during a public hearing and also in a follow-up letter), the comment is summarized once.

General Comments on the Amendment

Comment 1. One commenter expressed concern that the SBRM Amendment does not strike an adequate balance between specificity and generality. The commenter suggested that it is overly specific when it stratifies the bycatch reporting regime into "tens of hundreds" of strata, and it is too general in that it prescribes a uniform precision target across all fisheries.

Response: The commenter's claim of "tens of hundreds" of strata is incorrect. The SBRM Amendment stratifies fishing activities into 39 fishing modes that represent the appropriate gear type and area-based divisions to best serve as the basis for assigning observer coverage. Against these 39 strata, the implications of observer coverage are assessed for each species and species group managed under the Councils 13 FMPs, plus sea turtles, encountered by each fishing mode. While this creates a matrix composed of 585 cells, the Councils consider this to be an appropriate framework for the analysis conducted in support of the SBRM and with the appropriate level of specificity. The Councils do not consider the CV-based performance standard to be too general in its application across all fisheries. The CV-based methodology establishes the process by which observer coverage levels are determined and allocated across the wide variety of fisheries managed under the Northeast Region FMPs. Using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent (less variable) catches. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

Given that the expectations for the discard data obtained by at-sea fisheries observers should be consistent across all fisheries for which the data are used in similar ways (e.g., to obtain reasonably precise and accurate estimates of discards for use in stock assessments and to determine the stock-level implications of discarding), it stands to reason that a generally-derived performance standard is appropriate, particularly given the overlaps and inter-relationships among fisheries and species caught (see chapter 3). When the discard data are used for different purposes in certain specific fisheries (e.g., for real-time area-based quota monitoring), the generally-derived performance standard may need to be supplemented to more appropriately reflect the needs of the specific application. This amendment would not preclude either Council from modifying the SBRM process established through this amendment to accomplish such a change on an FMP-by-FMP basis as management needs dictate. In fact, the SBRM Amendment has been designed to ensure such flexibility remains available to the Councils (see section 6.5). The ability of the Councils to develop changes to the SBRM through the framework adjustment and/or annual specifications process preserves the flexibility suggested by the commenter.

Comment 2. The same commenter further stated that the SBRM Amendment does not comport with NMFS's nationwide bycatch reporting technical guidance because it establishes blanket standards of precision across all fishing modes, rather than considering the needs and requirements of each fishery.

Response: The Councils intend to establish a rigorous methodology with which to ensure that the discard data obtained by at-sea observers is of the highest quality possible, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data. Establishing a uniform, global CV level is warranted to ensure a consistent and standard minimum level of precision in the data collected by at-sea fisheries observers under the SBRM. As noted in the response to comment 1, using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent (less variable) catches. Also, the use of the importance filters (section 6.2.3) provides a mechanism to accommodate differences in discard levels among the subject fishing modes and to account for the overall mortality to a stock associated with discards in the various fishing modes. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

The option of evaluating and setting the CV-based performance standard on a cell-by-cell basis was considered during the development of the SBRM Amendment, but ultimately rejected as an unnecessary and impracticable approach to address the need for establishing a minimum level of precision (see section 6.8.4). The process proposed in this amendment does not preclude adjusting the fishery-specific CV levels as conditions in any fisheries warrant (this ability is created in the proposed framework adjustment provisions, see section 6.5). In effect, this amendment establishes a baseline CV level that applies to all fisheries to serve as an initial minimum level of precision, and provides a mechanism to adjust the standard as appropriate.

<u>Comment 3.</u> The same commenter stated that the SBRM Amendment should provide the Councils and NMFS with a process only and some ground rules that can be used to develop and implement fisheries-specific monitoring systems in fishery management plan (FMP) specific contexts. The SBRM Amendment, he wrote, should establish a broad program structure with the details left to development by plan development teams (PDTs) (or some other knowledgeable working group) in the context of the individual FMPs and with full consideration of specific FMP needs.

Response: The Councils disagree with the suggestion that the SBRM Amendment should implement a process only and not actually establish the SBRM to be implemented in the fisheries. The Court order clearly remanded to the agency the responsibility to establish the actual SBRM, not simply create a framework or guidelines for establishing an SBRM at some later date. The Councils considered addressing the Court order on an FMP-by-FMP basis, but ultimately decided it would be more effective and efficient to handle this requirement in an omnibus amendment to all Northeast Region FMPs.

<u>Comment 4.</u> A commenter expressed dissatisfaction with the process used by the Fishery Management Action Team (FMAT), with concern that it disengaged interested parties from the development of the amendment except for periodic updates to the Councils.

Response: NMFS and the Councils disagree that the use of the FMAT disengaged interested parties from the development of the amendment. The FMAT served as a technical working group of NMFS and Council staff to develop the technical elements of the SBRM Amendment and provide input to the Joint SBRM Oversight Committee and the Councils for their consideration. Public input from interested parties was encouraged and accepted at seven meetings of the Joint SBRM Oversight Committee, six meetings of the Mid-Atlantic Council, seven meetings of the New England Council, two public hearings on the draft amendment, and a meeting of members of the two Councils' Science and Statistical Committees (SSC). This represents a total of 23 meetings at which members of the public were welcome to engage the Councils on issues related to the development of the amendment. By contrast, there were nine meetings of the FMAT. For a complete list of all public meetings at which the SBRM Amendment was discussed, see chapter 9.

<ins>Comment 5.</ins> One commenter was critical of the objectives identified for the amendment, citing that the public hearing document did not define the objectives for the SBRM program. This commenter stated that it was insufficient to prescribe a blanket CV requirement and term this an objective.

Response: Section 1.4 has been clarified to identify the purpose of both the SBRM Amendment and the resulting SBRM itself. The SBRM is intended to ensure that the biologic sampling programs used to obtain discard data minimize bias and maximize precision to the extent practicable. The CV of 30 percent is not, in itself, an objective of the SBRM, but is rather an objective criterion to be used to gauge the level of success in achieving the objectives of the SBRM.

<ins>Comment 6.</ins> A commenter stated that NMFS should ensure the amendment document undergoes external peer review by a party such as the Center for Independent Experts. The peer review panel, he wrote, should be given the opportunity to comment on the technical issues and issues related to management and integration of the SBRM into stock assessments.

Response: The Councils agree that this amendment is an important document warranting external peer-review. On August 22, 2006, four members of the Mid-Atlantic and New England Councils' SSCs (two members from each SSC) met to conduct a review of the technical components of the SBRM Amendment. In a report prepared by the SSC reviewers, they concluded that the document does "a commendable job of formulating a comprehensive approach to the problem of assessing bycatch rates in multiple fisheries." The overall consensus of the reviewers is that the document "provides a rigorous objective framework for addressing the problem of bycatch monitoring."

Regarding the proposed CV of 30 percent, the reviewers concluded that this was "a reasonable objective from a statistical perspective" but they did caution the Councils that "it may not be possible to achieve this objective for all species and fleet sectors simply by reallocating the present number of trip days observed" and that "additional observations may be needed." The focus of the report was on several technical changes in the formulas used to estimate discards and calculate the CV that the reviewers suggested be made, as well as the suggestion that an "importance filter" be developed to prioritize coverage levels and account for situations where the magnitude of the discards are inconsequential relative to the level of observer coverage that would be necessary to achieve the performance standard.

All technical changes suggested by the SSC reviewers have now been made to the analyses described in the SBRM Amendment, and the amendment now includes provisions implementing the suggested "importance filter" process (see chapters 5 and 6 of the amendment for more discussion on these items).

Comment 7. Several commenters concluded that the amendment fails to meet the legal requirements of the Magnuson-Stevens Act, the National Environmental Policy Act (NEPA), and relevant Court orders. One commenter called for the SBRM Amendment to be withdrawn and for the Secretary of Commerce to implement emergency regulations to establish adequate levels of observer coverage until a "legally-compliant SBRM" is developed.

Response: The Councils disagree with the assertion that the amendment fails to meet the legal requirements of the Magnuson-Stevens Act, NEPA, and the relevant Court orders. The Councils were advised of the legal obligations under the applicable laws at each step in the development of this amendment. The Councils assert that this amendment fully complies with all applicable legal standards under the Magnuson-Stevens Act, NEPA, and other applicable laws (see chapter 8), and that the amendment fully complies with the relevant Court orders stemming from the Amendment 10 and Amendment 13 lawsuits.

There are no grounds on which to withdraw this amendment from development, nor any need or legal authority to promulgate emergency regulations regarding observer coverage levels at this time.

Comment 8. A commenter described the draft amendment as fatally flawed because it fails to incorporate the necessary requirements relating to "how" the bycatch data are to be collected; i.e., whether by observers and if so, the nature of the observer coverage. The SBRM should also specify, the commenter continued, how the data are to be analyzed and reported in support of management decisions.

Response: As a result of this comment, the amendment has been clarified to stipulate that, under the preferred alternatives, discard data are to be collected by at-sea fishery observers operating under the aegis of the NEFOP. For a detailed explanation of how the appropriate data are obtained by at-sea observers, refer to the Fisheries Observer Program Manual (NEFOP 2006a) and the Biological Sampling Manual (NEFOP 2006b). Chapter 5 and Appendix A explain, in detail, how the data are analyzed, and chapter 6 describes the SBRM reporting procedures proposed in this amendment.

Comment 9. Several commenters stated that NMFS will be fiscally unable to fulfill the requirements for observer coverage specified in the SBRM Amendment. The commenters expressed concern that failure to fulfill the precision or observer level targets may result in litigation affecting the agency's ability to manage fisheries and perhaps bearing on the conduct of the fisheries.

> Response: Based on the results of the analysis supporting this amendment, it is expected that observer coverage levels will need to increase in some fisheries from recent levels. It may be possible to decrease observer coverage in other fisheries, and this decrease may offset some of the increase needed, but not necessarily all. The Councils do not feel that the SBRM established by this amendment should be constrained to current or past levels of observer coverage, and acknowledge that observer coverage levels may need to increase overall to meet the SBRM performance standard. The purpose of this SBRM, as required by the Magnuson-Stevens Act and the Court orders, is to establish a methodology for assessing bycatch that is independent of the means available to fund the process. The SBRM Amendment recognizes that the agency's budget available to fund observer coverage is subject to change according to the appropriations authorized by Congress and the President, but it would not be appropriate to modify the SBRM based on expected funding levels that cannot be predicted. There may be years in which the available budget is insufficient to fully fund the observer coverage levels that result from the SBRM. The SBRM Amendment outlines a process for prioritizing available funding (see section 6.6).

<u>Comment 10.</u> A commenter noted that forms used for the reporting of bycatch should be standardized.

> Response: The forms used by at-sea fisheries observers to report discards are standardized and are described in the Fisheries Observer Program Manual (NEFOP 2006a) and Biological Sampling Manual (NEFOP 2006b).

<u>Comment 11.</u> Several commenters were concerned about how the SBRM can be adapted to support the bycatch information needs of each FMP and how the SBRM will be updated to respond to (or in anticipation of) changes in the fishery. These commenters suggested the SBRM should contemplate the changing dynamics of each fishery by gear type and species and be integrated into each FMP.

> Response: By definition, this omnibus amendment fully and adequately integrates the resulting SBRM into each FMP amended by this action. The Councils shared the concern raised by the commenter, so the SBRM Amendment includes provisions to allow changes to be made to elements of the SBRM through framework adjustments and/or specifications (see section 6.5). This is intended to preserve the ability of the Councils to make changes to the SBRM as needed to adapt to changes in the management programs of the various FMPs.

<u>Comment 12.</u> Commenters said that to ensure the SBRM can provide adequate information to support existing and future management needs, the amendment document should include a discussion of each fishery, its gear types, management scheme, and bycatch species.

Response: Chapter 2 of the SBRM Amendment provides a description of each FMP subject to the amendment that includes identifying the primary gear types used, the management scheme in place, the history and context for the FMP, the value of the fishery, and the primary ports of landing. Chapter 3 provides an overview of each fishing mode affected by one or more of the subject FMPs, including the major species caught, primary ports, and primary areas fished. The tables provided in Appendix C of the amendment identify the primary discard species for each fishing mode in 2004. These sections of the amendment address all items suggested in the comment.

Comment 13. The same commenters also suggested there should be a mechanism in place to update the allocation analysis annually or more frequently, in order to address changes in each fishery; i.e., gear innovations, changes in the total allowable catch, and other management changes.

Response: The Councils agree that the allocation analysis should be updated annually. The process established by this amendment includes an annual update to the analysis used to generate observer coverage levels and allocations. As a result of this amendment, the Councils would have the ability to change, through the framework adjustment process, certain aspects of the SBRM in order to address changes in each fishery.

Comment 14. One commenter suggested that the SBRM Amendment provide for future FMP-specific changes to be made by annual specifications, framework adjustment, regulatory action alone, or FMP amendment.

Response: The Councils agree and changes to the SBRM Amendment have been made to incorporate this flexibility (see section 6.5).

Comment 15. A commenter suggested that each FMP include a set of diagnostics, perhaps simply the coefficient of variation (CV) for bycatch estimate by mode, to gauge whether the FMP-specific SBRM is providing sufficiently precise information for management purposes.

Response: One of the primary outcomes of the SBRM Amendment is to establish a performance standard (a CV of no more than 30 percent) to function both as a mechanism to determine the level of observer coverage required in each fishing mode and as a diagnostic tool after the fact to evaluate whether the observer coverage provided data of the desired precision. This is described in detail in chapters 5 and 6 of the amendment, including a detailed discussion of the proposed SBRM reporting process intended to provide a periodic evaluation of the effectiveness of the SBRM at achieving its objectives. This evaluation would include determining the degree to which the observer coverage levels have been adequate to provide data of sufficient precision to achieve the CV-based performance standard (see section 6.4.2).

Comment 16. Several commenters stated that, despite observer allocation measures identified in the SBRM, the actual allocation of observers in any year will ultimately depend on available funding. They noted that while the amendment document acknowledges the potential for funding shortfalls, it does not explain how the funding-delimited allocation will occur and what standards will be used to set minimum levels of observer coverage. One commenter suggested the SBRM Amendment include a set of non-discretionary priorities for allocation of observer resources and that whatever approach was used, it take into account the available resources.

Response: The commenters are correct that in any given year, the costs to fully implement the observer coverage levels calculated through the SBRM proposed in this amendment may exceed available funding provided by Congress. However, the amendment proposes to address this contingency through a prioritization process to be set by the Councils (see section 6.6). It would be premature to establish non-discretionary priorities in this amendment, as management and scientific needs can and do change with time. There already exist, through some of the FMPs addressed by this amendment, prescribed observer coverage levels for certain programs (e.g., Northeast multispecies fishery SAPs and the B-Regular DAS program). Nothing in this amendment alters any current prescribed levels of observer coverage.

Comments on the Amendment and the Court Order

Comment 17. Several commenters expressed the opinion that the SBRM would not satisfy the remand orders. The Court ruling, they said, requires NMFS to specify the level and allocation of observer coverage in each fishery, and the actual level of observer coverage may not be left to the agency's discretion. Commenters opined that the SBRM establishes only a target performance standard (observer sea days sufficient to achieve a CV $\leq$ 30 percent for bycatch estimates), leaving the actual level of observer coverage as a matter of agency discretion, and therefore, the SBRM Amendment does not satisfy the Court's order.

Response: With respect to establishing an SBRM, the Court's orders only require that NMFS establish an SBRM that is non-discretionary, which the proposed SBRM does. The Councils disagree that the SBRM leaves the allocation of observer coverage to the discretion of the agency. The methodology established by and described in the SBRM Amendment dictates the level of observer coverage necessary in each fishing mode to meet the performance standard. Once established, the analyses that comprise the SBRM remove discretion from the process to determine observer coverage levels and allocations across fishing modes. In cases where there are insufficient resources (i.e., the agency budget cannot support) to fully allocate the levels of observer coverage required, the agency and the Councils will determine the appropriate prioritization of available observer coverage given the most pressing scientific and management needs (see section 6.6). The performance standard is not proposed to serve as a mere target, but is an objective measure of the level of observer coverage necessary to achieve the level of precision specified in the amendment. Moreover, the Court's order in *Oceana* v. *Evans* (II) explicitly rejected the need for specific percentage levels of coverage in footnote 38 of its opinion:

> Contrary to plaintiff's interpretation (*see, e.g.*, Mot. at 29), *Oceana I* did *not* require that an FMP mandate a specific level of observer coverage. Rather, the Court held that an FMP may not delegate the development of a standardized bycatch reporting methodology to the Regional Administrator.

<u>Comment 18.</u> Another of the commenters, noting the Court's reference to the bycatch monitoring plan in the Pacific Highly Migratory Species FMP as an example of a legally compliant SBRM, suggested that a similarly compliant SBRM will have to contemplate the dynamics of each fishery and be integrated into each FMP. The writer noted that the SBRM Amendment, as written, will not anticipate and adapt to future fishery conditions and management needs.

Response: This amendment already contemplates the dynamics of each fishery and will be integrated into each FMP. Chapters 2 and 3 provide information specific to each FMP and fishing mode subject to the SBRM. Chapter 4 contemplates discard reporting mechanisms (both those currently used and potential additional methods) and in the context of the various fisheries in the Northeast Region. By developing an omnibus amendment, the Councils and NMFS are integrating this SBRM into all 13 Northeast Region FMPs. The provisions in the SBRM Amendment that make changes to certain elements of the SBRM through annual specifications or framework adjustments to the individual FMPs provide a mechanism to allow the Councils to adapt the SBRM on an FMP-by-FMP basis, as needed, to future fishery conditions and management needs in a relatively time-effective manner without the need to go through the full amendment process.

<u>Comment 19.</u> A commenter asserted that the draft SBRM Amendment exceeds the requirements laid out by the Court and is far more comprehensive than the example bycatch monitoring plans cited by the Court. The writer agreed that the rulings require the SBRM's implementation to be non-discretionary, but the commenter argued for flexibility in the new program, asserting that the Court did not mandate any particular approach or set of performance requirements.

Response: The Councils agree that the SBRM Amendment is more extensive and comprehensive than would be necessary to minimally satisfy the Court's concerns, but this is hardly a flaw and is certainly legal and appropriate under the Magnuson-Stevens Act and the Court opinions. While the Court did not mandate any particular approach or set of performance requirements, the approach and performance requirements proposed in the amendment are entirely consistent with the Court opinions and fulfill the requirements under the Magnuson-Stevens Act. By establishing the performance requirements described in this amendment, the resulting SBRM would be more robust than if the performance requirements did not exist.

<u>Comment 20.</u> The same commenter noted that by establishing a target CV for bycatch estimates in hundreds of various mode-species combinations, the SBRM Amendment would require specific application of a generally-derived standard. The writer urged NMFS to recast the omnibus amendment as a broader set of standards and methods, perhaps adopting a CV target for more broadly aggregated bycatch estimates, under

which PDTs would establish fishery specific observer coverage requirements and, thus, removing from the agency the discretion for establishing observer coverage levels. The commenter asserted that such flexibility would be consistent with both Court decisions.

Response: The CV-based methodology establishes the process by which observer coverage levels are determined and allocated across the wide variety of fisheries managed under the Northeast Region FMPs. Using a global standard (a CV of 30 percent) across all fisheries does not mean that all fisheries would be allocated the same level of observer coverage (as would occur under a process by which all fisheries were required to achieve, for example, 20 percent coverage), but recognizes inherently that some fisheries—those that have more highly variable catches—require higher levels of observer coverage than those with more consistent catches. In this way, the differences among fisheries that would affect observer coverage levels are accounted for while ensuring that the data collected by observers on discards in all fisheries achieve a consistent and standard level of precision.

Given that the expectations for the discard data obtained by at-sea fisheries observers should be consistent across all fisheries for which the data are used in similar ways (e.g., to obtain reasonably precise and accurate estimates of discards for use in stock assessments and to determine the stock-level implications of discarding), it stands to reason that a generally-derived performance standard is appropriate, particularly given the overlap and inter-relationships among fisheries and species caught (see chapter 3). When the discard data are used for different purposes in certain specific fisheries (e.g., for real-time area-based quota monitoring), it may be that the generally-derived performance standard may need to be supplemented to more appropriately reflect the needs of the specific application. Nothing in this amendment precludes either Council from modifying the SBRM process established through this amendment to accomplish such a change on an FMP-by-FMP basis as management needs dictate. In fact, the SBRM Amendment has been designed to ensure such flexibility remains with the Councils (see section 6.5). The ability of the Councils to develop changes to the SBRM through the framework adjustment and/or annual specifications process preserves the flexibility suggested by the commenter.

Comment 21. Several commenters stated that the Court decision requires the SBRM to clearly establish that an observer program will be developed and made mandatory in each fishery.

Response: The Councils disagree that the Court decision requires that an observer program be *developed*; the Northeast Fisheries Observer Program is well established and has proven to be a successful observer program for over 15 years. Observer coverage is currently mandatory in all Northeast Region FMPs subject to this amendment (i.e., vessels with Federal permits are required to carry an observer any time they are requested to do so). This amendment will formalize the SBRM in place in the Northeast Region and reinforce the importance and necessity of at-sea fisheries observers for collecting data on discards.

Comments on the Amendment and NEPA

Comment 22. Several commenters stated that the Omnibus SBRM Amendment should be subjected to the scoping and development process of an Environmental Impact Statement (EIS). They argued that the environmental impacts of the SBRM Amendment are likely to be significant, since the SBRM ultimately would affect widespread marine life, as data collected under the SBRM would influence fisheries management decisions throughout the region for years to come.

Response: The Councils disagree that an EIS is necessary for this action. Section 7.2 of the amendment analyzes the direct, indirect, and cumulative impacts expected to result from the implementation of this amendment and section 8.9.2 supports the conclusion that no significant impacts to the human environment are expected. While data collected under the SBRM may influence fisheries management decisions throughout the region for years to come, each of those future management decisions would be the subject of its own environmental review under NEPA. This separate environmental review would be based on the specific management measures under consideration for the specific stock(s) and fishery(ies) for which the action has been deemed necessary.

The purpose of this action is not to directly or even indirectly alter fishing practices or levels of fishing effort. This action is specifically designed to establish the methodology to be used to obtain, analyze, and report information regarding discards occurring in Northeast Region fisheries. It does not directly or indirectly affect the physical environment and, therefore, an EIS is not necessary. Nevertheless, the process for developing this amendment involves extensive public input and involvement by the two Councils.

Comment 23. The same commenters stated that the SBRM Amendment document contemplates too few and too narrow a range of alternatives to satisfy NEPA. They suggested that additional alternatives should have been considered with respect to the importance filters, bycatch reporting and monitoring mechanisms, the performance standard, and bycatch program review and reporting.

Response: The Councils disagree that the SBRM Amendment contemplates too few and too narrow a range of alternatives to satisfy NEPA. NEPA does not require a minimum number of alternatives be analyzed, other than the proposed action relative to taking no action, and the breadth of what is considered a reasonable range is dependent on the nature of the action. This amendment provides a range of possible outcomes as alternative courses of action, but is organized for the sake of clarity such that for each of seven relatively independent decision points the status quo is compared to between one and three additional alternatives (some alternatives include an additional one to three options). Given the structure of the SBRM Amendment in categorizing the actions under consideration, there are actually 1,464 distinct outcomes possible for the SBRM to be adopted by the Councils, ignoring sub-options within some of the alternatives. Accounting for the sub-options, the number of different possible outcomes climbs to 2,160.

Comment 24. One commenter indicated that the lack of an EIS limited the opportunities for public participation and stymied involvement by the Councils in the development of the amendment.

Response: The Councils disagree that the preparation of an EA has in any way limited the opportunities for the public to participate in the process to develop the SBRM Amendment. NMFS and the Councils have endeavored to provide the public with numerous opportunities to participate in the process to develop this amendment, through a variety of fora and media. In addition to 13 Council meetings, 7 oversight committee meetings, and 1 meeting of members of the Councils' SSCs at which the SBRM Amendment was discussed in a public forum with opportunities for members of the public to provide input into the process, there were two formal public hearings held on the draft amendment for which the sole purpose was to solicit and obtain input from the public on the SBRM Amendment. The public hearings were held during a 59-day comment period that followed publication in the *Federal Register* of a notice soliciting input from the public on the draft amendment. Copies of the draft amendment, and a companion summary document, were distributed at Council meetings and the public hearings, were available by mail to anyone requesting a copy, and were posted on the Internet with instructions for how to provide comments.

In addition to these opportunities, upon submission by the Councils to the Secretary of Commerce for review, a notice of availability will be published in the *Federal Register* with a comment period prior to any decision by the agency to approve or disapprove the amendment. Publication of a proposed rule will provide yet another opportunity for the public to review and comment on the proposed regulations designed to implement the SBRM Amendment. These public meetings and review/comment periods meet or exceed the requirements of all applicable laws, including the Magnuson-Stevens Act, NEPA, and the Administrative Procedure Act.

Comment 25. Several commenters insisted that alternative threshold levels for the importance filter mechanism should be identified and analyzed in the NEPA document, as should a range of alternative CV levels, as the performance standard for the SBRM.

Response: The SBRM Amendment, at section 6.3.2, identifies ranges of alternative threshold levels considered to apply to the proposed importance filters. Although considered during the early development of the amendment, a range of alternative CV levels was not formally proposed (see section 6.8.4) due to the lack of a scientific basis for any CV other than the 20-30 percent encouraged in NMFS (2004). The Councils contend that the decision to adopt a performance standard of 30 percent is explained adequately in section 6.3.2. The only potential outcome of selecting a different threshold level for the importance filter (higher or lower) or selecting a different CV level for the performance standard (higher or lower) would be to change the resulting observer coverage levels necessary to comply with the SBRM (more or fewer days observed), which would, as explained in section 7.2.3, have no direct, indirect, or cumulative effect on the environment.

Comment 26. One commenter suggested that the purpose, need, and scope of the document are too vague. This commenter also suggested that the entire document, particularly the analytical sections, needs to be easily accessible to the public, stakeholders, and decision makers.

Response: As stated in section 1.4 of the amendment, the purpose and need of the document are to ensure that all Northeast Region FMPs comply with the SBRM requirements of the Magnuson-Stevens Act and to address the concerns raised by the Court in the *Oceana* v. *Evans I* and *II* decisions. The scope of the amendment is similarly explained in section 1.4 and Table 1, which identifies the 13 FMPs and 39 fishery species to which this amendment applies.

The Councils and NMFS intend for this document be easily accessible to the public, stakeholders, and decision makers. As noted in the response to comment 24, the document has been widely available in different media and through different means in order to ensure that all those interested in the SBRM Amendment would have access to it. The document is written in plain language (to the extent that issues of such a technical nature allow) so as to be understood by non-experts.

Comment 27. The same commenter argued that the environmental assessment (EA) ignores the indirect and cumulative environmental effects of the SBRM Amendment, and that attention should be paid to the relationship of precision of bycatch estimates to the risks to the environment.

Response: The Councils disagree that the EA "ignores" the indirect and cumulative environmental effects of the SBRM Amendment. Sections 7.2 and 7.3 of the amendment specifically analyze the potential direct, indirect, and cumulative effects of the action on the environment, as required under NEPA. Section 8.9.2 concludes that no significant direct, indirect, or cumulative impacts to the environment are expected to occur, as required for an EA under NEPA.

Comment 28. Also, the commenter suggested that through an EIS, NMFS should discuss the effect of the SBRM Amendment on the drafting and issuance of Incidental Take Statements and Biological Opinions under the Endangered Species Act.

Response: It is not necessary under NEPA to include a discussion of the effect of the amendment on the drafting and issuance of Incidental Take Statements and Biological Opinions under the ESA. An SBRM is a requirement of the Magnuson-Stevens Act, not the ESA, and an approved SBRM is not a prerequisite of preparing or implementing Incidental Take Statements or Biological Opinions.

Comments on the Species Addressed by the Amendment

Comment 29. Several commenters addressed the range of species that would be considered under the SBRM, asserting that without a method to assess and report bycatch of all species, the SBRM is incomplete. Commenters claimed the Magnuson-Stevens

Act's definition of bycatch includes more species than those contemplated in the amendment, and includes non-commercial and unregulated fish species (especially those considered at risk, such as wolfish, cusk, and corals), as well as highly migratory species and fish managed by the Atlantic States Marine Fisheries Commission.

Response: The Councils agree that without a method to assess and report bycatch of all species encountered by a fishing vessel, the SBRM would be incomplete. However, as explained in section 4.5 and section 6.8.1, the NEFOP currently recognizes and accounts for all species encountered by a fishing vessel, whether or not the species is managed under a Council FMP. The intent of the amendment is to establish an SBRM that accounts for *all species* encountered by a fishing vessel, by requiring that data on all species are obtained and recorded by at-sea observers and other data collections tools utilized under the SBRM, while ensuring that the data utilized by stock assessment biologists and the Councils to develop FMPs under the Magnuson-Stevens Act are of sufficient precision and accuracy.

Comment 30. The same commenters argued endangered species and marine mammals should also be addressed, and there should be a discussion of the bycatch of corals and sponges as indicators of impacts on marine habitat, particularly in those areas designated as essential fish habitat.

Response: Data on all species brought onto the deck of a fishing vessel are reported by at-sea fisheries observers, as explained in section 4.5 and section 6.8.1 of this amendment and in the Observer Program Manual (NEFOP 2006a) and Biological Sampling Manual (NEFOP 2006b). These include endangered species, marine mammals, sponges, and corals. However, marine mammals are not considered bycatch under the Magnuson-Stevens Act and are, therefore, not directly relevant to the design of the SBRM, as required by the Magnuson-Stevens Act. Also, although data on discards of sponges and corals are collected by observers and are available for use by scientists, managers, and others, assessing the implications of corals and sponges as indicators of impacts on marine habitat is outside the scope of this amendment.

Comment 31. One of the letters expressed concern for the "chronic imprecision and inaccuracy" of estimates of bycatch of sea turtles and other protected species.

Response: The Councils disagree with the contention that there exists "chronic imprecision and inaccuracy" of bycatch estimates for sea turtles and other protected species. The commenter provided no evidence to support their contention. The analysis conducted in support of the amendment indicates that the precision of the discard data collected by at-sea observers varied, but overall was relatively strong (of the non-gray cells in Table 44 for which there was observer coverage in 2004, 54 cells had no bycatch, 82 cells had CVs of 30 percent or less, 40 had CVs between 30 percent and 50 percent, and 56 had CVs in excess of 50 percent). While there is certainly room for improvement in many fisheries, the evidence appears to contradict the commenter's assertion of "chronic" imprecision. As to the accuracy, section 5.6.2 of the amendment summarizes the accuracy analyses performed to date, and these conclude that there is no evidence of systematic or significant bias in the observer program.

Comments on the Observer Coverage Levels

Comment 32. One commenter stated their opinion that the amendment does not establish an allocation of observer coverage and does not explain how one would be established. This commenter also expressed concern over whether there was an automatic mechanism to update the allocation analysis every year.

Response: The Councils disagree with the contention that the amendment does not establish an allocation of observer coverage. The primary purpose of the amendment is to establish just such a methodology by which observer coverage allocations are made. Chapter 5 describes, in detail, the methodology by which discard data are obtained and analyzed to, in turn, determine the necessary observer coverage allocations in each fishery. Chapter 6 describes, in detail, the proposed actions of the Councils to adopt this methodology as the basis to allocate observer coverage for all the FMPs. The intent of this methodology is to provide the mechanism to determine the observer coverage allocations on an annual basis, each year using the most recent complete year of observer data as an input into the process. The SBRM Amendment, in setting up a methodology for determining observer coverage allocations, rather than absolute coverage levels, used data from 2004 as an example dataset input into the proposed methodology.

Comments on the Level of Precision of Bycatch Estimates

Comment 33. One commenter asked to what units or level of aggregation would the CV target be applied; that is, would the 30 percent CV be an overall bycatch estimate for all species aggregated, or would it apply by fishing mode, species, or species group?

Response: The stratification used in the proposed methodology would be applied at the level of species or species group for each fishing mode (a gear- and area-based delineation of fisheries at the appropriate level for assigning observer coverage). This is described and explained in detail in chapter 5.

Comment 34. Another commenter stated that the performance standard must be mandatory, rather than a target, and that the SBRM must clearly establish how the standard is going to be applied for fishery, gear type/sector, and/or species.

Response: The Councils agree that the performance standard should be mandatory, and the SBRM Amendment proposes a mandatory performance standard (achieving a CV of 30 percent or less). However, while the performance standard is used to determine the level of observer coverage *expected* to achieve the standard, whether this standard is actually met can only be determined after fishing is concluded for the year. The CV is a measure of the variability in the data obtained in the sampling program. There are many factors that affect the variability of the discard data obtained by at-sea observers (e.g., changes in stock distribution) and many of these factors remain outside the control of NMFS or the Councils. Thus, meeting the appropriate observer coverage levels is not a guarantee that the CV will be 30 percent or less. As noted in the preceding comment, the stratification used in the proposed methodology to apply the performance standard is described and explained in detail in chapter 5.

Comment 35. Several commenters stated that the target CV does too little to limit the Agency's discretion in determining whether and how to allocate observers. They argued that the SBRM Amendment should require specific levels of observers in each fishery.

Response: The Councils disagree that the use of the CV-based performance standard leaves to the agency the discretion to decide whether and how to allocate observers. The CV level is the minimum standard necessary to estimate bycatch with the desired level of precision, and as long as the minimum level is attained, the SBRM meets the Magnuson-Stevens Act requirements. Any discretion used by NMFS to attain lower CVs only enhances the results derived from the SBRM, which is entirely consistent with the Magnuson-Stevens Act. The purpose of the CV-based performance standard and the methodology proposed in this amendment is to stipulate the specific analytical process by which the observer coverage levels required in each fishery would be determined. Nothing in this methodology would substitute agency discretion for achieving the minimum CV level as described in chapters 5 and 6. As noted, there may be years in which the budget available to the agency with which to fund at-sea observers is insufficient to meet the resulting observer coverage levels; however, the amendment includes a process by which the agency would consult with the Councils in order to develop priorities for how to apply the available funding.

Comment 36. Another commenter argued that the application of the same precision standard (CV $\leq$ 30 percent) to all mode-species combinations is impracticable and ignores the issues and objectives of each individual FMP. The commenter also stated that it runs counter to NMFS's own technical guidance calling for more general application of the CV standard across all bycatch species.

Response: While the proposed application of the performance standard at the species or species complex level for each fishing mode may exceed the minimum standard suggested in the NMFS technical guidance on this issue (NMFS 2004), the Councils assert there is nothing wrong with exceeding this minimum level for application of the performance standard. The rationale for proposing a CV of 30 percent is described in section 6.3 and section 6.9.3. It is the intent of this amendment to establish a rigorous methodology to ensure that the discard data obtained by at-sea observers are of the highest possible quality, with high levels of precision and accuracy to meet the needs of the scientists and managers that utilize the data.

The Councils disagree that application of the same performance standard to all mode-species combinations is impracticable. The analysis presented in the SBRM

Amendment utilizes this performance standard in its application of the proposed methodology. The proposed methodology successfully determined observer coverage levels that would be expected to achieve this level of precision, confirming that this approach is reasonable and practicable.

The Councils also disagree with the commenter's contention that this approach ignores the issues and objectives of each FMP. One of the reasons the CV-based performance standard is the preferred basis for determining observer coverage levels is that it implicitly accounts for the variability associated with each fishery by requiring higher levels of coverage in fisheries for which there is relatively higher bycatch variability and lower levels of coverage in fisheries with less variability. In contrast, the non-preferred alternative would require a specific *level* of observer coverage (e.g., 20 percent of all trips) in all fisheries. The non-preferred approach would not account for the inherent differences among fisheries and would likely result in over-sampling some fisheries while under-sampling others. By establishing a global CV-standard, the proposed methodology accepts that there is a certain objective minimum level of precision that is desirable across all fisheries, but that the actual level of observer coverage necessary to achieve that standard will vary according to the unique parameters of each fishery. In addition, this amendment would enable the Councils to modify certain aspects of the SBRM on a fishery-by-fishery basis though the use of framework adjustments to the FMPs. In this way, should a Council determine that a higher level of precision is needed in certain circumstances (for example, for adequate real-time monitoring of a quota in some fisheries), the performance standard could be changed to accommodate these situations with relative ease (see section 6.5).

Comment 37. The same commenter suggested that days-at-sea estimates to meet the target CV for all mode-species combinations would be likely to exceed current levels of observer coverage, and worried that the SBRM may oblige the agency to observer days-at-sea levels that cannot be met, perhaps resulting in litigation.

Response: Based on the results of the analysis supporting this amendment, it is expected that observer coverage levels will need to increase in some fisheries. It may be possible to decrease observer coverage in other fisheries, and this decrease may offset some of the increase needed, but not necessarily all. The Councils do not intend for the SBRM established by this amendment to be constrained to current or past levels of observer coverage, and acknowledge that observer coverage levels may need to increase overall to meet the SBRM performance standard. The SBRM Amendment merely establishes the methodology for assessing bycatch but does not establish funding or operational mandates for meeting SBRM objectives. Neither the Magnuson-Stevens Act nor the Court orders require that the SBRM resolve all potential funding and/or operational problems (e.g., an insufficient number of certified observers) that may arise in implementing the SBRM. If problems arise in implementing the SBRM due to funding or operational issues, the prioritization process described in section 6.6 would be utilized.

Comment 38. One commenter, in calling for the Secretary of Commerce to establish observer requirements through an emergency rule, stated that NMFS should establish observers on at least 20 percent of all days fished, except in cases wherein analysis of the best available science indicates otherwise.

> Response: The Court order in *Oceana* v. *Evans* II explicitly rejected the need for specific percentage levels of observer coverage (see response to comment 17). Nevertheless, this approach was considered in the SBRM Amendment, but is not preferred for the reasons explained in section 6.9.2. Also, the Councils disagree with the assertion that regulations establishing an SBRM should be implemented through an emergency rule. As noted above in response to other comments, there is no basis to assume the Secretary would or should disapprove this amendment, which fully complies with all SBRM-provisions of the Magnuson-Stevens Act and, therefore, there is no need or justification for emergency regulations.

Comments on the Importance Filters

Comment 39. In general, commenters supported the use of importance filters as a means of removing from consideration, for determining target observer sea day allocations, those mode-species combinations that are unlikely to occur or likely to be of minimal consequence, but urged caution in their refinement and use. One commenter characterized the use of importance filters for observer resource allocation as reasoned, practicable, and consistent with the law.

> Response: The Councils agree with the comment and continue to propose the use of importance filters as part of the process to determine observer coverage levels.

Comment 40. One commenter stated that the filtering mechanisms need to be clarified and expanded to ensure all of the criteria used as filters are fully identified.

> Response: The Councils agree and the final version of the SBRM Amendment clarifies and expands the discussion of the importance filters, including specifying the criteria to be used in implementing the filters (see sections 6.2 and 6.9.2).

Comment 41. Three commenters expressed concern that the importance filters rely on poor existing observer data as the foundation for calculation of the allocations. They suggested that a baseline level of observer coverage be established for a period of years to support future appropriate use of statistical filters.

> Response: The Councils disagree with the commenters' assertion that the importance filters rely on "poor" data as the foundation for calculating the observer coverage allocations. The commenters provide no evidence to support this claim. The measure of the CV, as described in chapter 5, is an unbiased indicator of the precision of the data. As noted above in response to comment 31, less than 25 percent of the non-gray cells for which there was observer coverage in 2004 had CVs in excess of 50 percent. The majority (58 percent) of cells had either no discards or CVs of 30 percent or less.

By definition, those cells that had either no discards or CVs less than 30 percent were of sufficient quality to meet the performance standard proposed to be implemented through this amendment. The remainder of cells (18 percent) had CVs between 30 percent and 50 percent. The Councils and NMFS agree, in principle, with the suggestion to establish a “baseline” level of observer coverage for a period of years in order to provide data for more comprehensive analysis. Section 5.3.3.2 of the amendment describes the concept of “pilot” coverage that would address this suggestion for cells for which there was no observer coverage available.

<u>Comment 42.</u> Commenters generally supported the first tier gray-box filter, but several insisted that each decision to gray out a mode-species combination be explained in the amendment document. Also, the same commenters said that the gray-box filter should not be applied to any mode-species combination, wherein the species is a “protected species,” or a species considered “at risk.” They suggested that only after a robust observer program is in place can it be determined that an interaction between a mode and protected species is unlikely to occur.

Response: The Councils support the use of the gray-cell filter approach as a reasonable way to focus on particular combinations of fishing modes and species that occur in nature with sufficient frequency as to warrant inclusion in the SBRM. The need for this filter is particularly evident due to the approach, taken for ease and consistency of presenting the data, to use a matrix (species across the top; fishing modes along the side) as the basic model for the SBRM. This approach results in all species appearing as cells for all fishing modes, even if the species is never encountered in the fishing mode. The gray-cell filter is a recognition that many species are either never encountered by a fishing mode, or are encountered so rarely as to be *de minimus*. The process used to determine which cells should be included is explained in section 5.3.3.1. This section addresses both fish species and protected species.

The Councils reject the commenters’ characterization that the current NEFOP is not “robust.” The NEFOP is a well-established at-sea fishery observer program that has been in place for over 15 years. While the level of observer coverage has varied during this time in response to changing Federal budgets, and the program’s objectives have evolved, the program itself has grown and developed in response to the needs of management and the scientists. The NEFOP observer program manual, biological sampling manual, training manuals, data handling procedures, and formal training facility and training program serve as a model for other observer programs around the country and around the world.

<u>Comment 43.</u> Several commenters claimed that the third level filter could be used to mask the real effects of bycatch in high volume fishery modes; i.e., when the discard rate for a species is small relative to a high volume fishery, but still of significant environmental consequence. The commenters asked for the third level filter to be removed from the amendment.

Response: Upon further consideration, the Councils have revised the third level filter to eliminate the potential that it could inadvertently mask the real effects of bycatch in high volume fishing modes. Section 6.2.3.2 of the amendment explains what changes were made to the filter and how these changes address this concern.

Comment 44. The same commenters expressed concern that the third and fourth level filters rely on threshold values (ratios) which are not specifically identified and analyzed in the amendment document. They stated that the SBRM Amendment must develop and address the specific fixed threshold alternatives through an EIS process before the public can properly assess the usefulness of the SBRM.

Response: The draft amendment included a range of potential threshold values from 0.5 percent to 3 percent, and the analysis in the document demonstrated the effects of these potential thresholds on observer coverage levels across the fishing modes. However, based on comments, the Councils have revised the importance filters to address concerns such as this comment. Section 6.2.3.2 explains the revisions made to the importance filters, and how the proposed threshold values were determined. Regarding the need for an EIS, see responses to earlier comments on this issue. The Councils are not preparing an EIS, but the revised EA that incorporates the changes made to the importance filters will be made available to the public for review prior to implementation.

Comment 45. A commenter suggested that the Councils consider adding an importance filter for any mode of fishing whose overall contribution to total landings falls below some threshold and, accordingly, for which the contribution to total discards can be considered *de minimus*. The commenter also suggested that the SBRM Amendment provide a means for the reduction of target observer sea days when gear improvements have reduced or eliminated the potential for bycatch.

Response: Regarding the first part of the comment, this is, in effect, the intent of the fourth level filter, which functions by comparing the total estimated discards of a species within a fishing mode with the total fishing mortality (commercial and recreational landings, plus discards) of that species among all fishing modes. In this way, species for which the total discards in a fishing mode is a *de minimus* amount of the total mortality of that species would not be used to determine the appropriate level of observer coverage needed in that fishing mode.

Regarding the second part of the comment, there are three ways in which changes in bycatch rates due to gear improvements could be accounted for under the proposed SBRM. First, the CV-based performance standard implicitly accounts for the variability associated with each fishery, by requiring higher coverage levels in fisheries for which there is relatively higher bycatch variability and lower coverage levels in fisheries with less variability. Thus, as conditions in a fishery change, whether as a result of gear improvements or not, and the variability of bycatch is reduced, the level of observer coverage necessary to achieve the performance standard would automatically decrease. However, the magnitude and the variability of bycatch are not necessarily directly related, as the magnitude relates to the overall amount of bycatch occurring in a fishery, and the variability tracks the relative amounts of bycatch on trips within a fishery. It is possible that as the overall magnitude of bycatch decreases as a result of a gear modification or other change in the fishery, the variability among trips could actually increase. This could be particularly true as the magnitude approaches zero, where even relatively small amounts of bycatch could appear as substantially different than zero. This concern could be addressed by the fourth-level filter, which is intended to control for *de minimus* amounts of bycatch, as explained above.

The third way in which the proposed SBRM could address this issue is in the gray-cell filter process. As explained in section 5.3.3, this filter accounts for infrequent or infeasible interactions (combinations of species and gear types), by filtering these cells. The initial allocation to the gray-cell filter was based on a technical review of 16 years worth of NEFOP data, but the intention is that the gray-cell filter would be updated as new information becomes available that may change the initial distribution. A rationale for expanding the gray-cell filter would include such things as changes in regulations that effectively reduce potential bycatch interactions to the level of being highly infrequent or infeasible.

Comments on the Analysis of Accuracy and Precision

Comment 46. One commenter stated that the amendment document sufficiently addresses the issue of accuracy, and its inclusion of the Rago et al. analysis of observer program accuracy rectifies previous Court-identified deficiencies.

Response: The Councils agree with the comment.

Comment 47. Another commenter stated that the treatment of accuracy in the document is limited to a dismissal of current science and suggested that the amendment document consider methods to retrospectively assess the accuracy of bycatch in periodic bycatch reports.

Response: The Councils disagree with the commenter's assertion that the treatment of accuracy in the document is limited to a dismissal of current science. A discussion of accuracy as it relates to precision is provided in section 5.2, and a summary of the analyses of accuracy conducted in support of the amendment is provided in section 5.6.2 and in Appendix A. The Court order in *Oceana* v. *Evans* I stipulated that the agency consider the information presented in Babcock et al. (2003), and this paper is discussed in Appendix A and in section 6.9.2. The commenter also suggests consideration of methods to periodically retrospectively assess the accuracy (bias) associated with the bycatch data collection program. This is an appropriate element of the proposed periodic SBRM Report, and the proposed contents of this report have been updated to include updating the accuracy analyses conducted in support of this amendment to evaluate the sources and magnitude of bias in the observer program data (see section 6.4.2).

Comment 48. A commenter, arguing for FMP-specific bycatch monitoring programs developed under a more general omnibus SBRM structure, suggested the amendment mandate that sampling designs minimize bias to the greatest extent practicable.

Response: The Councils agree that the development and implementation of sampling designs to minimize bias to the extent practicable is a valid objective for the SBRM, and the document has been clarified to identify this as an objective of the SBRM implemented under this amendment (see section 1.4).

Comment 49. The same commenter warned that the SBRM should not result in an undue fiscal burden on the public or the industry, and that precision and accuracy are matters of policy that should be left for the Councils to determine on an FMP basis. The commenter stated that the document should consider not only a scientific perspective on precision and accuracy, but should also include a discussion of the benefits and costs associated with varying levels of precision and accuracy.

Response: The Councils disagree with the commenter's assertion that precision and accuracy are matters of policy to be determined on an FMP-by-FMP basis. As discussed in the responses to comment 20 and comment 36, the proposed methodology is based on the premise that there is a certain objective minimum level of precision that is desirable across all fisheries, but that the actual level of observer coverage necessary to achieve that standard will vary according to the unique parameters of each fishery. As noted in chapter 5, accuracy is a measure of the bias associated with the sampling design. Improving the sampling design to minimize bias is not a policy issue but is a matter of science and is critical to the development of a reliable statistically-based biological sampling program. Likewise, while there are real costs associated with increased levels of precision, the precision associated with bycatch data has implications for the science conducted in support of fishery management decisions. The lower the precision of the data used, the less reliable are the results of stock assessments and the greater the risk to the resource (and the fishing industry) that results from management decisions. While uncertainty and risk are unavoidable in fisheries science and management, it is the position of the Councils that these can be minimized and balanced by improving the precision and accuracy of the data used in the process.

The costs and benefits associated with varying levels of precision are an important consideration, and can best be illustrated through an examination of the relationship of expected CVs over a range of observer coverage levels. Figure E-1 is excerpted from the Rago et al. (2004) paper as an example of this analysis. It demonstrates that at low levels of coverage, there is most often a substantial benefit (as indicated by decreasing CVs) from a small increase in observer coverage. However, as observer coverage levels increase, the returns (improvements in precision) diminish rapidly. Thus, in Figure E-1, there is an initial rapid improvement in precision up to approximately 100 observed trips, then the improvements taper off to the point that quadrupling the observer coverage up to 400 trips only improves the precision by 10 percent. Understanding this relationship and the diminishing returns that are expected as coverage levels increase are important considerations in evaluating the costs and benefits associated with varying levels of precision. There is not similar relationship in regards to varying levels of accuracy, as the accuracy of the data is a direct result of the amount of bias in the sampling program (see sections 5.2 and 5.6 for a complete discussion of accuracy, bias, and precision).

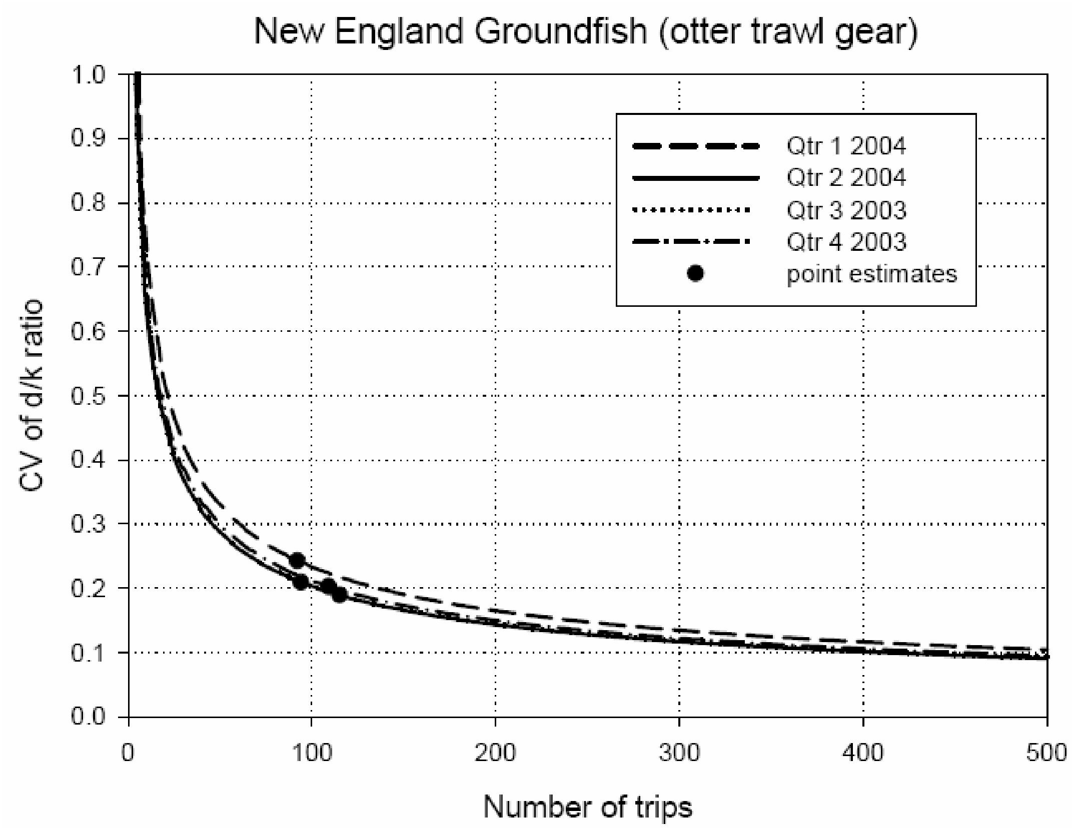

Figure E-1. The 2003/2004 point estimates of the coefficient of variation (CV) of the discard to kept (d/k) ratio for New England groundfish caught with otter trawl gear, and the expected coefficient of variation of the discard to kept ratio over a range of sample sizes (number of trips) (from Rago et al. 2004).

The commenter appears to suggest that observer coverage levels should be derived from target precision levels that are set by the Councils as an outcome of policy choices regarding the costs associated. The Councils disagree with this approach, but consider the SBRM to be a process that determines the observer coverage levels necessary to achieve the minimum precision level performance standard in order to provide the most robust discard data possible, without regard to the annual budgets available to fund such levels of observer coverage. The SBRM Amendment merely establishes the methodology for assessing bycatch but does not establish funding or operational mandates for meeting SBRM objectives (see response to comment 37). Once the available budgets are known, additional consideration of management priorities may be necessary by the Councils if the budget is insufficient to provide the full level of coverage desired.

Comment 50. A commenter stated that NMFS's bycatch mortality estimates are perceived by industry as inequitable from mode to mode and the document should better explain how discard mortality estimates are determined.

Response: The SBRM Amendment does not address discard mortality estimates. These estimates are derived on a stock-by-stock basis and utilized in stock assessments to determine total fishing-related mortality. The discard mortality estimates used in stock assessments are often based on a variety of sources, and are subject to the stock assessment peer-review process prior to being accepted as the basis for making determinations about fishing-related mortality. These estimates change over time as new information is utilized in the stock assessment process and as new assessment models are developed and refined. It would not be appropriate or practicable for the SBRM Amendment to address the issue of discard mortality estimates.

Comment 51. One commenter, providing a technical review on behalf of several fishing industry organizations, suggested that a typical assumption in the calculation of CVs based on observer coverage is that every tow is independent, but the truth is that sequential tows are clearly correlated and should not treated as statistically independent.

Response: While it is correct that sequential tows could be correlated and should not be treated as statistically independent, the proposed methodology is structured in recognition that the information content of tows is reduced by the inter-correlation; therefore, the tow was not used as the sampling unit. Instead, the SBRM analysis uses the fishing trip as the sampling unit. For a more detailed explanation, see chapter 5 and Appendix A.

Comment 52. This same commenter indicated that the "observer effect," the degree to which vessel operators behave differently when an observer is aboard, needs to be accounted for in the calculation of the CV.

Response: An analysis of the "observer effect" was conducted to explicitly evaluate the effect of bias, including the spatial patterns of fishing locations, the average trip length, and the average landings (kept pounds) of observed and unobserved fishing trips. These analyses indicated that the effect of observer bias is expected to be small and, therefore, the "observer effect" is not expected to contribute to the variance in the observer data. For a more detailed explanation, see chapter 5 and Appendix A.

Comment 53. This commenter also suggested that the CV calculation should account for observer downtime, those periods of fishing operations when the embarked observer is off duty.

Response: The bycatch ratio is based on the sum of the discarded pounds divided by the sum of the kept pounds of observed hauls and is, therefore, not influenced by the unobserved hauls. The bycatch ratio based on discarded pounds divided by days absent accounts for all hauls (observed and unobserved) by expanding the discarded pounds by the ratio of the number of total hauls to the number of observed hauls. For more information on this issue, see chapter 5.

Comment 54. This same commenter suggested that the method of calculating the CV is, to some extent, fishery/stratum dependent. For example, different methods should be applied to day boat fisheries versus longer trip oriented fisheries.

Response: A finer-scale stratification could improve the estimation; however, trade-offs have been made throughout the stratification scheme to accommodate the diversity of fleets and species groups. The heterogeneity in the relationship between the discard pounds to kept pounds may be evidence of this. Post-stratification is possible and a finer-scale division between day trips and multi-day trips is, in fact, made for observer deployment within otter trawl fleets.

Comments on Electronic Monitoring

Comment 55. A commenter who works in the field of video monitoring agreed with the amendment document's rather high estimates of the costs associated with fishery video monitoring program. He attributed the high costs to the market dominance of a single contractor and he suggested that costs would likely come down should video monitoring requirements become more widespread and more contractors enter the field.

Response: The Councils agree with the commenter that the costs associated with electronic video monitoring would be expected to decrease as more contractors enter the marketplace. The costs provided in the document are based on the most widely available cost data. While this cost information may not be reflective of the costs that would be expected in a market environment in which there are many participants competing for customers, it is considered a valid indicator of the likely initial costs to the industry in the Northeast under current market conditions.

Comment 56. Another commenter agreed with the document's discussion of analytical difficulties that would be involved in video monitoring, and expressed support for the finding that use of such systems be deferred, pending further development.

Response: The Councils agree with the comment.

Comments on the SBRM Reporting Process

Comment 57. Two commenters stated that the maximum report period should be annual, and the report should present the bycatch data by fishery, gear type, sector, area fished, species, and any other variable, as determined by the Councils.

Response: The Councils agree with the commenter that the frequency, format, and content of the SBRM Review Reports should be determined by the Councils for their

FMPs. Both Councils considered requiring SBRM Review Reports on an annual basis, every 3 years, every 5 years, or in conjunction with other required reports (such as SAFE reports or monitoring committee reports), but ultimately directed the SBRM Review Reports to be provided every 3 years (see section 6.4.2).

Comment 58. One commenter argued that various reporting content, format, and frequency alternatives should be described and analyzed in an EIS. Also, the commenter expressed disappointment at the examples provided in the appendices, suggesting that the Councils require "estimates of overall bycatch and bycatch mortality by species/stock within a fishery and/or fishery mode or gear sector in a particular area."

Response: Although the Councils are not preparing an EIS for this action, the SBRM Amendment complies with the commenter's request that options for the content, format, and frequency of the SBRM Review Reports be described and analyzed in the document. The example SBRM Review Report provided in Appendix F is an *example* of the type of information that would be available to the Councils in an SBRM Review Report for a specific FMP. It is not intended to represent the only possible format or content for the SBRM Review Report. As explained in section 6.4.2, the Councils are free to determine the type of information, format, and content they require. However, the example report does provide much of the information suggested by the commenter, such as the observed monkfish discards in each fishing mode, the ratio of monkfish discards to total discards of all species, estimates of total monkfish discards in each fishing mode, the percent of total monkfish discards associated with each fishing mode, and the CVs of the estimates of total discards in each fishing mode.

Comment 59. This commenter also expressed concern that the amendment did not require reporting on the SBRM, but provided only for the Councils to request a query of the appropriate databases.

Response: The Councils disagree with the commenter's assertion that the SBRM Amendment does not require reporting on the SBRM. The Councils developed and considered several alternatives regarding a formal SBRM Review Report, all of the which but the no action alternative would require a periodic SBRM Review Report to be prepared by NMFS. The document does, however, stipulate that regardless of the decisions of the Councils regarding the specific content, format, and frequency of the SBRM Review Report, they are always free to request any additional queries of NMFS' databases that they consider appropriate and necessary.

Miscellaneous

Comment 60. A commenter insisted the SBRM must address how data will be collected on sea turtle impacts in the scallop dredge fishery, noting that turtle-chains prevent sea turtles from being captured and hauled on deck in the dredge, and there is no mechanism for observing sea turtle interactions with the gear underwater.

Response: The Councils disagree with the comment. There is an important distinction between what is defined as a "take" under the Endangered Species Act (ESA) and what is defined as "bycatch" under the Magnuson-Stevens Act. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). This is a much broader definition than that of bycatch in the Magnuson-Stevens Act, which is defined as "fish which are *harvested* in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards [emphasis added]." The distinction hinges upon the term "harvested," which, while it is not defined in the Magnuson-Stevens Act, is accepted to mean an animal that is brought on board the vessel or otherwise removed from the ocean in the act of fishing. The activity described by the commenter regarding potential interactions between sea turtles and scallop dredge gear underwater that does *not* result in the turtles being captured and hauled on deck in the dredge could be considered a take under the ESA, but does not qualify as bycatch under the Magnuson-Stevens Act. Because the SBRM required to be established under the Magnuson-Stevens Act only pertains to the monitoring of *bycatch*, non-bycatch takes of sea turtles are outside the scope and purview of the SBRM. However, NMFS is obligated to monitor and address takes if required by the ESA or any applicable biological opinions associated with the FMPs amended by this omnibus amendment. Thus, while NMFS takes seriously the need to monitor interactions of fishing activity with sea turtles, such interactions that do not result in bycatch, as defined by the Magnuson-Stevens Act, are not explicitly addressed by the SBRM proposed in this amendment.

Comment 61. A commenter, arguing for greater FMP orientation of the SBRM, suggested that the amendment authorize and encourage a variety of cooperative research aimed at reducing bycatch and improving bycatch data quality.

Response: Including provisions to authorize and encourage cooperative research is outside the scope and purpose of the SBRM and this amendment. Nevertheless, the Councils support a wide variety of cooperative research programs, including many projects aimed at reducing bycatch. Bycatch reduction is frequently a priority research area of the Northeast Consortium, Cooperative Research Partners Program, and the various research set-aside programs. The Councils intend to continue to provide support for such projects, as resources allow.

Comment 62. A commenter stated that NMFS needs, as practical matter, to ensure the observer program is affordable and effective and enjoys stable funding and workforce.

Response: The NEFOP strives to maintain an effective and cost-efficient at-sea fishery observer program, including a stable, well-trained workforce. Funding levels vary and are dependent upon the annual Federal budget developed by the U.S. Congress and signed by the President.

Comment 63. A commenter suggested that NMFS should make use of industry and government resource surveys to estimate bycatch. The commenter noted that prior to opening an area to scallop fishing, the area is surveyed by observed commercial vessels and that the pre-opening surveys may support sufficient discard estimates and provide for reduced observer coverage in the fishery.

Response: All available information is considered and used, as appropriate, in stock assessments and management decisions. While the focus of this amendment is development of a standardized methodology for obtaining and utilizing discard data in a programmatic way across all Northeast Region fisheries, nothing in this amendment would preclude the use of additional data as they become available.

Comment 64. The same commenter expressed concern that the SBRM's reliance on gear and area fished to identify modes may result in an unmanageable number of separate modes for scallop vessels under the SBRM.

Response: A detailed explanation of the purpose and procedures for stratifying the fisheries according to gear type, port, and fishery program is provided in section 5.3. While the number of strata may change as conditions in the management system change, the stratification is an important component of the SBRM used to differentiate fishing modes so that the variability inherent in most fisheries can be minimized to the extent practicable, thus reducing potential sources of bias and improving the precision of the resulting data collected in the fishing mode.

Comment 65. A commenter stated that the amendment document does too little to standardize how observers conduct themselves and their data collection aboard fishing vessels.

Response: While this comment addresses two very important aspects of any successful at-sea fishery observer program, these issues are well addressed by the NEFOP in the Observer Program Manual (NMFS 2006a), the Biological Sampling Manual (NMFS 2006b), and the Observer Training Program, and are beyond the scope and purpose of this amendment.

Comment 66. Another commenter wondered if NMFS had the resources to support the analysis obligations made by the SBRM Amendment.

Response: The Councils expect that NMFS will complete all analyses required under the SBRM proposed in this amendment, to the extent that resources will allow.

Comment 67. One commenter suggested that law enforcement be increased "to 10 percent, not less than 1 percent."

Response: Enforcement of fishing regulations is not within the scope or purview of this amendment. The Councils expect that the commenter may have misunderstood the discussion of at-sea observer coverage levels to relate to fisheries enforcement. At-sea fisheries enforcement is conducted by the U.S. Coast Guard, as one of several important missions. The ability of the Coast Guard to provide an on-the-water presence and to engage in fisheries enforcement is dependent upon annual budgets and competing priorities such as drug interdiction, search and rescue, and homeland security.

Public Hearing Summary

Gloucester, MA
November 14, 2006

Chair: Dana Rice
Council Staff: Chris Kellogg
NMFS Staff: Michael Pentony
Council Members: Phil Ruhle
Attendance: 32 (8 signed in)

Introduction:

Mr. Rice welcomed those in attendance and introduced the purpose and structure of the SBRM Amendment public hearing. Mr. Pentony provided a short presentation on the purpose of the hearing, a summary of the SBRM Amendment and the Councils' preferred alternatives, and a review of the process to comment on the draft amendment, which are accepted at the hearing, or at the second of two public hearings on December 13, 2006, in New York, NY. Mr. Pentony announced that written comments would be accepted through December 29, 2006, via mail, fax, or email.

Five individuals provided comments on the draft amendment. The following represents a summary of the testimony of each commenter and is not intended to be a complete transcript.

Comments:

1. Gib Brogan, Oceana: Mr. Brogan relayed Oceana's concerns regarding the draft SBRM Amendment. Mr. Brogan asserted that the SBRM Amendment, as proposed, does not satisfy the Court's remand order regarding Amendment 13 to the Northeast Multispecies Fishery Management Plan (FMP). During his testimony, Mr. Brogan identified the following concerns with the document:

- The proposed SBRM continues to leave the level of observer coverage at the discretion of the Regional Administrator (RA). The SBRM Amendment should require a minimum level of observer coverage for each fishery and, therefore, does not meet the court order.
- The Purpose and Need in the first section of the document is not sufficiently clear. It should better state what is in the document and what it sets out to do; that is, how it will move the SBRM issue forward.
- An omnibus FMP amendment effects changes to all the region's FMPs. The document does not, but should, discuss how the amendment will affect each individual FMP.

- The possibility of future management implications is not spelled out in the document.
- The document should also clarify the annual process to update the observer allocations.
- An SBRM needs to establish an allocation of observer days and this document does not do that.
- The range of alternatives considered in the document is inadequate to comply with the National Environmental Policy Act (NEPA), and more viable alternatives should be considered. The performance standard of a CV equal to or less than 30% is accepted in the document as a gold standard without consideration of other CV levels.
- The document should specify what is to be included in the SBRM Report. The alternatives for requiring reports on the SBRM should be expanded.
- The idea of *accuracy* is not explored in the amendment document.
- The SBRM Amendment is very complex and technical and relies on NMFS science. The amendment should be peer reviewed to ensure the science and reasoning are robust.
- The concept of *importance filters* is too vague in the document. Sample threshold levels (used in several of the filters) and the effects of their range (0.5% - 3.0%) on the outcomes of data quality are not discussed. It appears that the threshold level can be manipulated. Threshold values should be fixed and established in the SBRM Amendment document. The importance filters should not be a mechanism merely for justifying status quo observer levels.
- Oceana has issues with specific fisheries. For sea scallop trawls, NMFS and the Councils should consider the use of underwater video monitoring to capture interactions of the fishing gear with marine life. There is no discussion of underwater video monitoring in the amendment document.
- Appendix E is an example of what a required SBRM Report might look like. The information provided in Appendix E is insufficient and does not satisfy the requests of the NEFMC regarding SBRM reporting. The example does not include any time/area data or analyses of bycatch patterns. Mr. Brogan expressed concern that if such information is not specified as required, it will not be collected.
- The SBRM Amendment has come a long way since the review of the Rago et al (2005) paper in September 2005, but more needs to be done to move the region's bycatch monitoring into modern management. Oceana will submit written comments.

2. David Frulla, Fisheries Survival Fund: Commenting on behalf of the Fisheries Survival Fund, Mr. Frulla expressed concern that some of the approaches proposed in the SBRM Amendment are too open to litigation. Mr. Frulla stated that the Fisheries Survival Fund will be submitting written comments and, perhaps, technical papers on specific issues. During his testimony, Mr. Frulla identified the following issues:

- Levels of precision and accuracy are matters of policy that should be left to the Councils. Whatever monitoring methods are decided upon, they should not unduly burden the public or bankrupt the industry.
- The document should explain the costs and benefits of achieving varying levels precision and accuracy.
- Mr. Frulla expressed support for the concept of importance filters and notes that under the example threshold levels the required number of observer days still more than doubles the highest levels ever achieved.
- Mr. Frulla concurs with the document's finding that video monitoring of discards is still a ways off. The method is not robust, as the boat deck is not a production line that is easily videotaped. Also, vis a vis underwater video monitoring, sea turtles that are deflected by a scallop dredge's turtle chains are not *bycatch*. A white paper by the Fisheries Survival Fund will address this issue.
- Mr. Frulla expressed support for the "gray cell" importance filter that removes from consideration (for observer day allocation) improbable bycatch gear/species combinations. Bycatch problems that have been addressed, such as sea turtles scallop dredges, might also be considered as gray cells in the importance filters.
- Add consideration of reducing needed observer coverage levels for fisheries that have implemented successful bycatch reduction devices.
- The detailed discussion of accuracy in the SBRM Amendment document and Rago et al (2005) should satisfy the Court's remand order. NMFS has done a good job addressing accuracy and bias in a principled way.
- The SBRM Amendment would set a performance standard of a CV less than or equal to 30% for each mode/species combination. Case law has provided more room for flexibility in this matter. The level of detail – down to mode/species combinations – is one reason the tally of observer days is so high. Mr. Frulla expressed concern that this approach may lead to a court order that requires observer coverage to meet a CV target of 30% for each mode/species combination.
- There's more flexibility in the court orders than Oceana suggests. Methodology has not been specified by the courts. The Pacific groundfish SBRM has been held up by the court as an acceptable example, but even it does not go into the level of detail of the Northeast SBRM Amendment.

3. Cindy Smith, Maine Department of Marine Resources (DMR): Speaking on behalf of the Maine DMR, Ms. Smith identified an issue related to the estimated discard mortalities. NMFS's mortality estimates by mode, derived from observed discards, are perceived by constituents in Maine as inequitable from mode to mode. The SBRM Oversight Committee should explain the discard estimates in the document. She explained that Maine DMR will be submitting written comments.

4. Jeff Kaelin, Ocean Spray Partnership/Ocean Frost Seafood: During his testimony, Mr. Kaelin identified the following issues:

- Mr. Kaelin supports the Council's decision not to adopt an electronic monitoring alternative. Electronic monitoring methods are not yet practical.

- Mr. Kaelin expressed concern regarding the Council's decision not to set minimum percentages of observer coverage.
- Mr. Kaelin also expressed concern regarding how a CV standard may leave NMFS open to litigation and that setting such a standard would handcuff the SBRM to artificial and unrealistic expectations. NMFS should not be in the position of getting sued due to lack of resources to meet CV and observer coverage targets. Can other parties at the table pitch in funds to support additional observer coverage?
- The use of importance filters in the determination of observer day determinations makes good sense. Mr. Kaelin expressed concern about the extrapolation of observed discards to derive total discard estimates. He will be submitting written comments.

5. Ron Smolowitz, Fisheries Survival Fund: During his testimony, Mr. Smolowitz identified the following issues:

- One component of monitoring that could be expanded is the use of industry and NMFS surveys to estimate bycatch. Prior to opening an area to fishing, the area gets surveyed by commercial vessels. The pre-opening surveys and the bycatch rates from VMS reporting could be expanded. Mr. Smolowitz believes that pre-opening surveys in which bycatch rates are determined may support discard estimates, even with a lower level of observer coverage in the fishery.
- The SBRM Amendment document should include a retrospective analysis of the Georges Bank sea scallop opening to determine whether the target CV was met using the pre- and post-opening surveys.
- Sea turtle interactions with scallop dredges are not bycatch. Turtle chains prevent the turtles from being caught. The interactions are "takes" (under the Endangered Species Act) and should be addressed elsewhere. This distinction should be clarified in the document.
- In areas without a TAC-driven closure, the Council and NMFS should consider requiring an exploratory level of observer coverage and develop methodology for such pilot coverage.
- The reliance in the SBRM Amendment on fishing gear/area modes is a concern for the scallop industry. Each new access area in the fishery is likely to result in a separate mode under the SBRM. This concern may be alleviated if pre-opening surveys are used to reduce the observer burden on the industry.

Conclusion:

No one else requested to speak, and the hearing was adjourned at 6:30 p.m.

Public Hearing Summary

New York, NY
December 13, 2006

Chair:	Laurie Nolan
Council Staff:	Jim Armstrong
NMFS Staff:	Michael Pentony
Council Members:	Pat Augustine, Paul Scarlett, Ed Goldman, Fran Puskas, Gene Kray, and Jeff Deem
Attendance:	16 (10 signed in)

Introduction:

Ms. Nolan welcomed those in attendance and introduced the purpose and structure of the SBRM Amendment public hearing. Mr. Pentony provided a short presentation on the purpose of the hearing, a summary of the SBRM Amendment and the Councils' preferred alternatives, and a review of the process to comment on the draft amendment. Mr. Pentony announced that written comments would be accepted through December 29, 2006, via mail, fax, or email.

After a short question-and-answer period to clarify several specific points about the amendment, four members of the public provided comments on the draft amendment. The following represents a summary of the testimony of each commenter and is not intended to be a complete transcript.

Comments:

1. Shaun Gehan, Fisheries Survival Fund: Speaking on behalf of the Fisheries Survival Fund, Mr. Gehan reiterated many of the comments made at the first hearing. In particular, Mr. Gehan identified the following issues:

   - The draft SBRM Amendment does a good job of addressing the issue of accuracy that was identified by the Court as an area of concern.
   - Overall, the importance filters are a good thing. In particular, they help focus limited resources where they would be the most meaningful.
   - Some concern that the plan far exceeds the National guidance for bycatch monitoring, which suggests achieving a CV of 20-30 percent across fisheries, not at the species-by-species level as the SBRM Amendment proposes.
   - Concerned over the potential for litigation if the amendment creates high expectations which are then not met. In order to remedy this, Mr. Gehan suggested expanding the importance filters and focusing them to further refine the resulting observer coverage levels.

- Concerned that the document does not go far enough in *requiring* an observer program; the Court said this was not optional. At a minimum, the document should stipulate that the use of observers is mandatory.

2. Greg DiDomenico, Garden State Seafood Association: Mr. DiDomenico expressed mixed emotions regarding this type of action, but stressed he hopes NMFS can get good information on bycatch occurring in the fisheries. He expressed concern that if the Agency cannot meet the requirements for fisheries observer coverage, then the amendment could serve as a tool for litigation. His primary concerns are that, if litigation occurs, either a fishery would be shut down due to incomplete observer coverage or the industry would be forced to pay for the observers.

3. Sima Freierman, Montauk Inlet Seafood: Ms. Freierman expressed concern that the SBRM Amendment does not address problems with the fisheries observer program, such as faulty data, anomalous tows, and putting observers on smaller vessels. She reported being particularly concerned about standardizing observer practices. Ms. Freierman would like the amendment to shift away from focusing on how the data are collected and to look at what goes on on the fishing vessels.

4. Peter Moore, American Pelagics Association: Mr. Moore indicated he would be submitting written comments, but expressed particular concern over the potential for unintended consequences of the amendment if the Agency cannot achieve the observer coverage levels stipulated in the amendment. He is concerned that fisheries may be shut down if there is insufficient funding to meet the expectations.

Conclusion:

There was some discussion among the attending Council members and staff, but no other members of the public requested to speak, and the hearing was adjourned at 8:15 p.m.

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Subject: PUBLIC COMMENT ON FEDERAL REGISTER OF 11/16/06 VOL 71 PG 66748
Date: Thu, 16 Nov 2006 07:33:23 -0800 (PST)
From: jean public <jeanpublic@yahoo.com>
To: SBRMcomment@noaa.gov, COMMENTS@WHITEHOUSE.GOV,
VICEPRESIDENT@WHITEHOUSE.GOV

FED REG DOC E6 19398 ID 102006a
HEARING IN NYC - 50 CFR 648
MEETING ON DECEMBER 13 AT 7 PM

OF COURSE THERE SHOULD BE STANDARDIZED FORMS WHICH ARE USED ALL OVER THE U.S. BY THESE COUNCILS.

HOWEVER, THE FORMS USED ISNT THE ISSUE, THE LIES TOLD BY COMMERCIAL FISH PROFITEERS WHO OVERCATCH IS THE ISSUE. LAW ENFORCEMENT NEEDS TO BE STEPPED UP TO TEN PERCENT, NOT LESS THAN ONE PERCENT.

WE NEED TO JAIL THESE OVER QUOTA COMMERCIAL FISH PROFITEERS, FINE THEM WITH FINES STARTING AT ONE MILLION DOLLARS AND GOING UP AND SEIZE THEIR VESSELS.

IT IS CLEAR THERE IS FAR TOO MUCH OVERFISHING GOING ON AND SPECIES AFTER SPECIES AFTER SPECIES ARE VANISHING FROM THIS EARTH. OUR CHILDREN'S HERITAGE IS BEING LOST BY NOAA AND ITS FAILURE TO PROTECT ALL AMERICANS FROM RAPACIOUS SMALL PROFITEERING CLIQUES.

B SACHAU
15 ELM ST
FLORHAM PARK NJ 07932

OCEANA | Protecting The World's Oceans.

2501 M Street NW, Suite 300
Washington, DC 20037 USA
+1.202.833.3900
www.oceana.org

December 22, 2006

Patricia Kurkul
Northeast Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

Via email to: SBRMcomment@noaa.gov

Re: Comments of Oceana Concerning the Omnibus Standardized Bycatch Reporting Methodology Fishery Management Plan Amendment for the New England and Mid-Atlantic Regions

Dear Ms. Kurkul:

We would like to take this opportunity to comment on the development and approval of the Standardized Bycatch Reporting Methodology (SBRM). Catch data is the fundamental basis of any fishery management system. Without an adequate bycatch reporting system, the sustainable management of New England and Mid-Atlantic fisheries will be impossible. Developing a robust program to collect, analyze, and report bycatch data – that is available and useful for fisheries managers, stakeholders, and the public -- is a critical step in improving the sustainability of these fisheries and the efficacy of the many rebuilding programs that are under way in these regions.

Oceana would like to commend the staff of the Fisheries Service for their work in developing a draft SBRM document that provides meaningful guidance for the Council and the Agency. The draft SBRM makes important conclusions about the need for increased use of at-sea observers to collect information about bycatch, including the findings of the National Working Group on Bycatch. This information and analysis will undoubtedly improve the way the regions' fisheries are managed.

However, the SBRM draft is the product of a remand order, and it must satisfy the requirements of the law and of the Court's order. As it stands now, the draft document fails to meet those requirements. This SBRM amendment will be a precedent-setting management action that will influence how fisheries are monitored and managed across the country. Oceana understands that it may require additional time and effort to fully address the requirements of the Court's order and controlling statutes, but emphasizes again that the document must be legal and complete. We are happy to work with the agency as the process moves forward, but intend on using every option to ensure that this document fulfills its requirements.

In order to meet the legal requirements of the Magnuson-Stevens Act, National Environmental Policy Act ("NEPA") and the Court order, the SBRM must incorporate significant changes, including:

- **The SBRM must mandate how data is collected by mandating the level and allocation of observer coverage**
- **The SBRM must mandate how data is reported**
- **The agency must take a hard look at the environmental impacts of the SBRM in an Environmental Impact Statement ("EIS").**

Below is more detail on these required changes.

DETAILED COMMENTS

I. THE SBRM MUST MANDATE HOW DATA IS COLLECTED BY MANDATING THE LEVEL AND ALLOCATION OF OBSERVER COVERAGE

As you know, Oceana brought lawsuits against the Fisheries Service concerning both Groundfish Amendment 13 and Atlantic Sea Scallop Amendment 10, because neither amendment contained an adequate SBRM. In these cases, the Court ruled that the amendments violated the SBRM requirement of the Magnuson-Stevens Act.

Most importantly, the Court held that Amendment 13 failed to "establish" an SBRM, because, while it set forth an intention to achieve 5% observer coverage, it left the actual level of observer coverage completely in the discretion of the agency. *Oceana v. Evans,* No. 04-0811, 2005 WL 555146 at *42 (D.D.C. Mar. 9, 2005) (hereinafter "*Oceana I* "). The Court found Scallop Amendment 10 to be unlawful, because it too failed to "establish" an SBRM, instead leaving the actual allocation of observers up to the Regional Administrator. *Oceana v. Evans*, 384 F. Supp.2d 203, 232 (D.D.C. 2005) (hereinafter "*Oceana II").*

The draft SBRM appears to have exactly the same flaw as Groundfish Amendment 13 and Scallop Amendment 10; it appears to establish performance targets while leaving the actual level and allocation of observer coverage entirely up to the agency.

What is more, the SBRM draft does not establish an allocation of observer coverage and does not explain how one would be established. The analysis in the document appears to be based upon a certain level of days-at-sea, but it is not clear whether there is an automatic mechanism to update the allocation analysis every year, which would be needed as fishing effort changes as the result of changes in total allowable catch levels ("TACs") and other measures controlling fishing effort. The draft also makes clear, at p. 184, that the actual allocation of observers would be further reduced based on funding, but the SBRM neither gives a minimum number of observers nor any way to determine how observer allocation would be reduced.

The hard work of the SBRM team should not be in vain. The Council and the agency must take the final step required by the law and establish the SBRM with binding requirements for observer allocation in affected fisheries.

II. THE SBRM MUST MANDATE HOW DATA ARE REPORTED

As an omnibus amendment to individual fishery management plans, the SBRM amendment must develop a standardized bycatch reporting methodology that addresses the management and data needs of each fishery. The reporting methodology should be an integral part of each plan and effectively contribute to improving fishery management. The current document does not consider current or future management needs or discuss how the information provided by the SBRM could improve or change the management of a given fishery. The final document should include a discussion of the management scheme for each affected fishery and the possible bycatch data needs of the current and future management of these fisheries. The amendment should take affirmative steps to address these needs.

For example, the SBRM as drafted merely states that the Council can request information and it will be provided through a 'query' of the bycatch database and related analyses. This non-binding and vague promise does not establish a reporting methodology – it leaves reporting solely at the discretion of the agency. Instead, the SBRM should specify data to be collected, reporting formats, and reporting frequencies to address the needs of specific fisheries.

III. THE SBRM MUST CONSIDER BYCATCH OF SPECIES THAT ARE NOT TARGETED UNDER FISHERY MANAGEMENT PLANS

The Magnuson-Stevens Act definition of bycatch and fish encompasses a much broader range of bycatch species than the SBRM document considers in its analyses. Species that are not targeted under fisheries managed by the New England or Mid-Atlantic Councils, such as those managed by the Atlantic States Marine Fisheries Commission (i.e. striped bass, shad, etc) or the National Marine Fisheries Service directly (Highly Migratory Species), must be considered in the Standardized Bycatch Reporting Methodology. Without a method to assess and report bycatch of *all* species, the SBRM is incomplete. Additionally, the SBRM must consider the management needs of the Councils in its analysis and include a discussion of bycatch of corals and sponges as possible indicators of impacts on marine habitat, especially essential fish habitat ("EFH").

IV. THE SBRM DRAFT DOES NOT SATISFY NEPA

A. An Environmental Assessment ("EA") Is Insufficient for This Action

The information and analysis in the SBRM document will have a significant impact on thirteen fisheries from the Canadian border to North Carolina. The information, analysis, and technical guidance contained in a complete SBRM will affect how these fisheries are managed, their stock assessments, and ultimately the management approaches used to reach management goals. Therefore, the Omnibus SBRM amendment is a major federal action significantly affecting the quality of the human environment. Accordingly, the agency must take a hard look at the environmental impacts of the preferred alternative as well as other alternatives, in a full Environmental Impact Statement.

With a wide range of stakeholders that could be affected by the findings of this process, the agency must engage in a complete scoping process to educate and engage the public about the issue and seek concerns and ideas to be investigated and developed as part of the document. Instead of an open public process, the agency chose to develop this document using the internal Fishery Management Action Team ("FMAT") process which removed interested parties from the development process with the exception of periodic updates to the Councils.

B. The SBRM Document Must Discuss the Purpose, Need, and Scope of the Amendment

In it current form, the SBRM document is vague and fails to clearly state the goals or issues to be addressed. The SBRM EIS must be presented in a format that is accessible to the public, affected stakeholders, and decision makers. The SBRM development process suffered because of a lack of public participation and the failure to engage the New England and Mid-Atlantic Councils apart from cursory presentations at council meetings. Putting the analysis in a more accessible format will yield a more complete and functional document.

C. The EIS Must Consider a Range of Feasible Alternatives

Instead of examining real alternatives for each decision point, the EA only presents the options of status quo, preferred alternative and impossible straw man. This is blatantly in violation of NEPA and quite similar to the EAs that were thrown out in the original EFH case. *See AOC v. Daley*, 183 F. Supp.2d 1, 19 (D.D.C. 2000) (EAs overturned where most considered only status quo and preferred alternative).

For the important choices the EIS must consider *real* alternatives. For example:

1. Performance standard

The document fails to define to which units of measurement the performance standard will be applied. For example, would the bycatch estimate that would have a 30% CV be an overall bycatch estimate for all species aggregated; an estimate for all species aggregated, but broken out by time and area; an estimate by "fishing mode;" an estimate for each individual species; or an estimates for various species groups?

For the SBRM to be effective, it needs to include a performance standard. This standard needs to be a requirement, not a target. Oceana believes that the SBRM can and should mandate compliance with relevant performance standards to ensure high quality bycatch data is used in fisheries management.

2. Reporting

The EIS should consider different reporting formats and frequencies and the option of a mandatory periodic report on bycatch in respective fisheries. The draft EA considers different frequencies of the SBRM review process, but does not discuss what should be in the report, or whether different reports should be required under the SBRM.

3. Accuracy

Precision and accuracy are equally important metrics by which the quality of data can be assessed. The treatment of accuracy in the SBRM is limited to a dismissal of current science (Babcock, et al). Although accuracy may be considerably more difficult to proactively plan for in sampling design, the EIS should consider alternative methods to retrospectively assess the accuracy of bycatch data in periodic bycatch reports.

D. The EIS Must Consider Cumulative Environmental Impacts

The EA erroneously ignores the indirect and cumulative effects of the SBRM on the environment. As a broad reaching amendment to 13 management plans, the SBRM will indirectly affect the level of fishing and the level of mortality of targeted, bycatch, and protected species in the many fisheries and will directly affect the quality of the data used to complete stock assessments and set mortality limits. Particularly salient is that the less frequent the reporting and the less precise the methodology, the greater the risk to the environment. The EIS must fully discuss these issues and the importance of a robust SBRM or risk marginalizing the document and its important work.

E. The EIS Must Address Protected Resources

Bycatch of protected species is a recently documented problem in some of the fisheries affected by this SBRM document. More attention must be given to the problem of protected resources and the chronic imprecision and inaccuracy of, e.g., sea turtle bycatch, estimates in these fisheries. Furthermore, the SBRM must address how data will be collected on sea turtle impacts in the scallop dredge fishery, which currently has no adequate monitoring mechanism since turtle chains render it impossible for at-sea observers to monitor interactions. Additionally, the EIS must fully discuss the impacts of the SBRM on the drafting and issuance of Incidental Take Statements and Biological Opinions for these fisheries.

F. The EIS Must Address Importance Filters

The various alternatives for filters must be laid out in an EIS that explains the implications of the filters and proposes levels at which the filters could be set. *See section VI below for additional information.*

V. Peer Review

The Omnibus SBRM Amendment is a significant action that will affect a wide range of fisheries. The National Marine Fisheries Service should ensure that the document receives a full external peer review by a body such as the Center for Independent Experts (CIE). Although the SBRM received a short review by a limited number of members of the joint Council Scientific and Statistical Committee, the review was limited to very technical issues, and was done while the SBRM was still very incomplete. Experts from the CIE should be given the opportunity to comment on the technical issues but also issues related to management and the integration of the SBRM into stock assessments.

VI. IMPORTANCE FILTER

A. Development of Filters

The preferred alternative would reduce the initial observer allocation by means of applying a series of "importance filters" to remove fishery mode/species combinations from the list of observer needs based on different criteria including the current database of fishery mode/species interactions. This approach is fundamentally flawed because it uses the scant observer data from past years as the foundation for the calculation of interaction percentages. Instead, the SBRM should mandate a baseline level of observer coverage and use the information from this coverage as the foundation for the future application of statistical filters.

Oceana also has serious concerns about the development and use of filters 3 and 4. These filters create a loophole through which the agency can support any level of observer coverage by manipulating the threshold values for these filters. If the SBRM does not specify the thresholds, the public has no way of knowing how useful the SBRM will be. Because the threshold values will constitute a significant part of the SBRM if the importance filter is adopted, the amendment must go out for further public comment on specific alternatives for the threshold values, including a proposed preferred alternative.

The draft document states that: "The third-level filter would eliminate species when the discards of that species in a mode are less than a certain minimum percentage of the total discards for that mode." Thus, the filter can be used to mask the real effects of a bycatch problem. For example, an unselective gear that catches a high volume of fish, like trawl gear, might catch a significant percentage of a particular species, but the percentage of that species in the total catch of the gear might not be high. Thus the third-level filter might fail to properly address bycatch of species like cod or haddock in gear like herring trawls.

Oceana recommends that filter 3 be removed from the SBRM and that the options for the percentage level for filter 4 be developed through an EIS.

B. Protected Species

Oceana agrees that applying the first level 'graying out' filter is appropriate for those species which are geographically limited or physically unable to be taken with a given fishery mode but recommends that criteria or discussion be provided for all combinations removed through 'graying out'. This importance filter, however, is inappropriate for removing any fishery mode/protected species combination. Interactions with protected species are rarer than interactions with fish species. Interaction combinations should not be excluded based on frequency of the interactions until a robust observer program is in place which indicates that an interaction is unlikely.

VII. COMMENTS ON DRAFT REPORT OF BYCATCH

Throughout the SBRM development process, FMAT members assured those involved at Committee and Council discussions that data would be available from the SBRM which would provide estimates of bycatch broken down by ***time, area, gear, and species/stock***.

Instead of real examples of the usable data that the SBRM could produce, the Council and the public were provided with disappointing reproductions of past uses of bycatch data in fisheries management.

The New England Council is moving forward with a new management action to meet the mortality and rebuilding goals of the Multispecies Fishery. The Council should require that the following information should be included in any report from a 'query':

Estimates of overall bycatch and bycatch mortality by species/stock within a fishery and/or fishery mode or gear sector in a particular area (e.g. Bycatch of George's Bank Cod in the small vessel gillnet fishery)

Without evidence of the capability to assess bycatch in this kind of detail, the Council should require the FMAT to resume development of the document until such time as this level of detail is available.

CONCLUSION

Oceana appreciates the work that has gone into the development of the SBRM document and its analyses. The work will advance the management of the region's fisheries and will bring the region closer to real fisheries accountability. Oceana is concerned that the process has gone most of the way toward completing its obligations but fails to take the final step to finish the job. We hope that the issues raised above can be amended before the SBRM is approved and implemented.

Thank you for your consideration.

Sincerely,

Michael F. Hirshfield, Ph.D.
Senior Vice President and Chief Scientist

cc: Members
New England Fishery Management Council

Paul J. Howard
Executive Director
New England Fishery Management Council

William Hogarth
Assistant Administrator
National Marine Fisheries Service

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service

Gene Martin
Regional Counsel
National Marine Fisheries Service

Subject: Comments on Section 7.2.1.3.2. Alternative 1.2 - Implement Electronic Monitoring
Date: Wed, 27 Dec 2006 08:02:29 -0900
From: Mark K. Buckley <mkbuckley@alaska.com>
To: SBRMcomment@noaa.gov

My comments are related to the concluding paragraph of the above-referenced section of the SBRM:

> “Comparatively, the costs associated with the electronic monitoring alternative appear much greater than the status quo alternative that is proposed as the preferred alternative at this time. Future consideration of electronic monitoring programs would need to weigh the benefits of such a program against the substantial costs to both the fishing industry and the Federal government, although as technologies improve, costs may decrease.”

The facts in support of this statement are found in the previous paragraphs of that section. They reflect the cost structure associated with one contractor, who has has thus far been involved with the vast majority of video monitoring deployments in the commercial fisheries of North America. This contractor provides excellent service, and my comments are in no way meant to disparage the quality or thoroughness of its products. Nonetheless the contractor enjoys a virtual monopoly in the video monitoring field on this continent. This market dominance and scarcity of competition, I believe, have led to higher prices for video monitoring services.

A case in point is a video monitoring RFP issued in 2006 by the Alaska Fisheries Science Center. In this example there was a competitive field, with my Alaska-based company bidding against the market leader. My company’s bid was $101,000 and the market leader’s bid was $151,000.

This 33% cost difference, I believe, was due to my company’s lower overhead and its local-hire business model. I am confident that if there were more competition to provide electronic observer services in places such as the New England Region, the prices would come down considerably.

Mark Buckley
Kodiak, Alaska

Mark K. Buckley
President
Digital Observer, Inc.
Kodiak, Alaska USA
Vox: 907 486 4684
Mobile: 907 223-5459
Fax: 907 486-1540

Natural Resources Defense Council
40 West 20th Street
New York, NY 10011
Tel: (212) 727-2700
Fax: (212) 727-1773

December 29, 2006

Patricia A. Kurkul
Regional Administrator
Northeast Regional Office
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Re: Comments on Draft SBRM Amendment

Dear Ms. Kurkul:

On behalf of the Natural Resources Defense Council (NRDC), I submit the following comments regarding the National Marine Fisheries Service (NMFS)' Northeast Region Standardized Bycatch Reporting Methodology, an Omnibus Amendment to the Fishery Management Plans of the Mid-Atlantic and New England Regional Fishery Management Councils ("Draft Bycatch Amendment" or "Draft Amendment").

NRDC's primary concern with the Draft Bycatch Amendment -- and it is a fundamental one -- is that the Draft Amendment fails to incorporate the necessary requirements relating to *how* the bycatch data is collected. Section 303 of the Magnuson-Stevens Act requires that each Fishery Management Plan ("FMP") and FMP amendment (hereinafter collectively "FMP") "shall … establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery …." *See* 16 U.S.C. § 1853(a)(11). It seems self-evident that, to "establish" such a standardized bycatch reporting methodology ("SBRM"), a FMP must "establish" both the manner in which the bycatch data is collected, *e.g.*, whether by observers and if so the nature of the observer coverage, as well as "establish" how this data is then processed so as to provide an adequate basis for management decisions. Adequate data collection is obviously a necessary predicate to adequate analysis.

In three different decisions, one in 2001 and two in 2005, the federal district court for the District of Columbia recognized that the requirement to establish a SBRM includes a requirement to establish the bycatch data collection system itself. *See Oceana v. Evans,* No. 04-0811, 2005 WL 555146 (D.D.C. Mar. 9, 2005) (hereinafter "*Oceana I"*); *Oceana v. Evans*, 384 F. Supp. 2d 203 (D.D.C. 2005); *CLF v. Evans*, 209 F. Supp. 2d 1 (D.D.C. 2001). The federal court specifically concluded that a SBRM that only indicates an "intent" to implement, rather than a mandate to implement, an adequate observer program fails to satisfy Section 303. *See, e.g. Oceana I,* 2005 WL at *34.

The Draft Bycatch Amendment does not satisfy the requirements of Section 303. In the portions of the Draft Amendment addressing data-gathering, NMFS simply states that its "preferred" approach is to continue to utilize the "status quo" data sources, most significantly the at-sea observer program. *The Draft Amendment is fatally flawed because it does not propose to set any requirements relating to these data gathering programs, or to otherwise "establish" them.* Most critically, the Draft Amendment does not set any requirements for level or allocation of observer coverage, or, for that matter, for any observers at all. The Amendment does propose the use of a 30% "Coefficient of Variation" ("C.V.") "standard" applied to "all applicable fishing modes for each species group." As an initial matter, we note that, because of the relatively general level at which NMFS proposes to apply the 30% C.V. "standard," it may not provide adequate precision. More significantly, like the 5% observer coverage level at issue in *Oceana I,* the 30% C.V. "standard" appears to still be simply a target, not a requirement. While such a performance measure may well provide an enhanced understanding of the precision of various bycatch estimates, as well as facilitate the most cost-effective use of observers, the 30% C.V. performance target proposal still falls short of what the law requires. As was already determined by the district court in *Oceana I:* it "merely suggests a hoped-for result, as opposed to 'establish[ing]' a particular standardized methodology, [and thus] does not measure up to the statute's requirements." *See id.*

In its comments dated December 22, 2006, Oceana addressed a number of other concerns with the Draft Amendment. NRDC shares these concerns and adopts Oceana's comments herein in their entirety. We want to draw the agency's attention in particular to the following concerns:

- The Draft Bycatch Amendment proposes the use of "importance filters" for the purpose of reducing observer coverage to only what it considers to be significant fishery mode/species interactions. As set out in the Draft Amendment, however, the "importance filters" threaten to ensnare the agency in a self-perpetuating data-poor bycatch reporting methodology and to mask the shortcomings of this methodology from the public. First, it is critical – given that up-to-date data of adequate specificity, *i.e.*, to the time/area/species/fishing mode level, is frequently lacking – that NMFS explain the limits of the existing data for each specific gear/species combination proposed to be "filtered out." Second, NMFS must identify, and allow the public to comment on, the "specific minimum percentage" thresholds that it intends to apply in the case of importance filters 3 and 4.

- The Draft Bycatch Amendment needs significantly more detail concerning how the bycatch information needs of each specific FMP will be addressed on an ongoing basis. For example, it is not at all clear that the proposed bycatch reporting methodology will be able to generate analyses, reports, and other forms of information that adequately address specific bycatch problems in specific fisheries, i.e., provide adequate information to make a management response possible. It is also important that managers be able to propose changes in the SBRM and supplemental monitoring in order to focus on a particular bycatch problem and enable development of a management response.

- For reasons set forth by Oceana, the Draft Bycatch Amendment requires an EIS. In this regard, we want to note that the Draft Amendment is, as NMFS almost certainly recognizes, a very important regulatory proposal. It addresses a significant fisheries management problem and proposes to do so by amending thirteen different FMPs, which cover dozens of managed stocks and affect a much larger number of marine species. The Draft Amendment is also of course a response to a judicial remand in two separate federal court actions.

In closing, NRDC does recognize that the Draft Bycatch Amendment is the product of considerable work and represents a step forward in certain respects, such as by recognizing the importance of observers and the need to increase observer coverage. However, as already noted, the Draft Amendment still falls substantially short of what the statute requires. We strongly urge NMFS to address the concerns we have highlighted above, as well as those identified by Oceana. Thank you for consideration of our comments.

Respectfully yours,

Brad Sewell
Senior Attorney
Natural Resources Defense Council

KELLEY DRYE
COLLIER SHANNON

December 29, 2006

David E. Frulla
Partner
202.342.8648
DFrulla@kelleydrye.com

VIA ELECTRONIC MAIL

Ms. Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: FISHERIES SURVIVAL FUND COMMENTS ON SBRM AMENDMENT

Dear Ms. Kurkul:

We represent the Fisheries Survival Fund, an association whose participants include the bulk of the Atlantic scallop full-time limited access permit holders. We submit this letter on behalf of the FSF, as well as North Carolina Fisheries Association, the Garden State Seafood Association, Montauk Inlet Seafood, Inc., the American Pelagic Association, and Associated Fisheries of Maine, and we expect other groups may associate themselves with these comments. Collectively, these organizations represent thousands, of participants in nearly every, if not every, fishery managed by the New England and Mid-Atlantic Fishery Management Councils. We appreciate this opportunity to provide comments, including technical comments prepared by a respected fisheries scientist, Mr. Paul Starr, who has years of experience in designing and implementing bycatch estimation programs,[1] on the proposed omnibus Standardized Bycatch Reporting Methodology ("SBRM") Amendment, under consideration by both these councils.

INTRODUCTION

Development of an omnibus SBRM amendment represents an ambitious project, albeit one that has not garnered attention and scrutiny commensurate with its significance. The Public Hearing Document is technical, but if it is implemented in the preferred form, it will have major practical ramifications for New England and Mid-Atlantic fisheries. It appears, moreover, that neither the fishing communities nor the New England and Mid-Atlantic Fishery Management Council members yet understand these ramifications. In contrast, and judging by the attendance at the two public hearings on the SBRM Amendment, environmental organizations, including those whose lawsuits in the groundfish and scallop cases resulted in the court decisions to which the SBRM Amendment responds, are paying close attention to this process. If the past is prologue, these groups will not hesitate either to renew such challenges if they perceive any weakness in the amendment or bring suit to enforce any mandate seen as resulting from the action the Councils take on this amendment.

1 These comments are included, along with Mr. Starr's *curriculum vitae*, as Attachments 1 and 2 to this letter.

Indeed, whatever standardized bycatch reporting methodology the Councils decide to implement, they should recognize that they are creating standards for a program that might be able to be enforced in court. In discussing a case involving invalidation of the Pacific Groundfish FMP for lacking an adequate SBRM, the federal court that invalidated the Scallop Amendment 10 SBRM, explained:

> The failing in PMCC was that NMFS had determined that a live observer program was necessary for accurate reporting, but it had nonetheless neglected to establish any type of observer program.

Oceana v. Evans, 384 F. Supp. 2d 203, 234 n.38 (D.D.C. 2005) ("*Oceana II*"), *citing Pacific Marine Conservation Council, Inc. v. Evans*, 200 F. Supp. 2d 1194, 1200 (N.D. Cal 2002).

In summary, the SBRM Amendment is currently not on a feasible or productive track. While considerable rigorous work has gone into this draft omnibus amendment, it does not strike an adequate balance between specificity and generality. It is overly specific when it stratifies the bycatch reporting regime into tens of hundreds of strata and then prescribes a uniform coefficient of variation ("CV") for each. Such fine gradations of the units of analysis are not necessary to meet the requirements for an SBRM requested by the court in the scallop and groundfish cases. (The undersigned participated on the government's side in the challenges to the SBRM in these cases and have a detailed understanding of these decisions.) Even more fundamentally, as explained herein, such an approach is not consistent with nationwide NMFS technical guidance.

Such a uniform CV approach across these many strata is likewise too general. Bycatch reporting objectives will and should vary with the particular management needs and problems specific to each fishery. NMFS explained in its nationwide technical guidance for establishing such monitoring systems that, "The development of a sampling strategy for the estimation of bycatch based on an at-sea observer program entails first clearly defining the objectives of the sampling program and selecting a sampling strategy designed to meet these objectives. . . . An explicit statement of the objectives is a critical step in devising effective sampling procedures."[2]

In contrast to this considered nationwide guidance, the omnibus amendment puts the metaphorical cart before the horse (as the court found in the prior cases) by establishing blanket standards of precision across a myriad of fisheries "modes" sub-divided by bycatch species, rather than considering the needs and requirements of individual fisheries. In this regard, the amendment appears to share the failures that the court found to exist in the scallop and groundfish amendments.

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[2] National Marine Fisheries Service, *Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs*, NOAA Technical Memorandum NMFS-S/SPO-66, at 48 (Oct. 2004) (hereafter "*Evaluating Bycatch*"); *see also* Comments of Mr. Paul Starr, at 1-2 (attached) ("Starr Comments").

This omnibus amendment would be more constructive if it provided the Councils and NMFS with a process and some ground rules they could employ to develop and implement fisheries-specific monitoring systems in plan-specific contexts. Such an approach could provide information that is actually useful to management. The amendment could also establish general rules for NMFS to use in administering observer programs. As we explain, we would expect, and the omnibus amendment could prescribe, that observer programs represent a core component of fishery-specific programs.

Finally, and perhaps equally importantly, such an approach could take into account available resources. As explained above, the Public Hearing Draft would prescribe that managers seek to achieve a 30% CV for tens of hundreds of different strata. While it is not clear whether the Public Hearing Document plans to treat this 30% CV goal as mandatory for each stratum, it is quite possible (and perhaps even likely) that a court would find this requirement to be enforceable, particularly if attainment of 30% CV represents the centerpiece requirement of the amendment. As the Councils can well understand, the resources do not and will not exist to achieve such a mammoth undertaking. However, failure to achieve these CVs could result in chronic and disabling litigation, each time a target CV is not met.

Fortunately, it is not necessary to begin the process from square one. With the adjustments suggested herein, which are based on the *Evaluating Bycatch* report, applicable law, consultation with experts in sampling design, and the decisions in the groundfish and scallop cases, the Omnibus SBRM Amendment can fully meet legal requirements and assist the Councils in their statutory responsibilities to evaluate and minimize bycatch. The following proposal provides a more practical – and practicable – way forward to create a workable program that not only actually can be implemented, but is also more consistent with legal requirements and the Councils' management needs. After setting forth our proposal, we will conclude by discussing the general legal framework applicable to this action and the specific issues raised in the SBRM Public Hearing Document.

RECOMMENDED DIRECTION FOR THE SBRM AMENDMENT

The key task identified by NMFS in its *Evaluating Bycatch* report is to define the objectives of any SBRM program. (Typically, an SBRM program would not be designed for an entire NMFS Region's worth of fisheries at once, but the principle remains the same.) As we explain below, the draft Public Hearing Document has not been able to define the objectives for the SBRM program, either as a whole or for each specific fishery. It is simply not sufficient to prescribe a blanket CV requirement and term this an objective.

Properly conceived bycatch and reporting methodology objectives will vary by fishery, depending on such factors as whether protected species issues are involved, the gear types employed, and the baseline amount of information on the types and amount of bycatch. As noted in *Evaluating Bycatch*, different fisheries have differing needs in terms of sampling design and other elements of an SBRM. The report explains:

> [A]n at-sea observer program designed with the objective of estimating fishery discards may be quite different from one designed to assess incidental takes of protected species, particularly if the latter represents rare events. When there are multiple objectives for an observer program, the program design often will need to address competing objectives and the optimal design cannot be determined unless weights have been assigned to the various objectives. Basically, when there are multiple objectives, it becomes much more difficult to clearly define the objective (including the weights to be used), to identify the appropriate sample design, and to identify the desired level of precision for each estimate.

Evaluating Bycatch, at 48-49; *see also* Starr Comments, at 1 ("There is no substitute for dealing with each fishery unit (or grouping) individually and tailoring the monitoring to fit the situation.").

Accordingly, the omnibus should instead focus on the development of a broad program – and methodology for developing fishery specific bycatch reporting regimes – with the details left to development in the context of individual fishery management plans. Such an approach represents a constructive enterprise. There is a value in and of itself for the Northeast Region to have a consistent set of standards for developing fishery-specific bycatch reporting programs.

Furthermore, the applicable case law does not require NMFS to develop fishery-specific programs to have a legally adequate and useful omnibus amendment. *Oceana II* explained that:

> A methodology need not necessarily be detailed, but it must at the very least provide decision makers and the public with a program of what actually will be *done* to improve bycatch reporting, and why these measures will be sufficient based on the best available science.

384 F. Supp. 2d at 234. Realistically, given the nature of this omnibus amendment process, the elements of this amendment must be somewhat general.

Whether general or specific, the key element for an appropriate SBRM is that it sets requirements for NMFS to follow in deploying observer coverage and undertaking other fishery monitoring programs. *Oceana II* explained:

> The Court concluded that the Secretary's mere "intention" to maintain a five-percent observer coverage level, while delegating the actual level of observer coverage and methodology to the Regional Administrator, did not constitute establishment of a "bycatch reporting methodology."

Oceana II, 384 F. Supp. 2d at 232 (*citing Oceana I*, 2005 U.S. Dist. Lexis 3959, 2005 WL 555416, at *40). Our proposal's strength is that it would allow the Councils to develop these requirements, based on the recommendations of those with fishery-specific expertise.

Accordingly, this SBRM omnibus amendment would meet all legal requirements so long as it: (1) establishes a process and broad programmatic outline that will guide the development of FMP-specific programs; and (2) directs the agency to focus resources according to certain criteria based on urgency for coverage determined from an examination of existing bycatch information, including reliable anecdotal information.

Regarding process, the omnibus amendment should authorize the Councils to develop and implement more detailed methodologies, specific to each fishery, through framework adjustments, regulatory amendments, or full plan amendments, as they see fit. To allow for initiation of such a subsequent FMP-specific process, the omnibus amendment should amend each fishery management plan to allow for the adoption of a bycatch estimation program by abbreviated rulemaking processes, such as through a framework action.[3] Individual plan development teams, perhaps supplemented by working groups (as explained by Mr. Starr at page 3), would have the specific knowledge of the fishery in question to develop practical and practicable approaches. Moreover, the process should allow managers to adjust these fishery specific requirements, perhaps through annual or biannual specification setting processes, as conservation and management requirements for the fishery change over time. This approach would allow each Council to tailor bycatch monitoring and reporting to the specific needs of each fishery as they evolve.

Regarding more substantive requirements, the amendment will most likely have to mandate a live observer program in each fishery, in conjunction with other data collection systems. *Evaluating Bycatch* and other studies have found observers to be important to achieve precise and accurate estimates. Courts have also recognized the importance of live observers.[4]

Additional substantive requirements can be more general in nature. To that end, we would suggest that the SBRM:

- Mandate that each fishery management plan establish observer coverage levels in that fishery based on considerations specific to that fishery. Such levels can be particular to an individual species or a species grouping, as well as to each specific gear type, and can be changed through framework adjustment or specification

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3 As an omnibus amendment, the SBRM Amendment can provide overarching analyses that can be incorporated into streamlined rulemaking documents under each FMP. This is perfectly consistent with legal requirements under the National Environmental Policy Act.

4 *See, e.g., Oceana II*, 384 F. Supp. 2d at 233-34 ("'Because the observer program is optional under Amendment 13, NMFS in theory could decide not to implement an observer program for the ground fishery, and nothing in Amendment 13 would prohibit the agency from making that decision.'") (quoting *Pac. Marine Conservation Council, Inc. v. Evans*, 200 F. Supp. 2d 1194, 1200 (N.D. Cal. 2002)).

setting processes, as conservation and management needs changes in the fishery and across fisheries[5];

- Provide that each FMP should establish a set of diagnostics, perhaps using a target CV or CVs for each fishery or fishery mode, to gauge whether the program is providing sufficiently precise information for management purposes. This is consistent with NMFS' guidance,[6] and far more realistic than attempting to achieve such a level for several hundred fishery modes sub-divided by bycatch species;
- Create a general set of priorities for deployment of limited observer resources that is non-discretionary for NMFS. For example, that resources be dedicated first to fisheries or sectors within a fishery that have taken protected species or that have material bycatches of overfished species;
- Mandate that sampling designs developed for each fishery minimize bias (thus promoting accuracy in assessments) to the greatest extent practicable;
- Authorize and encourage cooperative research to undertake such activities as, for example, development of gear that minimizes bycatch, identification of times/areas/gear with unusually high or levels of bycatch, testing of sampling designs, and getting basic information for fisheries for which the extent of bycatch information is not well understood. *See Evaluating Bycatch*, at 35 (also suggesting cooperative research projects focus on discard mortality and identifying means of minimizing the so-called "observer effect");
- Explain, expand upon, and authorize the use of "importance filters" by Councils as they develop fishery-specific observer plans, in order to insure that resources are focused on the highest priority areas.

These suggestions are not exclusive, but provide some flavor of the type of guidance the Omnibus SBRM Amendment should provide, and most of these elements are already contained in the document. A combination of mandatory elements, such as the observer program, priorities, and general guidance will together provide the necessary structure and guidance for the operation of fishery-specific monitoring programs that do not leave all the discretion with NMFS. As explained above, this is a key element of the court decision in the groundfish and scallop cases. *See Oceana II,* 384 F. Supp. 2d at 234 n.41 ("[T]he Court is not suggesting that the FMP should mandate the precise areas where observers must be concentrated for years to come; it only requires that the FMP establish some method for determining observer concentration instead of leaving all decisions to the Regional Administrator's discretion.").

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5 In developing these fishery-specific programs, existing observer commitments (such as for higher levels of coverage in the Atlantic sea scallop area access and groundfish "B" day programs) will need to be considered as well.

6 *See Evaluating Bycatch*, at 57-58.

As noted, our proposal does not represent a major change from the direction that the current SBRM Amendment has taken. The Public Hearing Document contains many useful elements, such as its discussion of the various reporting methodologies, tools (such as logbooks, VMS, electronic monitoring systems, etc.). However, in its ambition, it far exceeds both legal requirements and what is feasible given current constraints, not to mention the national guidance from NMFS. As such, there is a very real danger that, if passed essentially as is, it could be found by courts to set a new standard that is neither feasible nor necessary.[7]

GENERAL LEGAL ISSUES

Before turning to the specifics of the Public Hearing Document, there are general legal issues to consider. The Executive Summary of the Public Hearing Document explains:

> Generally, an SBRM can be viewed as the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Several specific analyses are conducted to calculate a measure of the variance associated with the data that have been collected by fisheries observers and to determine the most appropriate fisheries observer coverage levels and the optimal allocation of observer effort across the fisheries in order to minimize the variance to the degree practicable. Given the target level of data precision desired by fisheries scientists and managers, fisheries observer coverage levels can be calculated that would be expected to provide data of the desired precision [and accuracy].

Public Hearing Document, at iv.

The appropriate levels of precision and accuracy to be achieved from the SBRM contain a policy component under the Magnuson-Stevens Fishery Conservation and Management Act. The Public Hearing Document explains that the Magnuson-Stevens Act "addresses both the requirement to establish an SBRM for each FMP and the requirement to include conservation measures to minimize bycatch and bycatch mortality to the extent practicable . . . ." Public Hearing Document, at 6 (citing 16 U.S.C. § 1853(a)(11) (requiring these bycatch related measures in each FMP)). Notably, the Public Hearing Document proceeds to explain that it will deal with only the former element, and not address bycatch reduction as a conservation matter. *Id.* However, it does note that the goal is "to minimize the variance to the extent practicable." *Id.* at iv.

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7 Parenthetically, the supervening changes in the Magnuson-Stevens Act, signed into law on December 27, 2006, and their applicability to amendments such as this now under consideration, mean that a slightly new course can be charted without any delay beyond that which will necessarily occur as guidance is developed and the SBRM Amendment reviewed for consistency with the newly-amended law.

Accordingly, the Magnuson-Stevens Act's practicability standard applies to this exercise. In this instance, practicability entails two considerations: (1) the monitoring standards/observer requirements should not unduly burden the public fisc or bankrupt the fishing industry to implement; and (2) there needs to be a discussion of the benefits and costs of various levels of precision and accuracy, not just a purely scientific conclusion that a certain level is required. The court in the *Oceana* cases essentially made this point, and we are litigating it in another context.

A corollary to the first point, also, is that the SBRM should not be established as a set of aspirational goals that are not expected to be attained on a regular basis, given the expected resource constraints from a budgetary and observer manpower perspective. If the system is either aspirational, or so ambitious that it can only be expected to be aspirational, it will just become fodder for litigation from year to year when the standards are not met, with the threat of a court injunction on the fishery as a remedy for non-compliance.

As to the point regarding practicability, it must be noted that the requirement to establish an SBRM is an adjunct to the duty of the Council to minimize bycatch more generally. Indeed, the SBRM must be designed "to assess the amount and type of bycatch occurring in the fishery," and that bycatch must then be minimized to the extent practicable. 16 U.S.C. § 1853(11). In instances where a particular bycatch species is rarely encountered, and thus has been minimized, it is fully consonant with the legal requirement not to expend significant scarce resources in an attempt to develop extremely precise estimates. That is the essence of the practicability limitation, which applies with as much force to the SBRM as to the bycatch minimization objective itself.

In this regard, the FSF applauds the decision to include "importance filters" as a means of insuring that limited resources are directed to where they will be most effective. The Public Hearing Document, *see e.g.*, *id.* at 167-71, does an admirable job of providing a reasoned explanation and justification for their use, and does so in legally relevant terms. For instance, it notes that achieving the essentially arbitrary target level of precision for estimates of red crab bycatch would cost more than three times the value of the entire red crab fishery. *Id.* at 170. Employment of these filters as a means of identifying the truly important bycatch species and fishing modes in which to focus limited observer resources represents a reasoned, practicable policy judgment that meets the requirements of the law.

Finally, it is worth noting that the SBRM well addresses one of the key issues in the court decisions in the Amendments 10 and 13 cases, specifically, the issue of accuracy. The failure in those amendments to address the findings in the Babcock, *et al.*, study with respect to levels of observer coverage necessary to achieve precise and accurate estimates was one of the key omissions identified by the court. This shortcoming, however, has been rectified with the Rago, *et al.*, study referenced in, and included with the amendment.

ELEMENTS OF SBRM AMENDMENT

Turning to the elements of the Public Hearing Document, it prescribes four choice points for the councils: (1) bycatch reporting and monitoring mechanisms; (2) analytical techniques and allocation of observers; (3) SBRM standard; and (4) SBRM review process. This memorandum will set forth the Councils' preferred alternative and some initial thoughts below.

The problem, however, is that the uncertainties of agency budgets and observer availability make it very difficult for NMFS to ensure implementation of a mandatory, highly ambitious level of observer coverage. Perhaps the most fundamental flaw in the Public Hearing Document is that it provides for an incredibly, in fact unduly, ambitious set of standards for observed trips, without any discussion or understanding of whether and how that level of observer coverage can be provided or paid for, or whether the agency can even make use of all the data it would collect under such a program (which has been a problem even in very targeted observer programs). *See* Starr Comments, at 2.

Oceana II makes clear that an SBRM standard may not be based, or back-calculated from, how much observer coverage can be funded. "While the logistics of paying for observers is a fair consideration in establishing a particular bycatch reporting methodology," the agency cannot put "the cart before the horse, predicting sampling frequency, observer distribution, and precision rates based on potentially available funding rather than establishing a methodology." *Oceana II*, 384 F. Supp.2d at 236.

Monitoring Mechanisms: Regarding element one, monitoring mechanisms: The Public Hearing Document essentially contains two options. The first involves using the sources of information that are currently available: fishery independent surveys, fishing vessel trip reports, dealer purchase reports, at-sea observers, commercial port sampling, recreational fishery sampling (MRFSS), and industry-based surveys. The document then addresses the strengths and limitations of each source of data from the perspective of identifying bycatch:

> Observer-gathered discard information is generally considered the most accurate and objective in recording bycatch and discard information. Observer programs often collect detailed biological information on both catch and discards for all aspects of commercial catch . . . .
>
> Observer data are preferred over other data sources including FVTR data for a few reasons. Unlike fishermen, who may be performing or managing many fishing related tasks at once . . . observers are focused solely on data collection while deployed at sea. . . .
>
> [However,] [m]anaging an observer program requires dealing with numerous practical and fiscal constraints. Observers must be carefully trained, work under sometimes hazardous conditions, and deal with a variety of circumstances that can arise while at sea on a fishing vessel. Logistical issues, such as having an adequate number of observers available to cover a wide geographic area,

> numerous ports, and a variety of fisheries; and getting the observers aboard vessels within relatively short windows of time before they intend to sail further add to the complexity and costs of observer programs.

Public Hearing Document, at 89. The document identifies only video sampling as an alternative to the current array of monitoring options, and explains that video does not currently provide the same types of detail as on-board observers. *Id.* at 98-101. The document correctly recognizes the analytical difficulties involved in transitioning to video monitoring and thus sensibly defers use of these systems, pending further development. *Id.* at 113.

Of course, this is not the end of the story. If the status quo is chosen, NMFS needs, as a practical matter, to get to an affordable and effective observer system, with a stable workforce and budgets. This is lacking right now for most Northeast Region fishing fleets.

Analytical Techniques and Allocation of Observers: In general, we support the preferred alternative, which would apply an "importance filter" to "aid in establishing target observer sea day allocations." *Id.* at 117. Recommended by the Scientific and Statistical Committee, the importance filter "is specifically designed to 'weed out' particular combinations of fishing gear and bycatch species where the infrequency and variable amounts of discards would result in very high observer sea day coverage levels, in spite of the fact that the actual magnitude and frequency of discards is very low and likely of no consequence to the discarded species." *Id.* "The importance filter focuses on the encounter rate (the proportion of trips in which the species was encountered and discarded), the relative proportion of discards of that particular species when compared to the discards of other species within the fishing mode, the magnitude of the observed discards, and the proportion of the discards of the species within the fishing mode to the total landings of the species among all fisheries." *Id.*

The importance filtering mechanisms need to be clarified and perhaps expanded to ensure that they have sufficiently identified the criteria to be used as filters. For instance, while an importance filter includes an encounter rate component, the Amendment should state that observer sea days can be reduced when gear improvements have reduced, if not eliminated, the potential for bycatch, viz. turtle chains ought to preclude intensive scallop fishery turtle monitoring. The Councils should also consider a filter for any mode of fishing whose overall contribution to total landings falls below some threshold or is so rarely used that it can be assumed that the contribution to total discards are likely *de minimus*. This would help to reduce the administrative complexity of the plan, as well as to preserve limited observer assets for areas of real concern.

SBRM Standard: The question presented in the Public Hearing Document is whether the SBRM Amendment would "specify a target CV as a performance measure or standard against which to judge the adequacy of the bycatch monitoring program described in the amendment." *Id.* at 121. The options are the *ad hoc* approach that exists now, or application of a uniform 30% CV, subject to importance filtering. As explained above, we submit these decisions should be made in a more structured way than they currently are, but in FMP-specific contexts.

The Public Hearing Document explains that the preferred alternative (uniform 30% CV) would comprise the following:

> In addition to a set of bycatch reporting and monitoring mechanisms used to collect information on discards in a fishery, and a set of analytical techniques and procedures used to estimate discards, allocate at-sea fishery observer effort, and perform stock assessments, the preferred alternative would also establish a performance measure to ensure that the bycatch-related data collected under the SBRM and utilized in stock assessments and management is adequate for those tasks. In order to ensure that the SBRM is performing to the expected level, this preferred alternative would establish a process to periodically review the adequacy of the SBRM, with consideration of how and when changes to the SBRM should be made.

Id. at 121.

We submit that it will be important for the Amendment to establish some standards, to ensure fidelity to the *Oceana* decisions, but that: (1) there will need to be some flexibility in these standards; and (2) the Amendment should not be light years more ambitious than NMFS guidance in seeking to apply these standards. Our recommendations that seek to address these concerns are set forth above.

In terms of flexibility, such performance measures should represent diagnostic tools, and must not be read or be able to be characterized as immutable standards, such that failure to achieve them in any given year becomes an event for litigation. In this regard, as discussed below in regards to the second point, the ambitions of the SBRM as proposed in the Public Hearing Document may far exceed the ability of the agency to meet on a sustained basis, making it very important that the Councils utilize the importance filters, make clear that the CVs are aspirational, and state that program overall is sufficient to precisely characterize and assess bycatch across fisheries (as opposed to any particular mode).

Such flexibility is consistent with the decisions in the *Oceana* cases. The primary deficiency of Amendments 10 and 13 was the Council's failure to develop an reporting methodology coupled with what the judge saw as a grant of unfettered discretion to the Regional Administrator to determine when, where, and how much observer coverage to deploy. "[A]n FMP that merely suggests a hoped-for result, as opposed to 'establishing' a particular standardized methodology, does not measure up to the statute's requirements." *Oceana v. Evans* ("*Oceana I*"), 2005 U.S. Dist. LEXIS 3959, at *136 (D.D.C., March 9, 2005) (citation omitted). "Instead of analyzing what type of program – whether a mandated level of coverage or *some other mechanism* – would succeed in producing the statistically reliable estimates of bycatch needed to better manage the fishery, the FMP essentially assigns this task to the Regional Administrator." *Oceana II*, 384 F. Supp. 2d at 233-34 (emphasis added).

In the current instance, the methodology specified more than meets, and even exceeds, the requirements laid out by the court.[8] In fact, the proposed amendment is far more comprehensive than what has been laid out in FMPs for other fisheries, such as the Pacific Groundfish and the Pacific Highly Migratory Species fisheries, the latter of which was cited by the environmental plaintiffs as a model and the former which was promulgated in response to a similarly successful SBRM challenge.

What the *Oceana* cases did not do, however, was to mandate any particular approach or set of performance requirements in order to meet the SBRM requirement. For instance, the judge explicitly noted that "*Oceana I* did *not* require that an FMP mandate a specific level of observer coverage. Rather, the Court held that an FMP may not delegate the development of a standardized bycatch reporting methodology to the Regional Administrator." *Oceana II* at 384 F. Supp. 2d at 234 n.38. The court also noted that it "is not suggesting that the FMP should mandate the precise areas where observers must be concentrated for years to come; it only requires that the FMP establish some method for determining observer concentration instead of leaving all decisions to the Regional Administrator's discretion." *Id.* n.41. What the court did require, and this amendment actually overachieves relative to NMFS's guidelines, as noted below, is that mechanisms be developed that "would succeed in producing the statistically reliable estimates of bycatch needed to better manage the fishery." *Id.* In these terms, the task is to best utilize the government's resources to gain a precise estimate of the amount and composition of bycatch in the managed fisheries rather than designing a theoretically ideal system.

Even in instances where the importance filtering still requires some coverage, there may be a need for reduced levels of coverage designed to identify whether there is any bycatch issue when the data is too sparse to determine what level of observer coverage would be needed to achieve a pre-determined level of precision/accuracy. This may also need some statistical support as a basis for application either of an importance filter or some tolerance for a reduced level of precision/accuracy. These considerations are best addressed in context, as both *Evaluating Bycatch* and Mr. Starr explain. *See Evaluating Bycatch*, at 58-59; Starr Comments, at 1-2.

What would appear to be required, however, is a mandate that the agency create an observer program to implement the SBRM. *See, e.g., Oceana II*, at 135 ("'Because the observer program is optional under Amendment 13, NMFS in theory could decide not to implement an observer program for the ground fishery, and nothing in Amendment 13 would prohibit the agency from making that decision.'") (quoting *Pac. Marine Conservation Council, Inc.*, 200 F. Supp. 2d at 1200). This is not the same as setting minimum levels of observer coverage, which,

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8 *See id.* ("A methodology need not necessarily be detailed, but it must at the very least provide decision makers and the public with a program of what actually will be *done* to improve bycatch reporting, and why these measures will be sufficient based on the best available science.") (citation omitted)).

it should be stressed, is not required under the law.[9] Rather, it is a matter of including language similar to that in Pacific Groundfish Plan: "The Regional Administrator will implement an observer program through a Council-approved Federal regulatory framework." PFMC, Pacific Coast Groundfish FMP, at 71 (Sept. 2006). Such is necessary to avoid the same deficiency the court found in the *Oceana* cases.

The second, and significant, issue is that the Public Hearing Document goes far beyond NMFS guidance by recommending to apply this level of statistical precision to fishery modes, as opposed to the fishery for a species as a whole. It would also apply such a level of precision to each bycatch species rather than to bycatch in a fishery as a whole:

> In total, the proposed SBRM would separately track and report the precision associated with the discard estimates of 36 individual fishery resources or species groups and 23 individual protected species or species groups across 39 separate fishing gear modes. In sum, this means that rather than trying to achieve a precision of 20-30 percent for a single estimate of total discards in each of the 16 major fisheries (16 separate estimates), under the proposed SBRM, the Councils and NOAA Fisheries Service will strive to achieve a precision of no more than 30 percent in up to 2,301 unique fishing gear mode and species combinations [less certain importance-filtered combinations].

Id. at 123. The *Oceana* decisions do not require this level of detail, as the quotes from the decisions above indicate.

Significantly, the Public Hearing Document's disaggregated approach countervails nationwide NMFS guidance. The SBRM Amendment explains:

> Although the proposed 30-percent CV target is based on the recommendation [for CVs of 20-30% for SBRM programs] in NMFS (2004), the proposed application

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9 While the court found fault with the fact that Amendments 10 and 13 did not set a mandatory level of observer coverage, those decisions were made in the context of two plans that contained "recommended" levels of observer coverage that could be changed or not implemented at all at the agency's sole discretion. *See, e.g., Oceana I* at 133 ("[T]he Secretary stated that he merely 'intends' to maintain a 5% coverage level. While he did state that a 5% level 'will resume in FY 05 and beyond,' in the context of the Secretary's overall response to criticisms of Amendment 13's bycatch reporting, it is clear that this figure is not mandatory and may be subject to change if the Secretary deems it proper.") (citations omitted). In other words, minimum levels of observer coverage were the primary means for collecting bycatch information under those two plans, and as such, the Court found that they must be mandatory and shown to be sufficient to collect precise and accurate data. By contrast, Councils could select a different mechanism, to wit, a methodology focused on gear types, sectors, and fisheries.

> of this standard differs in several important ways. First, the precision goal is recommended to apply to a "fishery," but in the proposed SBRM, the target CV would apply at the level of the fishing mode. [The Amendment then explains that this would require the six separate modes of the monkfish fishery to be examined separately.]
>
> ***
>
> Another way in which the proposed application of the SBRM differs from the NMFS (2004) guidance is that while the guidance document indicates that the precision goal of 20-30 percent should apply to total discards "aggregated over *all* species [emphasis added], this proposed alternative proposes disaggregating all species to the level of individual species or groups of related species. Continuing the example of the monkfish fishery, among the gear types that catch monkfish, there are more than 29 other species caught in those gears (along with many other non-FMP species). The guidance in NMFS (2004), therefore, recommends that the precision of the estimate of total discards of all 30+ species across all applicable fishing gears would be sufficient if the single estimate had a CV between 20 and 30 percent. The SBRM proposed under the preferred alternative would separately track the precision of the discard estimates for each individual species, except for a few limited cases where a species complex is more appropriate, managed under a Northeast Region FMP.

Id. at 122.

This is not an academic exercise. In practical effect, adopting the preferred alternative might require, based on estimates provided at the SSC, about 58,000 observer sea-days across the Northeast Region, compared to the 8,000 or so deployed, for example, in 2004. As explained above, the *Oceana* decisions suggest that if the Amendment appears to set certain standards for observer coverage, Councils will likely be held to those standards. It is, furthermore, unlikely that even with such coverage levels this standard could be attained for many of the various modes.

In this regard, Mr. Starr explains:

> It is very unlikely that a single CV "performance standard" can be applied successfully to such a broad and diverse range of fisheries. While the application of such a standard may improve the existing situation, given that relatively little monitoring presently exists, I believe that it will also result in a large number of data collection programmes which will be poorly designed, badly applied and subsequently not properly analysed. Thus I believe that the overall goal of better monitoring and management of these fisheries will not be achieved, particularly in the short term.

Starr Comments, at 1. It is also Mr. Starr's conclusion, which coincides with the advice in the NMFS nationwide technical document, that "[t]here is no substitute for dealing with each fishery unit (or grouping) individually and tailoring the monitoring to fit the situation." *Starr Comments, at 1.*

The divergence from NMFS guidance that would seek to prescribe a uniform level of precision of estimates for each bycatch species appears to present the biggest obstacle in practical implementation.[10] Tellingly, Mr. Starr further explains that, in his experience, calculation of CVs for each cell is a detailed, individualized process. Starr Comments, at 2-4. It is hard to conceive how NMFS could administer this program, with the resource constraints it faces and its essential inflexibility as an institution. There is a reasonable concern that litigation could ensue again if NMFS were not able to achieve the stated degree of precision (plus accuracy) in each of these 2,000 or so individual situations, even if this approach is not consistent with NMFS guidance.

Figuring out how to address this issue will be very important for the fishing fleets in the Northeast Region. It may be that observer and management decisions could be based on an aggregated estimate, consistent with the NMFS nationwide guidance, and that the species by species information could be assembled as a diagnostic and evaluative tool. In either event, importance filtering will have an important role.

CONCLUSION

The suggestions offered represent a workable and legally sufficient approach, that better meshes with available resources. It will also provide the Councils with the fishery-specific bycatch information they need in order to meet the conservation and management of the Magnuson-Stevens Act, especially as amended. This is an important issue, albeit one which is comparatively complicated. It bears taking the time necessary to produce a workable and realistic methodology.

Sincerely,

David E. Frulla
Shaun M. Gehan

Counsel for Fisheries Survival Fund

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[10] There may be good reason, to seek to ensure consistent levels of coverage among fishing sectors, but there needs to be flexibility in terms of the levels of precision that are sought. *See Evaluating Bycatch*, at 59 ("Flexibility is needed when setting CV targets for specific fisheries and bycatch species.").

ATTACHMENT 1

Paul Starr, Fisheries Stock Assessment Scientist
61A Rhine Street, Island Bay, Wellington, New Zealand

29 December 2006

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: Submission on SBRM Amendment

Dear Ms. Kurkul:

Introduction and qualifications

I have been asked by the Fisheries Survival Fund (FSF) to prepare an independent submission as an outside expert familiar with many of the issues being debated over the adoption of the Standardised Bycatch Reporting Methodology (SBRM) Amendment. I have had considerable experience over the thirty years that I have been a fisheries scientist in designing, implementing and analysing data generated from various programmes intended to measure quantities of interest in a fishery. These programmes range from observer programmes such as those being discussed in relation to the SBRM to logbook programmes which are designed to be completed by the fisherman.

I am not completely familiar with the details of how fisheries are managed on the eastern seaboard of the United States nor am I fully cognisant of all the sensitivities which exist between the various sectors and stakeholders who participate in these fisheries. However, I feel that I am able to make some general comments on the nature of the "preferred alternatives" identified in the SBRM Public Hearing Document because such programmes tend to have strong similarities regardless of where they are implemented. I have experienced this universality myself, having worked extensively in western Canada as a salmon and groundfish scientist and also having worked in the New Zealand groundfish and shellfish fisheries.

Summary

The following is a summary of the main points of this submission:

- It is very unlikely that a single CV "performance standard" can be applied successfully to such a broad and diverse range of fisheries. While the application of such a standard may improve the existing situation, given that relatively little monitoring presently exists, I believe that it will also result in a large number of data collection programmes which will be poorly designed, badly applied and subsequently not properly analysed. Thus I believe that the overall goal of better monitoring and management of these fisheries will not be achieved, particularly in the short term.
- There is no substitute for dealing with each fishery unit (or grouping) individually and tailoring the monitoring to fit the situation. Therefore, a more productive approach

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would be to establish a process through which all stakeholders can participate in the establishment of the monitoring programme, including agreement on the overall management goals.

- Finally, my experience has shown that successful fishery monitoring programmes need the co-operation of the stakeholders being monitored. It is easy to mandate compulsory programmes, but they tend to be less successful (and more costly) than programmes that have been developed co-operatively.

General comments

The most relevant comment that I feel I can make is that collecting information from any fishery without clear objectives which are tightly integrated into the management of that fishery is not a sensible course of action. This seems to me to be the most fundamental flaw in the SBRM Public Hearing Document where the "preferred alternative" is to specify a single region-wide performance standard, specifically the "30% CV" for mean catch estimates, without reference to the management objectives the coefficient of variation (CV) standard is to serve, including conservation issues applying to these fisheries. That is because specifying a CV without knowing how the data will be used in the management or the science is like putting the "cart before the horse". The precision required for an estimate should always be tied to the purpose to which the estimate is put. To do otherwise is poor science and not good management practise.

I recognise that there is a lack of information to manage some aspects of these fisheries and the SBRM is an attempt to rectify important missing components needed for management. However, simply specifying a minimum level of observer coverage and/or specifying a target performance standard is probably not the best way to go about establishing the collection of data that can be used to manage these fisheries. My understanding is that the SBRM will apply to about 1,500 strata (where a stratum would be a species, fishery, time period cell) for which data would be collected. It is almost inconceivable that any agency would have the resources to go through a process of designing, implementing and finally analysing the data for such a large number of strata. Even 100 such strata would tax the capacity of any agency with which I am familiar. It is important to note that an observer on a vessel collecting information over a number of species will not achieve the 30% CV performance standard for each species collected. Instead, the 30% CV performance standard will require a separate sampling protocol for every species because each species is captured at different rates, even on the same vessel.

A frequent lapse in many observer programmes is the failure to adequately analyse the resulting data. Captain Ron Smolowitz, an independent gear technologist and consultant to the FSF, described to me the existence of observer bycatch information for a scallop dredge fishery in the Georges Bank Scallop Access Areas which takes yellowtail flounder as a bycatch. High levels of observer coverage are used to manage this fishery and there exist at least four years of good quality data. However, I understand that these data have not yet been analysed to see whether they have achieved a target CV performance standard nor has the design of this observer programme been adjusted based on the data collected. Given that resource constraints apply to all natural resource management regimes with which I am familiar, this example shows how difficult it is to achieve an adequate level of design, implementation and analysis for a single programme, let alone 1,500 cells.

Therefore, I believe that mandating a fixed CV performance standard on 1,500 strata and expecting that this will supply useful information that can be used in managing these fisheries is a recipe for failure. It is inconceivable to me that there would be sufficient resources, either in terms of personnel or of money, that could successfully undertake the design of such a large programme, let alone implement and evaluate the outcome of each and every stratum. The SBRM, as I think it will progress over time, will most likely result in a pattern of putting

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observers on vessels without a great deal of thought, collecting a large amount of data, some of which may be relatively useless and then allowing the data to moulder in a computer without being properly analysed.

An alternative approach

My experience has shown that this problem should be approached differently to achieve success. For instance, in New Zealand, the Ministry of Fisheries uses "Working Groups" (which are organised around specific fisheries or species groupings) to help it to perform the following tasks: a) setting priorities for which fisheries are to be monitored (usually on the basis of perceived problems), b) arranging for the scientific design of an observer programme to address the problems, c) critiquing and evaluating the design before implementation, d) overseeing the implementation of the design and e) arranging for an evaluation of the final product.

In New Zealand, Working Groups are comprised of knowledgeable and interested people who represent all components of fishery "stakeholders": government and industry scientists, managers, representatives from NGOs, recreational fishery groups and aboriginal groups. The Working Groups tend to work on a consensus basis, primarily putting forward material on which there is agreement. Occasionally there is dissension and a minority report will also be filed. But there is usually strong agreement on issues which involve fishery observer coverage because these issues tend to be straightforward and usually do not cause much difference in opinion.

It appears to me that what is missing in the SBRM Public Hearing Document is the establishment of a <u>process</u> – the development of fishery-specific methodologies – that will achieve the collection of useful information which can be used to manage bycatch in these fisheries without specifically mandating a fixed 30% CV for large number of separate strata. Such a process needs to be measured, thoughtful and directed towards where it will do the most good and will address the problems which require immediate attention. Resources are always limiting in natural resource management situations and they need to focussed on those problems which are perceived to be the most acute. This can be best done (in my experience) in a group setting where consensus can be reached. A motivated and well run Working Group will achieve a much better result than single individuals working in isolation, regardless of which agency or interest group they represent.

Additional issues concerning the design of observer programmes

I have a few additional points to add to this submission, which are technical but which have implications for the SBRM decision:

1. Observer coverage CVs often are calculated as if every tow is independent. This is not true because observer coverage takes place in the context of a fishing trip, a series of tows conducted by the same skipper. Experience has shown that sequential tows by the same skipper are correlated, which means they are not statistically independent. This means that more tows need to be observed to achieve the statistical performance standard of a 30% CV than would be required if all tows could be randomly selected. While this issue is not strictly relevant to the specification of the 30% CV performance standard, it is frequently overlooked and means that achieving the mandated performance standard is often much more difficult than envisioned.

2. There are also auxiliary issues associated with observer coverage. One of these is the "observer effect". That is, vessels perform differently when an observer is present. This effect is obviously most important when observer coverage is low, because there will be the greatest leverage. However, this effect may affect the calculation of the CVs and should be considered in the design of the programme.

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3. Another issue is how to handle downtime while the observer is on board. NGO commentary often suggests that commercial vessels use this opportunity to subvert the coverage afforded by an independent observer, although this effect may be less pronounced in fishery systems that are managed by a trip limit or by the number of days fished. More importantly, observer downtime will affect the estimate of the CV and should be included in the estimation of this quantity. Again, this is frequently an aspect of observer coverage which tends to be overlooked with the more usual response being to assume that every tow on a vessel with an observer is actually observed.

4. The method of calculating the CV will also be, to some extent, fishery (or stratum) dependent. For instance, fisheries that consist mainly of day trips will have different issues for calculating the CV compared to fisheries that go out for a week or more. This dichotomy shows the weakness of relying on a universal standard to ensure adequate coverage for all fishery strata and indicates that specifying a single target CV performance standard will not address all the relevant issues.

I bring up these points not because they are directly relevant to the decision of whether to implement the SBRM, but because they affect the design of the programme which is needed to achieve the mandated 30% CV and illustrate why specifying a single CV target is not adequate in itself. The calculation of the CV itself will be incorrect unless all factors which affect the CV are incorporated, and these will vary across fisheries or even within the same fishery, as they will differ by species. With these factors contributing complications in calculating the CV estimates, there is a danger that the focus of the SBRM programme will move to determining whether the performance standard was achieved, rather than ascertaining whether the data needed to manage the fishery were obtained.

Conclusion

My instinctive reaction to the SRBM proposal is that a single performance standard that applies to a range of objectives across a large number of fisheries is doomed to failure. Fisheries don't fit the "one size fits all" model. It is not sensible to expect that a single over-arching performance standard, such as specifying a 30% CV, will automatically result in satisfactory outcomes across a number of differing situations. Fisheries are complex and managing them requires careful consideration of the components of each situation individually. To do otherwise is a recipe for failure.

One final point: my experience has shown that observer programmes are much more successful when the participants support the project. Observers always are "extra" in that they interfere with the smooth operation of the vessel and potentially may affect the livelihoods of everyone on board. Therefore, it makes a lot of sense to design the programme in such a way that the co-operation of those most affected is secured. Mandating unrealistic solutions that are probably not achievable is not the best way to proceed. Instead, if a process where fishermen are allowed to have a real and significant input at the design level of the programme is developed, then the overall goals of the programme are much more likely to be achieved.

Sincerely yours,

Paul Starr

ATTACHMENT 2

CURRICULUM VITAE

Full Name: Paul J. Starr

Present Position: Consulting Fisheries Stock Assessment Scientist

Present Employer: self-employed

Present Work Addresses:
61A Rhine Street
Wellington
New Zealand
Phone: (644) 383 8148

1406 Rose Ann Drive
Nanaimo, British Columbia V9T 4K8
Canada
Phone: (250) 758 6097

Email : paul@starrfish.net

Academic Qualifications:

1973 Master of Science
University of British Columbia
Thesis title: Population dynamics and colonisation of *Sida crystallina* in Marion Lake, British Columbia.

1968 Bachelor of Science
Yale University
Thesis topic: Distribution of aquatic invertebrate fauna in cave ecosystems

Professional Positions Held:

2000 – present Consulting Fisheries Stock Assessment Scientist
Major clients:
- Canadian Groundfish Research and Conservation Society
- New Zealand Rock Lobster Industry Council
- New Zealand Seafood Industry Council

1997 – 2000 Chief Scientist
NZ Seafood Industry Council

1991 – 1997 Fisheries Stock Assessment Scientist
NZ Seafood Industry Council
(previously *New Zealand Fishing Industry Board*)

1982 – 1991 Senior Stock Assessment Biologist (chinook salmon)
Canadian Department of Fisheries and Oceans (DFO)
Biological Sciences Branch

1981 - 1982	Program Planner Canadian Department of Fisheries and Oceans Program Planning Branch
1980 - 1981	Management Biologist, Canadian Department of Fisheries and Oceans Fraser River Division Fisheries Branch
1976 - 1980	Biological Technician Canadian Department of Fisheries and Oceans Fraser River Division Fisheries Branch
1975 -1976	Fisheries Biologist Province of British Columbia Fish and Wildlife Branch
1973 - 1975:	Research Assistant University of British Columbia Institute of Animal Resource Ecology

Present Research/Professional Speciality:

- Experience in stock assessment of a variety of marine species, including deepwater demersal species (orange roughy, oreo, hoki and other species), inshore demersal species (snapper), shellfish (including lobster) and salmon (chinook, coho, sockeye, chum and pink).
- Experience in designing marine fisheries research programmes, including biomass tagging surveys, sampling of commercial and recreational catches, and research trawl surveys.
- Specialisation includes designing self-monitoring programmes for the collection of scientifically useable information in commercial potting, long line and trawl fisheries.
- Experience in the presentation and interpretation of fisheries data for the purposes of fishery management, including extensive participation in peer review working groups in Canada, New Zealand and the United States.
- Experience in providing advice to the fishing industry, to government policy makers, and to government negotiators in international fishing treaties.
- Experience in the New Zealand ITQ system, particularly in its implementation of research planning for fisheries assessment research, the evaluation of the research output and its integration into eventual management decisions.
- Specialisation in the interpretation and presentation of scientific information to all parts of the NZ Fishing Industry to allow informed decision making on scientific issues.
- Supervision and training of graduate students in a practical fisheries assessment and management environment.

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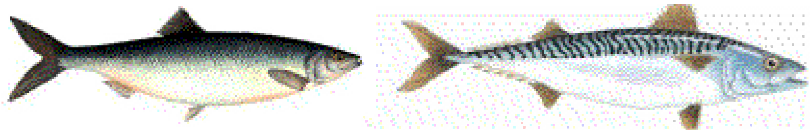

NW Atlantic Small Pelagic Resource Oversight Group
4 Fish Island
New Bedford, MA 02740
Contacts: Brady Schofield/NORPEL, New Bedford, MA (508) 979 1171
Jeff Reichle/Lund's Fisheries, Cape May, NJ (609) 884 7600

Processors:

Lund's Fisheries
Atlantic Capes Fisheries
Cape May, NJ
NORPEL
New Bedford, MA
P/V Frost
Fall River, MA
Cape Seafoods, Inc.
Gloucester, MA
Atlantic Pelagic Seafoods, LLC
Portland, ME

Vessels:

Cape May, NJ:
F/V Enterprise
F/V Gulf Stream
F/V Flicka
F/V Dyrsten
F/V Retriever
F/V White Dove

Newport, RI
F/V Seabreeze

New Bedford, MA
F/V Atlantic
F/V Moragh K
F/V Mary K
F/V Nordic Explorer
F/V Dona Martita
F/V Eastern Hunter
F/V Western Hunter
F/V Crystal Sea
F/V Luke and Sarah

Gloucester, MA
F/V Osprey
F/V Western Venture
F/V Endeavor
F/V Challenger
F/V Voyager

Portland, ME
F/V Harmony

Associations:

American Pelagic Association

Garden State Seafood Association

December 29, 2006

VIA ELECTRONIC MAIL

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

RE: FISHERIES SURVIVAL FUND COMMENTS ON SBRM AMENDMENT

On behalf of the companies and vessels listed in our masthead, we are writing in support of the comments submitted to you today by Kelley Drye Collier Shannon (Shaun Gehan and David Frulla, on behalf of Fisheries Survival Fund) relative to the Standardized Bycatch Reporting Methodology Omnibus Amendment.

Their comments and suggestions reflect our needs, and will make the Omnibus Amendment workable for the Agency, the Councils and the affected industry.

As an industry, we advocate for sound fishery science and management. We believe the Omnibus Amendment, as currently written, could be very detrimental to your Agency's ability to manage the fisheries properly given the likelihood for litigation if and when the Agency is unable to fulfill the specific requirements of the Amendment as currently proposed.

Thank you,

/s/
Brady Schofield and Jeff Reichle

Conservation Law Foundation

December 29, 2006

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

Via electronic mail to: SBRMcomment@noaa.gov

Re: Comments on SBRM Amendment

Dear Ms. Kurkul,

The Conservation Law Foundation (CLF) submits the following comments on the omnibus Standardized Bycatch Reporting Methodology Amendment (Omnibus SBRM). We again acknowledge and thank the New England Fishery Management Council (NEFMC) and the National Marine Fishery Service (NMFS) for responding to our request in the fall of 2005 to decouple the draft SBRM, advanced by NMFS at that time from Groundfish Framework 42. The draft Omnibus SBRM amendment that will apply to all fisheries in New England is clearly a superior effort that has benefited from additional work. Developing and implementing a comprehensive SBRM based on the best available science is an important step toward achieving full compliance with the Magnuson-Stevens Act's bycatch requirements and addressing one of the most serious conservation and management issues facing fisheries management in New England.

While the proposed Omnibus SBRM demonstrates considerable effort by NMFS to develop a draft SBRM that would be a significant improvement over the existing patchwork of bycatch reporting measures, it simply continues to fail to meet the legal requirements of the Magnuson-Stevens Act (MSA), the National Environmental Policy Act (NEPA), and relevant court orders. CLF urged that these shortcomings be addressed throughout development of the Omnibus SBRM, thus it is unfortunate that at this time we must urge you to again withdraw the draft Omnibus SBRM in order to develop and analyze an appropriate range of alternatives addressing the legal shortcoming discussed below through a full Environmental Impact Statement (EIS). While we continue to seek expeditious implementation of SBRMs throughout New England's fisheries, the fact is that this SBRM will establish precedent for future SBRM's across the nation. Thus, while we are disappointed that more time will be required to complete the amendment, it is more important that it be done right and that further litigation on this matter is avoided if at all possible.

I. Bycatch Information is Critically Important to Effective Fisheries Management

The Northwest Atlantic ecosystem, the fish populations it supports, and fishing communities throughout New England continue to suffer due to depleted fish populations resulting from the failure of the existing groundfish management system to achieve its conservation and rebuilding goals. A

14 Maine Street, Suite 200, Brunswick, Maine 04011-2026 • 207-729-7733 • Fax: 207-729-7373 • www.clf.org

MASSACHUSETTS: 62 Summer Street, Boston, Massachusetts 02110-1016 • Phone: 617-350-0990 • Fax: 617-350-4030
NEW HAMPSHIRE: 27 North Main Street, Concord, New Hampshire 03301-4930 • 603-225-3060 • Fax: 603-225-3059
RHODE ISLAND: 55 Dorrance Street, Providence, Rhode Island 02903 • 401-351-1102 • Fax: 401-351-1130
VERMONT: 15 East State Street, Suite 4, Montpelier, Vermont 05602-3010 • 802-223-5992 • Fax: 802-223-0060

significant contributing factor to the poor condition of N.E. stocks is the failure of New England fisheries managers to adequately implement measure to avoid and minimize bycatch.

As clearly set out in the Magnuson-Stevens Act, development of a SBRM to assess the amount and types of bycatch occurring in fisheries is a critical aspect of the Council's responsibility when writing fishery management plans, and it is the first step to fulfilling the Act's mandates to minimize bycatch and bycatch mortality. Without an accurate and precise assessment of bycatch, the Council and NMFS are simply hamstrung in their ability to develop management measures to account for the ecological and economic waste that is occurring in our fisheries. Without appropriate bycatch assessment and reporting, effective management is impossible.

II. The Omnibus SBRM Fails to Meet the Requirements of the Court Order Regarding the Development of a Standardized Bycatch Reporting Methodology

As you are aware, the Conservation Law Foundation brought two separate federal court cases resulting in decisions holding that the bycatch measures developed by the Council and NMFS for inclusion in the Groundfish FMP failed to meet the legal requirements of the Magnuson-Stevens Act (MSA).[1] While the proposed Omnibus SBRM Amendment is greatly improved over initial efforts, it is still inadequate and fails to meet the applicable legal requirements as set forth in the March 9, 2005 Order by the United States District Court for the District of Columbia. Specifically, the Federal Court ordered NMFS and the NEFMC to evaluate its bycatch reporting and assessment program, establish a standardized reporting methodology, specify observer coverage levels in their fishery management plans, and address other demonstrated shortcomings in their observer program.[2] In reaching this conclusion, the Court emphasized the following points:

1. NMFS violated the MSA when it failed to require any observers in the New England groundfish fishery.[3]

2. NMFS violated the MSA and ignored the best available science when it failed to take account of the report on bycatch and observers submitted by Oceana to NMFS as part of the Amendment 13 administrative record.[4]

3. NMFS violated the MSA when it failed to assess the bycatch problem by sector, gear type, and species.[5]

4. NMFS violated the MSA when it relied upon discredited methodologies for monitoring and reductions in bycatch in the New England groundfish fishery.[6]

[1] *Conservation Law Foundation v. Evans,* 209 F. Supp. 2d (D.D.C. 2001); *Conservation Law Foundation v. Evans,* D.D.C. No. 04-811 ESH (March 9, 2005)(*consolidated as Oceana v. Evans).* In the 2001ruling, the Court explicitly criticized NMFS for relying upon bycatch reporting methods that were demonstrably inaccurate and inadequate. In the March 9, 2005 ruling, the Court referenced these earlier findings. *Oceana v. Evans*,. at 85.
[2] *Oceana v. Evans*, D.D.C. No. 04-811 at 85.
[3] *Id.* at 79-82.
[4] *Id.* at 83-84.
[5] *Id.* at 84-85.
[6] *Id.* at 85.

Upon entering these findings, the Court remanded the bycatch portion of Amendment 13 to NMFS with instructions to comply with the MSA.[7]

Given that NMFS has already delayed its compliance with the bycatch requirements of the MSA by over ten years, and now for more than five years following the ruling by Judge Kessler in December of 2001, we again request prompt compliance with the MSA and the March 9, 2005 Order. In order to do so, the following changes to the draft SBRM must be made.

1. Specify levels of Observer Coverage in the FMPs

The Court found that the groundfish FMP failed to specify a level of observer coverage in the fishery. Further, the Court rejected the argument by NFMS that is had met its SBRM obligations by stating an intention to achieve a certain level of observer coverage while retaining complete discretion for setting the actual level of observer coverage.[8] The draft Omnibus SBRM appears to take the same approach rejected by the Court by establishing mere performance targets in the SBRM while leaving the actual level of observer coverage entirely up to NMFS's discretion.

Further, insofar as the SBRM appears to undertake an allocation analysis for observer coverage based upon a certain level of days fished, it is not clear whether there is a mechanism in place to update the allocation analysis annually (or more often) in order to address changes in the fishery. The draft also indicates that the actual allocation of observers would be reduced based on funding, but there is no way to determine how this will occur and no standards are set for minimum levels of coverage. The Omnibus SBRM must set the stage for the Council and NMFS to specify the levels of observer coverage in all fisheries by gear type, sector, and/or other appropriate criteria.

2. Adequately Assess the Bycatch Problem by Fishery, Gear Type, and Species.

In reaching its conclusion that the SBRM needed to address bycatch by sector, gear type, and species, the Court considered the bycatch plan utilized in the Pacific Highly Migratory Fisheries (FMP) as a reference point for what a legally compliant SBRM in New England would look like.[9] As is evident by the Court's decision and a review of the Pacific FMP, to be useful in improving fisheries management the SBRM must specifically contemplate the changing dynamics of each fishery by gear type and species, and be integrated into each FMP. The draft Omnibus SBRM does not do this in a meaningful way, and therefore it is likely to fall well short of anticipating and adapting to future fishery conditions and management needs. As a starting point for addressing these shortfalls and making the SBRM a truly useful document, it should include a discussion of each fishery, gear type, and associated species interactions along with the fisheries management scheme. It should then consider and seek to anticipate the potential bycatch data needs in order to make appropriate recommendations for levels of observer coverage and other means for collecting bycatch data.

Further, the MSA's bycatch provisions contemplate that a broader range of species will be addressed than is covered by the Omnibus SBRM. Species not commercially targeted under fisheries managed by the New England or Mid-Atlantic Councils should be included. These

[7] *Id*. at 85-86.
[8] *Id.* at 79-82.
[9] The Court noted specifically that the FMP evaluates various kinds of reporting for different types of fishing gear and vessels. (See CLF Mot. Ex. 2 (HMS FMP, August 2003) at Ch. 5, pp. 34-36 (previously provided as part of this record).

species should include those managed by the Atlantic States Marine Fisheries Commission, Highly Migratory Species, protected species (e.g., sea turtles), and species known to be at risk (e.g., wolfish, cusk, corals). Absent these species, the SBRM is incomplete and will fail to meet the MSA's intended goals.

3. Best Available Science Must be Applied in Establishing the SBRM

Performance standard

To be effective, the Omnibus SBRM must set a mandatory performance standard; it cannot be a mere target standard. The standard must clearly indicate how it is to be applied, and it needs to be set for each fishery, gear type and/or sector, and species.

Reporting

There should be, at a minimum, an annual report on bycatch for each fishery broken down by gear type, sector (as appropriate), area fished, species and other means as determined by the Council. All reports must be public.

Filters

The Omnibus SBRM proposes to reduce the initial observer allocations by applying a series of "importance filters." These filters would remove fishery mode/species combinations from the list of observer needs based on different criteria including the current database of fishery mode/species interactions. This approach is fundamentally flawed because it uses the existing poor observer data as the foundation for the calculation of the allocation. A better approach would be to establish a baseline level of observer coverage for a period of years and to then use this observer data to establish the appropriate use of future of statistical filters. Further, until there is a robust data set providing a high degree of confidence in the use of filers, no protected species or species at risk should be eliminated as a result of data shoing a low frequency of interaction because, by definition, a low frequency is likely in many instances due to the low abundance of protected species.

CLF is also concerned that filter 3 could result in the inappropriate removal of a fishery mode/species because the species could show up as a low volume in a very high volume fishery, yet the environmental impact could be significant. Recent evidence of bycatch of haddock in the herring mid-water trawl fishery is one example though, because of the severely depleted status of cod, a cod/herring trawl interaction could be even more serious. Filter 3 should be eliminated from the SBRM. Filter 4 is also of concern because it fails to establish a threshold value, a matter that should be analyzed through an appropriate EIS alternatives analysis.

III. Failure to Complete an Environmental Impact Statement or Meet Other Fundamental National Environmental Policy Act Requirements

1. The SBRM Will Have Significant Environmental Impacts Triggering the Need for an EIS

Contributing significantly to the shortfalls in the Omnibus SBRM is the failure to develop the Amendment through an EIS. Lack of an EIS limited the opportunities for public participation and stymied New England and Mid-Atlantic Council involvement, which in turn has significantly limited the range of alternatives considered and the substantive analysis of the issues.

As noted above, the first step to fulfilling the Act's mandates to minimize bycatch and bycatch mortality is the SBRM; if the SBRM fails to include an accurate and precise assessment of bycatch it is impossible for the Council and NMFS to develop the management measures necessary to reduce the ecological and economic waste that is occurring in our fisheries. The decisions made as a result of the SBRM analysis will affect fisheries and other ocean life throughout the New England and Mid-Atlantic regions and will help form the basis for nearly all fundamental fisheries management tools including stock assessments and management measures to control fishing mortality and bycatch, itself. A poorly designed SBRM could result in significant environmental harm as bycatch issues are missed or their seriousness is not accurately assessed resulting in the severe depletion of a species.

It is difficult to imagine an action to be taken by NMFS with a greater potential to significantly affect the quality of the human environment, thus the agency must take a hard look at the environmental impacts of the Omnibus SBRM in a full EIS.

2. The SBRM Fails to Consider a Range of Alternatives

Fundamentally, the draft Omnibus SBRM only contains two alternatives for each decision point, one of which is the status quo, and fails to consider other reasonable alternatives. In some cases the identified alternative is so overly simplistic the result is in effect to have no alternative at all (e.g., whether to specify an SBRM review process). Development of a SBRM, like other major federal actions, requires consideration of an appropriate range of alternatives to comply with NEPA and the MSA. Additional alternatives should have been considered in many areas of the Omnibus SBRM, including for importance filters, bycatch reporting and monitoring mechanisms, performance standards, and bycatch review and reporting. The failure to consider a reasonable range of alternatives here at least partly stems from the decision early on not to undertake an EIS, thereby limiting public participation and the opportunity to develop additional alternatives.

IV. NMFS Should Specify Observer Coverage via Emergency Rule

Because the fishery management plans for New England continue to unlawfully fail to require any level of observer coverage, NMFS must take action immediately by emergency rule to establish an adequate level of coverage during the period of time it takes to develop a legally compliant SBRM through an EIS. The observer coverage established through emergency rule must be based on the best available science. In instances where draft SBRM or other information does not represent the best available science for setting the level observer coverage necessary to assure accurate and precise estimates of bycatch for a given gear type or sector, NMFS should establish observers on at least 20 percent of all days fished (trips) consistent with the Oceana report on bycatch discussed in the March 9, 2005 federal court ruling (e.g., 20 percent).[10]

Thank you for considering these comments. The Conservation Law Foundation looks forward to working with NMFS, the NEFMC and other interested parties to address the concerns raised in these comments. Should you have questions regarding these comments or wish to discuss any of the issues further, please contact me at rfleming@clf.org or by telephone at 207.729.7733.

Sincerely yours,

/S/__________
Roger Fleming
Senior Attorney

[10] *Oceana v. Evans*, D.D.C. No. 04-811 at 84-85.

cc: New England Fishery Management Council

Paul J. Howard
Executive Director
New England Fishery Management Council

William Hogarth
Assistant Administrator
National Marine Fisheries Service

Gene Martin
Regional Counsel
National Marine Fisheries Service

Appendix F
Example SBRM Report and Data Queries

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EXAMPLE – EXAMPLE – EXAMPLE – EXAMPLE – EXAMPLE

Northeast Region SBRM Review Report

[*Note: This is an* _example_ *report to illustrate one possible structure for presenting information relevant for reviewing and evaluating the Northeast Region SBRM. This information should be considered preliminary and is not intended for Council action.*]

Monkfish

Background

Amendment 3 to the Monkfish Fishery Management Plan (FMP), part of the Omnibus Standardized Bycatch Reporting Methodology (SBRM) Amendment to the Northeast Region FMPs, implemented several requirements regarding the reporting of bycatch information for the monkfish fishery. This amendment was developed under the authority of section 303(11)(a) of the Magnuson-Stevens Act, which requires that all FMPs establish an SBRM. The SBRM Amendment addressed four elements: (1) The bycatch reporting and monitoring mechanisms used to obtain information on discards in Northeast fisheries; (2) the analytical techniques used to estimate discards and to allocate at-sea observer effort; (3) establishing a precision-based performance standard for the SBRM; and (4) requiring a periodic review and reporting process as part of the SBRM.

This document complies with the fourth element of the SBRM implemented under Amendment 3: The periodic SBRM Report. This report is intended to provide information with which the New England and Mid-Atlantic Fishery Management Councils (Councils) and NOAA Fisheries Service would consider the effectiveness of the SBRM and, if necessary, take appropriate steps to improve the SBRM. As described in Amendment 3, the SBRM Report would provide the following information: (1) A review of the recent levels of observer coverage in each applicable fishery; (2) a review of recent observed encounters with each species in each fishery, and a summary of observed discards by weight; (3) a review of the coefficient of variation (CV) of the discard information collected for each fishery; (4) an estimate of the total amount of discards associated with each fishery (these estimates may differ from estimates generated and used in stock assessments, as different methods and stratification may be used in each case); (5) an evaluation of the effectiveness of the SBRM at meeting the specified target for each fishery; (6) a description of the methods used to calculate the reported CVs and to determine target observer coverage levels, if the methods used are different from those described and evaluated in the SBRM Amendment; and (7) an evaluation of the implications for management of the discard information collected under the SBRM.

The information to be provided in the report for the purpose of determining the effectiveness of the SBRM in meeting the CV standards should not be confused with the level of information a Council may want or need to address specific management issues. More detailed discard-related information, structured in a way and at a scale meaningful for the particular management issue, can always be provided at the Councils' request.

Analytical Overview

This report focuses on the monkfish fishery, as managed under the Monkfish FMP, but addresses the discards of all species in the monkfish fishery as well as the discards of monkfish in other fisheries. There are three primary fishing gear modes that comprise the monkfish fishery: New England large-mesh otter trawl; New England extra-large-mesh gillnet; and Mid-Atlantic extra-large-mesh gillnet. This analysis will examine the discards of all species that occur in these three fishing modes.

In addition to the three primary monkfish fishing modes identified above, there are another 17 fishing modes for which at least some amount of monkfish was discarded in 2004. Of these, there are nine that contributed at least 1 percent of the total estimated monkfish discards in 2004: New England and Mid-Atlantic open area, limited access scallop dredge; New England and Mid-Atlantic small-mesh otter trawl; New England and Mid-Atlantic open area, general category scallop dredge; New England and Mid-Atlantic closed area, limited access scallop dredge; and Mid-Atlantic large-mesh otter trawl. This analysis will examine monkfish discards in these fishing modes.

Review of Recent Levels of Observer Coverage

Table 1 identifies the observer coverage in 2004 for the primary monkfish fishery and monkfish discard fishing modes. This table also identifies the number of FVTR reports submitted for each fishing mode, in order to calculate an observer coverage rate for 2004.

Fishing Mode	Observed Trips	Observed Sea Days	FVTR Trips	Coverage Rate
NE large-mesh otter trawl	386 (153)	1,076 (871)	16,156	2% (3%)
NE x-large-mesh gillnet	445 (124)	533 (168)	4,712	9% (12%)
MA x-large-mesh gillnet	27 (115)	30 (122)	2,568	1% (6%)
NE OL scallop dredge	26 (10)	344 (113)	1,229	2% (3%)
MA OL scallop dredge	69 (9)	591 (84)	1,822	4% (4%)
NE small-mesh otter trawl	142 (58)	449 (128)	3,484	4% (6%)
NE OG scallop dredge	9 (11)	11 (13)	3,566	0.25% (1%)
NE CL scallop dredge	86	805	292	29%
MA CL scallop dredge	35	373	78	45%
MA OG scallop dredge	22 (17)	33 (22)	3,433	1% (1%)
MA large-mesh otter trawl	75 (1)	183 (3)	8,850	1% (1%)
MA small-mesh otter trawl	194 (11)	471 (18)	5,222	4% (4%)

Table 1. 2004 observer coverage rates for the primary fishing modes associated with either the monkfish fishery (landings) or monkfish discards. Numbers in parentheses represent additional observer coverage included in the protected resources dataset (either training trips or "limited protocol" trips). For modes with no number in parentheses, there were no additional trips in the protected resources dataset.

Recent Observed and Estimated Discards

Discards in the Monkfish Fishery

As noted above, there are three primary fishing modes that comprise the monkfish fishery: New England large-mesh otter trawl; New England extra-large-mesh gillnet; and Mid-Atlantic extra-large-mesh gillnet. Together, three fishing modes accounted for over 92 percent of monkfish landings in 2004 (see Table 2). Although there were 142 species observed to be discarded in 2004 by these three fishing modes, the top 10 discard species accounted for 83 percent, by weight, of the total observed discards (see Table 3). Winter and little skates were the primary discard species, together comprising over 41 percent of observed discards. All skates combined represented 58 percent of all observed discards in these three fishing modes. Spiny dogfish accounted for another 14 percent of observed discards; monkfish, 4 percent; Jonah crab, 3.2 percent; American lobster, 2.9 percent; and thorny skate, 2.8 percent. All other discard species represented 1 percent or less of the total observed discards for these three fishing modes. Attachments 1, 2, and 3, identify all observed discards, by weight, for the three primary monkfish fishing modes.

Fishing Mode	2004 Monkfish Landings (lb) (FVTR)	Percent of Total 2004 Monkfish Landings	Cumulative Percentage of Landings
NE Large-mesh Trawl	14,955,163	47.6%	47.6%
NE X-Large-mesh Gillnet	9,836,119	31.3%	78.9%
MA X-Large-mesh Gillnet	4,301,618	13.7%	92.6%
NE Scallop Dredge	878,931	2.8%	95.4%
NE Large-mesh Gillnet	615,585	2.0%	97.3%
MA Scallop Dredge	348,132	1.1%	98.4%
MA Large-mesh Trawl	346,457	1.1%	99.5%
NE Small-mesh Trawl	49,150	0.2%	99.7%
MA Small-mesh Trawl	36,600	0.1%	99.8%
MA Scallop Trawl	32,555	0.1%	99.9%

Table 2. 2004 monkfish landings, by weight, by fishing mode (FVTR).

Discard Species	Total 2004 Observed Discards (lb)	Percent of Total Observed Discards	Cumulative Percent of Observed Discards
Winter skate	386,292	21.5%	21.5%
Little skate	353,072	19.6%	41.1%
Spiny dogfish	253,710	14.1%	55.2%
Skate, NK	219,095	12.2%	67.3%
Monkfish	72,706	4.0%	71.4%
Jonah crab	57,026	3.2%	74.5%
American lobster	51,748	2.9%	77.4%
Thorny skate	50,240	2.8%	80.2%
Atlantic cod	27,633	1.5%	81.7%
Windowpane flounder	23,448	1.3%	83.0%

Table 3. Top ten discard species, by weight, and percent of total 2004 observed discards in the New England large-mesh otter trawl, and New England and Mid-Atlantic extra-large-mesh gillnet fishing modes, combined.

Discards of Monkfish in Other Fisheries

As noted above, there are 20 fishing modes, including the three primary modes in the monkfish fishery, for which at least some amount of monkfish was discarded in 2004. Table 4 identifies the discards of monkfish in 2004, based on observed fishing trips in these 20 fishing modes. The table identifies both the observed discards, the ratio of observed monkfish discards to total observed discards (which indicates the degree to which monkfish is a component of the total discards in the fishing mode), an estimate of the total discards of monkfish in these fishing modes (based on the techniques described in the SBRM Amendment), and the percent (and cumulative percent) of the estimated total monkfish discards in these fishing modes.

Fishing Mode	Observed Monkfish Discards (lb)	Observed Discards, All Species (lb)	Ratio of Monkfish to Total Discards	Estimate of Total Monkfish Discards (lb)	Percent of Total Monkfish Discards	Cumulative Percent of Discards
NE Scallop Dredge OL	37,877	806,792	4.7%	2,896,875	29.71%	29.71%
MA Scallop Dredge OL	45,211	787,116	5.7%	2,027,711	20.79%	50.50%
NE Large-mesh Otter Trawl	41,061	1,545,623	2.7%	1,313,457	13.47%	63.97%
NE Small-mesh Otter Trawl	26,577	1,108,074	2.4%	1,136,577	11.66%	75.63%
NE X-Large-mesh Gillnet	29,933	241,610	12.4%	635,797	6.52%	82.15%
NE Scallop Dredge OG	3,330	9,918	33.6%	402,741	4.13%	86.28%
NE Scallop Dredge CL	123,828	1,477,622	8.4%	377,988	3.88%	90.15%
MA Scallop Dredge CL	67,163	960,608	7.0%	245,389	2.52%	92.67%
MA Scallop Dredge OG	1,307	33,400	3.9%	209,696	2.15%	94.82%
MA Large-mesh Otter Trawl	3,629	208,137	1.7%	166,051	1.70%	96.52%
MA Small-mesh Otter Trawl	7,744	776,602	1.0%	110,351	1.13%	97.65%
MA X-Large-mesh Gillnet	1,712	13,386	12.8%	103,961	1.07%	98.72%
MA Scallop Trawl OL	275	16,019	1.7%	76,078	0.78%	99.50%
MA Scallop Trawl OG	585	37,893	1.5%	28,377	0.29%	99.79%
NE Large-mesh Gillnet	878	555,903	0.2%	11,021	0.11%	99.90%
MA Scallop Dredge CG	11	394	2.8%	6,106	0.06%	99.97%
NE Midwater Trawl	269	402,297	0.1%	2,241	0.02%	99.99%
MA Midwater Trawl	94	18,637	0.5%	461	0.00%	99.99%
NE Shrimp Trawl	2	2,175	0.1%	428	0.00%	100.00%
MA Fish Pot	1	7,771	0.0%	234	0.00%	100.00%

Table 4. 2004 discards of monkfish, both observed and estimated total discards, by weight, for the 20 Northeast Region fishing modes with at least 1 lb of observed discards. The ratio of monkfish to total discards indicates, based on observer data, the relative proportion of the total observed discards that are accounted for by discards of monkfish. For example, the data collected by at-sea observers in 2004 suggest that monkfish comprise one-third of all discards in the New England open area, general category scallop dredge fishing mode.

Precision of Discard Estimates

Based on the information presented in the SBRM Amendment, a CV is a measure of the precision of the data used in developing discard estimates. Table 5 and Table 6 provide the CVs associated with the discard estimates for the fishing modes most relevant to this report. Table 5 identifies the CVs for all relevant species and species groups for the New England large-mesh otter trawl, and the Mid-Atlantic and New England extra-large-mesh gillnet fishing modes (the primary three fishing modes associated with the monkfish fishery). Table 6 identifies the CVs for monkfish discards for the 12 fishing modes for which the discards of monkfish accounted for at least 1 percent of the total monkfish discards in 2004.

Discard Species/Species Group	NE large-mesh otter trawl	NE extra-large-mesh gillnet	MA extra-large-mesh gillnet
Bluefish	247%	**18%**	**30%**
Atlantic herring	131%	38%	*
Deep-sea red crab	**28%**	N/A	N/A
Sea scallop	35%	N/A	N/A
Mackerel, squid, butterfish	57%	50%	*
Monkfish	**9%**	**17%**	**27%**
Large-mesh multispecies	**10%**	**16%**	*
Small-mesh multispecies	**18%**	62%	N/A
Skates	**17%**	**12%**	**11%**
Spiny dogfish	**24%**	**16%**	**13%**
Summer flounder, scup, black sea bass	32%	**23%**	**30%**
Surfclam, ocean quahog	N/A	N/A	N/A
Tilefish	53%	N/A	N/A
Sea turtles	*	*	49%

Table 5. The CV of total discards, by fleet and species group, derived from the 2004 Northeast Region Fisheries Observer Program, for the primary three fishing modes associated with the monkfish fishery. "*" indicates that there were zero discards in 2004. "N/A" indicates that the particular combination of species and fishing mode is excluded from the review.

Fishing Mode	Monkfish Discards
NE Scallop Dredge OL	32%
MA Scallop Dredge OL	**17%**
NE Large-mesh Otter Trawl	**9%**
NE Small-mesh Otter Trawl	40%
NE X-Large-mesh Gillnet	**17%**
NE Scallop Dredge OG	56%
NE Scallop Dredge CL	**25%**
MA Scallop Dredge CL	**26%**
MA Scallop Dredge OG	**20%**
MA Large-mesh Otter Trawl	**29%**
MA Small-mesh Otter Trawl	35%
MA X-Large-mesh Gillnet	**27%**

Table 6. The CV of total monkfish discards, by fleet, derived from the 2004 Northeast Region Fisheries Observer Program, for the 12 fishing modes for which each mode's monkfish discards account for at least 1 percent of total monkfish discards.

Evaluation of Effectiveness of Meeting the SBRM Standard

The SBRM Amendment [*proposes to*] implement a performance standard of a CV of no more than 30 percent for each relevant combination of fishing mode and species/species group in the Northeast Region. The intent of this standard is to ensure that the data obtained through the Northeast Region SBRM is sufficiently precise to enable scientists and managers to confidently use the resulting data for conducting stock assessments and making management decisions.

Based on the information presented in Table 5 and Table 6, we can evaluate whether the SBRM has met the performance standard for the fishing modes relevant to the subject of this report, monkfish. For the three primary monkfish fishing modes, there are five species groups for which a CV could not be calculated because there were no (zero) discards observed in these fishing modes. There were also 10 species groups which are not included due to the “gray-cell” filter process (see SBRM Amendment for explanation of the gray-cell process). Of the remaining 27 combinations of fishing modes and species groups, 17 have CVs of 30 percent or less. Many of these have CVs considerably better than the SBRM standard (e.g., monkfish in New England large-mesh otter trawl, 9 percent; spiny dogfish in Mid-Atlantic extra-large-mesh gillnet, 13 percent). The remaining 10 combinations have CVs that exceeded the standard, and ranged from 32 percent to 247 percent.

For the 12 fishing modes with monkfish discards included in Table 6, 8 have CVs of 30 percent or less. The other four fishing modes have CVs that range from 32 to 56 percent. Overall, of the 41 unique fishing mode and species group combinations subject to the SBRM standard and related to monkfish, 14 (one-third) have CVs that exceed the standard. The remaining 27 combinations either meet the CV standard or have zero discards.

Implications for Management

In addition to determining whether or not the SBRM standard was met for each applicable combination of fishing mode and species group, it is also important to examine the potential management implications of not meeting the standard. The reasons for not meeting the standard can vary and include: Insufficient sampling; highly variable discard events; rare discard events; etc. Taking stock of the discard information driving the high CVs can be informative for both understanding the implications of not meeting the standard as well as setting priorities for redressing the issues. Table 7 displays, for each of the three primary monkfish fishing modes, the species groups for which the 2004 CV exceeds the SBRM standard and the observed discards, the estimated total discards, and the percent of total catch represented by the estimated total discards. Table 8 shows similar information for monkfish discards by the primary discard fishing modes for which the 2004 exceeds the SBRM standard.

	Discard Species/Species Group	2004 CV	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
NE Large-mesh Otter Trawl	Atlantic bluefish	247%	854	31,518	0.14%
	Atlantic herring	131%	563	18,710	0.01%
	Sea scallop	35%	1,191	39,996	0.06%
	Mackerel, squid, butterfish	57%	357	12,498	0.01%
	Summer flounder, scup, black sea bass	32%	21,854	720,531	1.48%
	Tilefish	53%	285	8,798	0.38%
NE X-Large-mesh Gillnet	Atlantic herring	38%	46	531	0.00%
	Mackerel, squid, butterfish	50%	393	9,736	0.00%
	Small-mesh multispecies	62%	373	4,414	0.02%
MA X-Large-mesh Gillnet	Sea turtles	49%	Yes	N/A	N/A

Table 7. Summary information regarding the potential impact of discards for species/species groups for which the 2004 CV exceeded the SBRM standard.

Fishing Mode	2004 CV (Monkfish)	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
NE Scallop Dredge OL	32%	37,877	2,896,875	12.58%
NE Small-mesh Otter Trawl	40%	26,577	1,136,577	4.93%
NE Scallop Dredge OG	56%	3,330	402,741	1.75%
MA Small-mesh Otter Trawl	35%	7.744	166,051	0.48%

Table 8. Summary information regarding the potential impact of monkfish discards for fishing modes for which the 2004 CV exceeded the SBRM standard.

Examining the information presented above provides insight into the potential implications for management of the relatively high CVs associated with the discard information collected in 2004 for the primary monkfish fishery fishing modes. With the possible exception of summer flounder, scup, and black sea bass discards in the New England large-mesh otter trawl mode, and sea turtle encounters in the Mid-Atlantic extra-large-mesh gillnet mode, the impacts of the discards associated with relatively high CVs are very likely to be trivial. Except as noted, estimated total discards do not exceed 40,000 lb for any species/species group, and for most cases, the estimated total discards represent less than 1/10 of 1 percent of the total (recreational and commercial) landings. Within the fishing modes that discard monkfish, although New England open area, limited access scallop dredge contributes the most monkfish discards, the CV (32 percent) is very close to the SBRM standard. Mid-Atlantic small-mesh otter trawl also has a CV (35 percent) relatively close to the SBRM standard, and the estimated total discards represent less than ½ of 1 percent of the total monkfish landings for 2004.

Further examination of the summer flounder, scup, and black sea bass discards in the New England large-mesh otter trawl fishing mode indicates that over 90 percent of the observed discards for this species group are summer flounder (19,723 lb out of 21,854 lb). Table 9 provides additional information on these three species for this fishing mode. In this case, the highest CVs are associated with scup and black sea bass, but estimated total discards for these two species are relatively low (0.45 percent and 0.15 percent, respectively, of total (commercial and recreational) 2004 landings). Most of the discards within this species group are summer flounder, but even though the CV is greater than the SBRM standard, it remains relatively close (33 percent rather than 30 percent).

Individual Species	2004 CV	Observed Discards (lb)	Estimated Total Discards (lb)	Discards as Percent of Total Landings
Summer flounder	33%	19,723	650,271	2.23%
Scup	92%	1,879	61,951	0.45%
Black sea bass	83%	253	8,341	0.15%

Table 9. Additional summary information regarding the potential impact of discards for species for which the 2004 CV exceeded the SBRM standard.

The implications of CVs exceeding the SBRM target, based on this information, are likely to be most important for the discards of monkfish in the New England small-mesh otter trawl and New England open area, general category scallop dredge fishing modes.

Trends in Discards

There is no information to be presented at this time on recent or developing trends in discards for the subject fishing modes.

Notes on the Example

This information should be considered to be preliminary. It is not presented for Council action, but rather is intended solely as an example of the potential structure and content that could be used in preparing future SBRM Reports.

The information presented in this example report was collected prior to the development and implementation of the Northeast Region SBRM. Future evaluations of the SBRM data should be conducted based on information collected after the SBRM is implemented.

Were this an actual SBRM report, additional information could be utilized and incorporated into the report, such as trend information on discards over time. Also, additional information could be presented depending on the specific needs of the Councils, Plan Development Teams, Fishery Management Action Teams, or Monitoring Committees.

Attachment 1: *Observed Discards in the NE Large-mesh Otter Trawl Fishing Mode*

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	SKATE, WINTER (BIG)	366,380	1,545,623	23.70%	23.70%
2	SKATE, LITTLE	347,835	1,545,623	22.50%	46.21%
3	SKATE, NK	217,238	1,545,623	14.06%	60.26%
4	DOGFISH, SPINY	149,701	1,545,623	9.69%	69.95%
5	CRAB, JONAH	49,502	1,545,623	3.20%	73.15%
6	SKATE, THORNY	47,074	1,545,623	3.05%	76.20%
7	MONKFISH (ANGLER, GOOSEFISH)	41,061	1,545,623	2.66%	78.85%
8	LOBSTER, AMERICAN	29,328	1,545,623	1.90%	80.75%
9	FLOUNDER, SAND DAB (WINDOWPANE)	23,446	1,545,623	1.52%	82.27%
10	FLOUNDER, WITCH (GREY SOLE)	22,266	1,545,623	1.44%	83.71%
11	FLOUNDER, SUMMER (FLUKE)	19,723	1,545,623	1.28%	84.99%
12	SKATE, SMOOTH	18,832	1,545,623	1.22%	86.20%
13	FLOUNDER, YELLOWTAIL	17,016	1,545,623	1.10%	87.30%
14	RAVEN, SEA	15,844	1,545,623	1.03%	88.33%
15	SPONGE, NK	15,118	1,545,623	0.98%	89.31%
16	COD, ATLANTIC	13,711	1,545,623	0.89%	90.19%
17	FLOUNDER, AMERICAN PLAICE	12,086	1,545,623	0.78%	90.98%
18	SCULPIN, LONGHORN	9,979	1,545,623	0.65%	91.62%
19	HADDOCK	9,724	1,545,623	0.63%	92.25%
20	OCEAN POUT	9,242	1,545,623	0.60%	92.85%
21	BASS, STRIPED	9,217	1,545,623	0.60%	93.45%
22	CRAB, TRUE, NK	8,419	1,545,623	0.54%	93.99%
23	SKATE, BARNDOOR	7,846	1,545,623	0.51%	94.50%
24	STARFISH, SEASTAR,NK	7,529	1,545,623	0.49%	94.99%
25	REDFISH, NK (OCEAN PERCH)	7,220	1,545,623	0.47%	95.45%
26	CRAB, DEEPSEA, RED	6,660	1,545,623	0.43%	95.88%
27	CRAB, SPIDER, NK	4,945	1,545,623	0.32%	96.20%
28	FISH, NK	4,499	1,545,623	0.29%	96.49%
29	FLOUNDER, FOURSPOT	4,474	1,545,623	0.29%	96.78%
30	FLOUNDER, WINTER (BLACKBACK)	3,871	1,545,623	0.25%	97.03%
31	HAKE, SILVER (WHITING)	3,648	1,545,623	0.24%	97.27%
32	POLLOCK	3,570	1,545,623	0.23%	97.50%
33	LUMPFISH	3,481	1,545,623	0.23%	97.73%
34	SKATE, CLEARNOSE	2,997	1,545,623	0.19%	97.92%
35	CRAB, ROCK	2,961	1,545,623	0.19%	98.11%
36	ANEMONE, NK	2,364	1,545,623	0.15%	98.26%
37	RAY, TORPEDO	2,358	1,545,623	0.15%	98.42%
38	SHARK, BASKING	2,000	1,545,623	0.13%	98.55%
39	DOGFISH, SMOOTH	1,999	1,545,623	0.13%	98.68%
40	SCUP	1,879	1,545,623	0.12%	98.80%
41	SCULPIN, NK	1,742	1,545,623	0.11%	98.91%
42	HAKE, WHITE	1,674	1,545,623	0.11%	99.02%
43	HAKE, RED (LING)	1,280	1,545,623	0.08%	99.10%
44	CRAB, NORTHERN STONE	1,253	1,545,623	0.08%	99.18%
45	SEA ROBIN, STRIPED	1,197	1,545,623	0.08%	99.26%
46	SCALLOP, SEA	1,191	1,545,623	0.08%	99.34%
47	HALIBUT, ATLANTIC	942	1,545,623	0.06%	99.40%
48	FLOUNDER, NK	875	1,545,623	0.06%	99.45%
49	BLUEFISH	854	1,545,623	0.06%	99.51%
50	CRAB, HORSESHOE	716	1,545,623	0.05%	99.56%
51	CRAB, SNOW	590	1,545,623	0.04%	99.59%
52	HERRING, ATLANTIC	563	1,545,623	0.04%	99.63%
53	CRAB, HERMIT, NK	468	1,545,623	0.03%	99.66%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
54	CUSK	435	1,545,623	0.03%	99.69%
55	CRAB, CANCER, NK	288	1,545,623	0.02%	99.71%
56	TILEFISH, GOLDEN	285	1,545,623	0.02%	99.73%
57	SEA ROBIN, NK	267	1,545,623	0.02%	99.74%
58	SEA ROBIN, NORTHERN	260	1,545,623	0.02%	99.76%
59	SEA BASS, BLACK	253	1,545,623	0.02%	99.78%
60	WOLFFISH, ATLANTIC	251	1,545,623	0.02%	99.79%
61	SNAIL, MOONSHELL, NK	241	1,545,623	0.02%	99.81%
62	SKATE, ROSETTTE	236	1,545,623	0.02%	99.82%
63	WHITING, BLACK (HAKE, OFFSHORE)	214	1,545,623	0.01%	99.84%
64	SEA CUCUMBER, NK	179	1,545,623	0.01%	99.85%
65	SHARK, PORBEAGLE (MACKEREL SHARK)	175	1,545,623	0.01%	99.86%
66	RAY, NK	164	1,545,623	0.01%	99.87%
67	SQUID, SHORT-FIN	154	1,545,623	0.01%	99.88%
68	SNAIL, NK	140	1,545,623	0.01%	99.89%
69	MUSSEL, NK	126	1,545,623	0.01%	99.90%
70	HERRING, BLUEBACK	111	1,545,623	0.01%	99.91%
71	WRYMOUTH	108	1,545,623	0.01%	99.91%
72	LUMPSUCKER, ATL SPNY	100	1,545,623	0.01%	99.92%
73	CLAM, NK	100	1,545,623	0.01%	99.93%
74	QUAHOG, OCEAN (BLACK CLAM)	86	1,545,623	0.01%	99.93%
75	SQUID, NK	82	1,545,623	0.01%	99.94%
76	TAUTOG (BLACKFISH)	77	1,545,623	0.00%	99.94%
77	SHAD, AMERICAN	69	1,545,623	0.00%	99.95%
78	HAKE, NK	67	1,545,623	0.00%	99.95%
79	ROSEFISH,BLACK BELLY	66	1,545,623	0.00%	99.95%
80	MACKEREL, ATLANTIC	62	1,545,623	0.00%	99.96%
81	SEA URCHIN, NK	43	1,545,623	0.00%	99.96%
82	WHELK, CHANNELED (SMOOTH)	43	1,545,623	0.00%	99.96%
83	STURGEON, NK	40	1,545,623	0.00%	99.97%
84	SQUIRRELFISH, NK	35	1,545,623	0.00%	99.97%
85	SHRIMP, NK	34	1,545,623	0.00%	99.97%
86	ALEWIFE	33	1,545,623	0.00%	99.97%
87	HAKE, SPOTTED	30	1,545,623	0.00%	99.97%
88	SQUID, ATL LONG-FIN	30	1,545,623	0.00%	99.98%
89	BUTTERFISH	29	1,545,623	0.00%	99.98%
90	HAKE, RED/WHITE MIX	29	1,545,623	0.00%	99.98%
91	CLAM, SURF	26	1,545,623	0.00%	99.98%
92	WHELK, NK, CONCH	25	1,545,623	0.00%	99.98%
93	CUNNER (YELLOW PERCH)	21	1,545,623	0.00%	99.99%
94	SHARK, ATL SHARPNOSE	21	1,545,623	0.00%	99.99%
95	SEA SQUIRT, NK	17	1,545,623	0.00%	99.99%
96	DOGFISH, NK	17	1,545,623	0.00%	99.99%
97	CUSK-EEL, NK	16	1,545,623	0.00%	99.99%
98	HERRING, NK (SHAD)	15	1,545,623	0.00%	99.99%
99	SHARK, SANDBAR (BROWN SHARK)	15	1,545,623	0.00%	99.99%
100	HAGFISH, ATLANTIC	13	1,545,623	0.00%	99.99%
101	CRAB, SPIDER, PORTLY	13	1,545,623	0.00%	99.99%
102	OCTOPUS, NK	12	1,545,623	0.00%	99.99%
103	EEL, NK	11	1,545,623	0.00%	99.99%
104	EELPOUT, NK	11	1,545,623	0.00%	100.00%
105	CRAB, LADY	11	1,545,623	0.00%	100.00%
106	DORY, BUCKLER (JOHN)	10	1,545,623	0.00%	100.00%
107	SHAD, HICKORY	7	1,545,623	0.00%	100.00%
108	CRAB, BLUE	5	1,545,623	0.00%	100.00%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
109	MENHADEN, ATLANTIC	5	1,545,623	0.00%	100.00%
110	JELLYFISH, NK	5	1,545,623	0.00%	100.00%
111	FLOUNDER, LEFTEYE, NK	5	1,545,623	0.00%	100.00%
112	WHELK, KNOBBED	4	1,545,623	0.00%	100.00%
113	INVERTEBRATE, NK	4	1,545,623	0.00%	100.00%
114	TRIGGERFISH, NK (LEATHERJACKET)	3	1,545,623	0.00%	100.00%
115	WEAKFISH (SQUETEAGUE SEA TROUT)	2	1,545,623	0.00%	100.00%
116	ROCKLING, FOURBEARD	2	1,545,623	0.00%	100.00%
117	MACKEREL, NK	1	1,545,623	0.00%	100.00%
118	SHRIMP, MANTIS	1	1,545,623	0.00%	100.00%
119	SHRIMP, PANDALID, NK (NORTHERN)	1	1,545,623	0.00%	100.00%
120	TOADFISH, OYSTER	1	1,545,623	0.00%	100.00%
121	STARGAZER, NK	1	1,545,623	0.00%	100.00%
122	GRENADIER, COMMON (MARLINSPIKE)	1	1,545,623	0.00%	100.00%
123	SEA ROBIN, ARMORED	1	1,545,623	0.00%	100.00%
124	SCALLOP, BAY	1	1,545,623	0.00%	100.00%

Attachment 2: ***Observed Discards in the NE Extra-Large-Mesh Gillnet***

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	DOGFISH, SPINY	100,388	241,610	41.55%	41.55%
2	MONKFISH (ANGLER, GOOSEFISH)	29,933	241,610	12.39%	53.94%
3	LOBSTER, AMERICAN	22,402	241,610	9.27%	63.21%
4	SKATE, WINTER (BIG)	19,309	241,610	7.99%	71.20%
5	COD, ATLANTIC	13,922	241,610	5.76%	76.96%
6	SKATE, BARNDOOR	7,871	241,610	3.26%	80.22%
7	CRAB, JONAH	7,444	241,610	3.08%	83.30%
8	CRAB, ROCK	4,831	241,610	2.00%	85.30%
9	RAVEN, SEA	4,266	241,610	1.77%	87.07%
10	SKATE, LITTLE	3,768	241,610	1.56%	88.63%
11	SKATE, THORNY	3,167	241,610	1.31%	89.94%
12	TUNA, BLUEFIN	2,875	241,610	1.19%	91.13%
13	FLOUNDER, SUMMER (FLUKE)	2,416	241,610	1.00%	92.13%
14	FISH, NK	2,286	241,610	0.95%	93.07%
15	BLUEFISH	1,935	241,610	0.80%	93.88%
16	CRAB, TRUE, NK	1,577	241,610	0.65%	94.53%
17	SKATE, NK	1,535	241,610	0.64%	95.16%
18	POLLOCK	1,526	241,610	0.63%	95.79%
19	BASS, STRIPED	1,219	241,610	0.50%	96.30%
20	STARFISH, SEASTAR,NK	1,169	241,610	0.48%	96.78%
21	SHARK, PORBEAGLE (MACKEREL SHARK)	721	241,610	0.30%	97.08%
22	SPONGE, NK	631	241,610	0.26%	97.34%
23	LUMPFISH	515	241,610	0.21%	97.56%
24	HAKE, WHITE	437	241,610	0.18%	97.74%
25	SHARK, THRESHER	400	241,610	0.17%	97.90%
26	MACKEREL, ATLANTIC	392	241,610	0.16%	98.06%
27	SHARK, MAKO, NK	300	241,610	0.12%	98.19%
28	CRAB, NORTHERN STONE	294	241,610	0.12%	98.31%
29	MUSSEL, NK	289	241,610	0.12%	98.43%
30	RAY, TORPEDO	282	241,610	0.12%	98.55%
31	HAKE, RED (LING)	277	241,610	0.11%	98.66%
32	SKATE, SMOOTH	258	241,610	0.11%	98.77%
33	FLOUNDER, YELLOWTAIL	200	241,610	0.08%	98.85%
34	OCEAN POUT	176	241,610	0.07%	98.92%
35	HADDOCK	176	241,610	0.07%	98.99%
36	FLOUNDER, WINTER (BLACKBACK)	153	241,610	0.06%	99.06%
37	CRAB, SPIDER, NK	126	241,610	0.05%	99.11%
38	SHARK, MAKO, SHORTFIN	120	241,610	0.05%	99.16%
39	CRAB, HORSESHOE	116	241,610	0.05%	99.21%
40	SCULPIN, LONGHORN	115	241,610	0.05%	99.26%
41	STURGEON, ATLANTIC	113	241,610	0.05%	99.30%
42	SKATE, CLEARNOSE	107	241,610	0.04%	99.35%
43	STURGEON, SHORT-NOSE	100	241,610	0.04%	99.39%
44	DOGFISH, SMOOTH	99	241,610	0.04%	99.43%
45	DORY, BUCKLER (JOHN)	97	241,610	0.04%	99.47%
46	HAKE, SILVER (WHITING)	97	241,610	0.04%	99.51%
47	TUNA, NK	95	241,610	0.04%	99.55%
48	SEA ROBIN, NORTHERN	88	241,610	0.04%	99.58%
49	HALIBUT, ATLANTIC	82	241,610	0.03%	99.62%
50	TUNA, YELLOWFIN	71	241,610	0.03%	99.65%
51	TILEFISH, GOLDEN	71	241,610	0.03%	99.68%
52	DOGFISH, NK	69	241,610	0.03%	99.71%

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
53	SEA URCHIN, NK	69	241,610	0.03%	99.73%
54	FLOUNDER, NK	50	241,610	0.02%	99.75%
55	SCALLOP, SEA	49	241,610	0.02%	99.78%
56	SNAIL, NK	48	241,610	0.02%	99.80%
57	HERRING, ATLANTIC	46	241,610	0.02%	99.81%
58	FLOUNDER, FOURSPOT	43	241,610	0.02%	99.83%
59	CRAB, CANCER, NK	36	241,610	0.01%	99.85%
60	SCULPIN, NK	33	241,610	0.01%	99.86%
61	CLAM, NK	30	241,610	0.01%	99.87%
62	CRAB, DEEPSEA, RED	26	241,610	0.01%	99.88%
63	SEA BASS, NK	24	241,610	0.01%	99.89%
64	FLOUNDER, AMERICAN PLAICE	22	241,610	0.01%	99.90%
65	SHARK, NK	20	241,610	0.01%	99.91%
66	STURGEON, NK	20	241,610	0.01%	99.92%
67	CRAB, HERMIT, NK	19	241,610	0.01%	99.93%
68	WHELK, NK, CONCH	18	241,610	0.01%	99.93%
69	SEA CUCUMBER, NK	18	241,610	0.01%	99.94%
70	TAUTOG (BLACKFISH)	17	241,610	0.01%	99.95%
71	SHAD, AMERICAN	16	241,610	0.01%	99.96%
72	SEA ROBIN, STRIPED	13	241,610	0.01%	99.96%
73	FLOUNDER, LEFTEYE, NK	12	241,610	0.00%	99.97%
74	REDFISH, NK (OCEAN PERCH)	11	241,610	0.00%	99.97%
75	CUNNER (YELLOW PERCH)	9	241,610	0.00%	99.97%
76	ANEMONE, NK	9	241,610	0.00%	99.98%
77	SEA SQUIRT, NK	8	241,610	0.00%	99.98%
78	SNAIL, MOONSHELL, NK	8	241,610	0.00%	99.98%
79	WRYMOUTH	5	241,610	0.00%	99.99%
80	HERRING, BLUEBACK	4	241,610	0.00%	99.99%
81	HAKE, NK	4	241,610	0.00%	99.99%
82	JELLYFISH, NK	3	241,610	0.00%	99.99%
83	LAMPREY, NK	3	241,610	0.00%	99.99%
84	CUSK	2	241,610	0.00%	99.99%
85	FLOUNDER, SAND DAB (WINDOWPANE)	2	241,610	0.00%	99.99%
86	SEA ROBIN, NK	2	241,610	0.00%	99.99%
87	DOGFISH, CHAIN	2	241,610	0.00%	99.99%
88	CORAL, STONY, NK	2	241,610	0.00%	100.00%
89	STARFISH, BRITTLE,NK	2	241,610	0.00%	100.00%
90	SEA ROBIN, ARMORED	2	241,610	0.00%	100.00%
91	HAGFISH, ATLANTIC	1	241,610	0.00%	100.00%
92	INVERTEBRATE, NK	1	241,610	0.00%	100.00%
93	BUTTERFISH	1	241,610	0.00%	100.00%
94	FLOUNDER, WITCH (GREY SOLE)	1	241,610	0.00%	100.00%
95	SCUP	1	241,610	0.00%	100.00%
96	SKATE, ROSETTTE	1	241,610	0.00%	100.00%
97	WORM, NK	1	241,610	0.00%	100.00%

Attachment 3: ***Observed Discards in the MA Extra-Large-Mesh Gillnet***

	Species Name	Observed Discards (lb)	Observed Discards, All Species (lb)	Ratio of Discards to All Discards	Cumulative Percent of Total Discards
1	DOGFISH, SPINY	3,620	13,386	27.05%	27.05%
2	CRAB, HORSESHOE	2,107	13,386	15.74%	42.79%
3	MONKFISH (ANGLER, GOOSEFISH)	1,712	13,386	12.79%	55.58%
4	SKATE, LITTLE	1,469	13,386	10.97%	66.55%
5	SKATE, WINTER (BIG)	603	13,386	4.50%	71.05%
6	STARFISH, SEASTAR,NK	600	13,386	4.48%	75.53%
7	STURGEON, ATLANTIC	547	13,386	4.09%	79.62%
8	BASS, STRIPED	453	13,386	3.38%	83.00%
9	FISH, NK	379	13,386	2.83%	85.83%
10	BLUEFISH	328	13,386	2.45%	88.28%
11	SKATE, NK	322	13,386	2.40%	90.68%
12	STURGEON, NK	235	13,386	1.76%	92.44%
13	SPONGE, NK	192	13,386	1.43%	93.87%
14	FLOUNDER, SUMMER (FLUKE)	113	13,386	0.84%	94.71%
15	STURGEON, SHORT-NOSE	110	13,386	0.82%	95.53%
16	SKATE, CLEARNOSE	107	13,386	0.80%	96.33%
17	DOGFISH, SMOOTH	89	13,386	0.66%	97.00%
18	CRAB, JONAH	80	13,386	0.60%	97.59%
19	CRAB, ROCK	60	13,386	0.45%	98.04%
20	SCALLOP, SEA	60	13,386	0.44%	98.49%
21	CRAB, TRUE, NK	27	13,386	0.20%	98.69%
22	MENHADEN, ATLANTIC	23	13,386	0.17%	98.86%
23	CRAB, SPIDER, NK	23	13,386	0.17%	99.03%
24	LOBSTER, AMERICAN	18	13,386	0.13%	99.17%
25	CROAKER, ATLANTIC	18	13,386	0.13%	99.30%
26	FLOUNDER, NK	15	13,386	0.11%	99.41%
27	DOGFISH, NK	15	13,386	0.11%	99.53%
28	STARGAZER, NK	14	13,386	0.10%	99.63%
29	RAY, TORPEDO	12	13,386	0.09%	99.72%
30	WHELK, NK, CONCH	8	13,386	0.06%	99.78%
31	CRAB, CANCER, NK	7	13,386	0.05%	99.83%
32	ANCHOVY, NK	5	13,386	0.04%	99.87%
33	STARFISH, BRITTLE,NK	5	13,386	0.04%	99.91%
34	WEAKFISH (SQUETEAGUE SEA TROUT)	4	13,386	0.03%	99.94%
35	CRAB, HERMIT, NK	2	13,386	0.01%	99.95%
36	MACKEREL, FRIGATE	1	13,386	0.01%	99.96%
37	HERRING, BLUEBACK	1	13,386	0.01%	99.97%
38	SEA ROBIN, STRIPED	1	13,386	0.01%	99.98%
39	CLAM, NK	1	13,386	0.01%	99.99%
40	MUSSEL, NK	1	13,386	0.01%	99.99%
41	SEA ROBIN, NORTHERN	1	13,386	0.00%	100.00%
42	SEA URCHIN, NK	1	13,386	0.00%	100.00%

Examples of how observer discard data can be queried and analyzed to support management decisions.

Example 1

The follow excerpts are from pages 137, 152, and 153 of Framework 40A to the Northeast Multispecies FMP. This example demonstrates the use of observer discard data to make predictions of possible biological impacts of management alternatives. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS
Proposed Action

CAII Haddock SAP

An experiment has not been conducted that estimates the incidental catch species that will be taken during the CAII haddock SAP. As a result, this analysis uses recent observer reports from the area and the results of several gear experiments to evaluate the impacts of this SAP on incidental catch species. First examined were observer reports for trawl trips in SA 561 and 562 from calendar years 2001 through 2003. A summary of observed tows by area and quarter is provided in Table 45. The analyses focus on 2002 and 2003 because of the higher level of observer coverage in SA 562. Note that for these tows, there was no requirement to use a haddock separator trawl. Catches of the top fifteen species are shown by statistical area for calendar years 2002 and 2003 in Table 57 and Table 58. Of the regulated groundfish species in this list, the stocks of concern that were caught most frequently in both years were cod, white hake, plaice, and witch flounder. Large quantities of skates were also caught and these catches will be discussed in a following section that analyzes bycatch.

The proposed SAP is allocated a portion of the GB cod incidental catch TAC. The observed trips were examined further to determine catch rates of cod and to estimate the number of days that may be fished before the cod TAC is caught. Cod catches on observed tows in 2002 averaged 109 lbs./tow for the entire area. The difference between the average cod/tow in SA 561 (166) and SA 562 (75) was statistically significant. Catch per tow on observed tows in 2003 was 245 lbs./tow. Once again, the catch per tow in SA 561 (365) was significantly higher than that in SA 562 (141). Catches for plaice, white hake, and witch flounder were less than 25 lbs./tow. 2003 tows were analyzed to determine the mean catch of cod on tows targeting haddock. For both areas, the average cod catch/tow was 235 lbs for tows targeting haddock. The cod catch/tow in SA 561 (457 lbs.) was significantly different than that in SA 562 (110 lbs.). According to the data, catches per tow of cod are higher in SA 561, while catches of haddock are higher in SA 562.

	Number of Observed Tows								
	2001			2002			2003		
Quarter	Both	561	562	Both	561	562	Both	561	562
1	68	63	5	29	20	9	192	108	84
2	54	52	2	135	41	94	576	321	255
3	9	9	0	208	58	150	240	67	173
4	30	29	1	72	49	23	189	55	134
Total	161	153	8	444	168	276	1197	551	646

Table 45 – Observed otter trawl tows, calendar years 2001 – 2003, statistical areas 561 and 562 (NMFS OBDBS database)

Species	SA 561		SA 562		Grand Total
	Discarded	Kept	Discarded	Kept	
ANGLER	955	17,246	479	4,008	22,688
COD	631	27,181	136	20,526	48,473
FLOUNDER, AM. PLAICE	150	5,486	3	13	5,652
FLOUNDER, SUMMER	66	192	4,633	2,399	7,289
FLOUNDER, WINTER	2	30,208	1,695	287,302	319,207
FLOUNDER, YELLOWTAIL	378	25,468	165	41,184	67,194
HADDOCK	292	15,966	758	18,163	35,179
HAKE, WHITE	77	4,823	9	34	4,943
LOBSTER	1,752	5,980	2,272	6,246	16,250
SCALLOP, SEA	261	8	6,514	3,490	10,273
SEA RAVEN	2,021	10	2,150	10	4,191
SKATE, LITTLE	14,428	1,352	111,140		126,920
SKATE, THORNY	2,779		1,883		4,662
SKATE, WINTER(BIG)	12,761	7,228	72,358	13,287	105,634
SKATES	5,980	70	35,401	2,303	43,754
Grand Total	42,532	141,218	239,594	398,962	822,307

Table 57 – Top fifteen species caught by otter trawls on observed tows in SAs 561 and 562, 2002 (pounds) (NMFS OBDBS)

Species	SA 561		SA 562		Grand Total
	Discarded	Kept	Discarded	Kept	
ANGLER	3,787	72,916	1,939	11,309	89,951
COD	11,210	190,872	1,412	89,895	293,388
FLOUNDER, AM. PLAICE	1,210	16,384	53	1,630	19,277
FLOUNDER, WINTER	1,554	85,278	432	354,303	441,566
FLOUNDER, WITCH	1,304	9,192	329	1,181	12,006
FLOUNDER, YELLOWTAIL	954	83,699	4,012	131,763	220,428
HADDOCK	3,313	39,560	6,656	199,215	248,743
HAKE, SILVER	759	243	212	17,111	18,325
LOBSTER	6,581	25,037	3,995	15,038	50,651
POLLOCK	24	19,115		445	19,584
SCALLOP, SEA	2,554	7,268	15,794	12,745	38,360
SEA RAVEN	5,027		7,412		12,439
SKATE, LITTLE	56,812		282,885		339,697
SKATE, WINTER(BIG)	66,581	46,318	330,624	56,742	500,264
SKATES	16,018	14,742	87,040	20,611	138,410
Grand Total	177,687	610,622	742,794	911,986	2,443,089

Table 58 – Top fifteen species caught by otter trawls on observed tows in SAs 561 and 562, 2003 (pounds round weight), 2003 (NMFS OBDBS)

Example 2

The following excerpt is from page 205 of Framework 42 to the Northeast Multispecies FMP. This is a good example of how observer discard data can be used to examine a specific program in a defined area and time period, in this case, the Yellowtail Flounder Special Access Program in Closed Area II. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

6.5.2.4 Closed Area II Yellowtail Flounder Special Access Program

Yellowtail flounder discards in the SAP were reviewed to determine the cause. Thirty-one (out of 319, or 9.7 percent) trawl trips in the CAII Yellowtail Flounder SAP were observed. Yellowtail flounder (600,805 lbs.), haddock (156,378 lbs.), sea scallops (88,634 lbs.), monkfish (68,417 lbs.), and winter skates (47,517 lbs.) were the top five kept species on these observed trips. The top discarded species were skates (704,205 lbs., all species), sea scallops (32,610 lbs.), yellowtail flounder (30,290 lbs.), and haddock (22,178 lbs.). The primary reason for yellowtail flounder discards on observed trips was that the fish were smaller than the regulatory minimum size (21,289 lbs., or 70 percent of observed discards). Vessels that had filled their quota discarded another 3,409 lbs. on observed trips, while 4,081 lbs. were discarded due to market conditions.

Example 3

The following excerpts are from page 211-215 of Framework 42 to the Northeast Multispecies FMP. In this example, observer discard data are used to help evaluate the performance of the haddock separator trawl in commercial fishing operations. The complete document is available at: http://www.nefmc.org/nemulti/index.html.

6.5.2.8 Haddock Separator Trawl

This action proposes two measures that require use of the haddock separator trawl: an extension of the Eastern U.S./CA Haddock SAP, and a proposal to require the use of the separator trawl when participating in the Category B (regular) DAS Program (which may be renewed). There are a limited number of observed trips by vessels using the separator trawl which can be used to supplement experimental data on the performance of the trawl.

The observer (OBDBS) database was queried to identify trawl trips that used a separator panel (excluder device='3') in CY 2005. A total of 20 observed trips were identified in the database as of December 14, 2005. Additional observed trips may have occurred but may not yet be entered into the database. Fourteen trips were recorded as U.S./CA area trips while six trips were recorded as Category B (regular) DAS trips. This designation is made by the observer, and it is possible that they are not exclusive (e.g. a Category B (regular) program trip may occur in the U.S./CA area). Seven trips made tows both with and without the panel. Most trips used the separator panel in the Eastern U.S./Canada area (SAs 561 and 562).

Catches (kept and discarded) of the top twenty-five species on tows using a separator panel are shown in Table 74. Regulated groundfish accounted for sixty-five percent of the catch, with haddock, yellowtail flounder, cod, and winter flounder as the four largest regulated groundfish components. Combined catches of skates (207,136 lbs.) exceeded the haddock catch (199,634 lbs.). The overall ratio of haddock to yellowtail flounder was 2.6:1, the ratio of haddock to cod was 4.2:1, and the ratio of haddock to winter flounder was 3.2:1. Monkfish, witch flounder, and plaice were also caught in substantial quantities.

The ratio of haddock to other species was compared for trips identified as occurring in the Category B (regular) DAS program and trips identified as taking place in the U.S./CA area. With only five observed trips using the separator trawl in the Category B (regular) DAS program these results should not be considered definitive. While the ratio of haddock to winter flounder in both programs was similar (3.1:1 in the U.S./CA area, 3.4:1 in the Category B(regular) DAS program), the ratio of haddock to yellowtail flounder was 4.1:1 in the U.S./CA program but 1.1:1 in the Category B (regular) DAS Pilot Program. The ratio of haddock to cod in the U.S./CA program was 3.8:1, while it was 7:1 in the Category B (regular) DAS program. The ratio of haddock to monkfish was similar in both programs.

Haddock discards accounted for six percent of the haddock catch (12,466 lbs.), with almost all discards due to the fish being smaller than the regulatory minimum. Cod discards accounted for fifty percent (21,504 lbs.) of the cod catch; sixty-seven percent of these discards were due to a filled vessel quota, twenty-three percent were due to high grading, and various other reasons were given for the remaining discards. Ninety-four percent of the skates caught were discarded, totaling 193,937 pounds. Winter skate (49,716 lbs.) and little skates (54,369 lbs.) were the largest components identified by species, but an additional 78,711 lbs. was identified as skates (NK). There were also 10,609 lbs. of barndoor skates caught, all discarded, and 532 lbs. of smooth skates.

Catch composition on tows using the separator trawl was examined by trip, focusing on regulated groundfish. All twenty trips caught haddock and cod while using a separator trawl, seventeen trips caught yellowtail, winter flounder, or monkfish, fifteen trips caught plaice, and thirteen trips caught grey sole (witch flounder). The ratio of haddock to cod for the twenty trips ranged from 0.2:1 to 22.4:1. For the seventeen observed trips that caught winter flounder, the ratio of haddock to winter flounder ranged from 0.1:1 to 186.8:1. For the trips that caught yellowtail flounder, the ratio of haddock to yellowtail flounder ranged from 0.1:1 to 5,230:1.

There were a total of 405 observed tows that used a separator trawl on these fifteen trips. Over these tows, haddock was caught on 370 tows (ninety-one percent), cod on 309 tows (seventy-six percent), yellowtail flounder on 266 tows (sixty-six percent), and winter flounder on 243 tows (sixty percent). The average catch of haddock per tow was 493 lbs., yellowtail flounder was 189 lbs., cod was 117 lbs., and winter flounder was 156 lbs. In comparison to the observed data, FW 40A estimated that the cod catch per tow would be between 47 and 92 lbs. and the haddock catch per tow would be 765 lbs. There was considerable variation in the catch of regulated groundfish between trips and tows. For example, four trips did not have any tows catching yellowtail flounder, four trips had occasional tows that caught small amounts, one trip had yellowtail catches decline as the trip passed, and six trips had frequent tows catching sizeable amounts of yellowtail flounder.

As reported earlier, seven trips made tows both with and without the separator trawl. These trips were examined to contrast the performance of tows using the separator trawl with tows that did not use the separator trawl by vessels that used both on the same trip. While this approach reduces the likelihood that any differences are due to differences between vessels, it does not resolve the issue that catches may be the result not just of the gear used, but numerous other factors: location, depth fished, etc. Catch composition differed: haddock accounted for twelve percent of the catch on tows without the separator trawl, and thirty-three percent of the catch on tows with the trawl (Table 75). Overall, the ratio of haddock to cod for these trips, while not using the separator trawl, was 1.4:1, the ratio of haddock to yellowtail flounder was 0.7:1, the ratio of haddock to winter flounder was 11.8:1, and the ratio of haddock to monkfish was 1:1. While using a separator trawl, for these vessels the ratio of haddock to cod on the same trip was 2.5:1, the ratio of haddock to yellowtail flounder was 7.4:1, the ratio of haddock to winter flounder was 3.1:1, and the ratio of haddock to monkfish was 6.3:1. In an effort to reduce the influence of tows in different areas, five trips were examined that fished in SA 561 and 562. The results, while not detailed here, were similar.

Table 73 – Observed trips using a separator panel, CY 2005 (OBDBS data available as of December 14, 2005)

Program	Month	521	522	525	561	562	Total
US/CA	01	0	0	0	0	1	1
	03	1	0	0	4	3	5
	05	0	1	0	5	5	5
	06	0	0	1	0	2	2
	07	0	0	1	1	1	1
Sub-Total		1	1	1	10	10	14
CAT B (regular)	03	1	1	0	0	0	1
	05	0	0	1	0	2	2
	06	2	2	1	0	0	2
	07	0	1	0	0	0	1
Sub-Total		3	3	2	0	4	6
Grand Total		4	4	3	10	14	20

Table 74 – Catches (pounds, live weight, kept and discarded) by statistical area on observed tows using a haddock separator trawl, CY 2005

COMNAME	521	522	525	552	561	562	Grand Total
HADDOCK	8,445	31,152	142	18	47,946	140,234	227,937
SKATE, LITTLE	25	83,432	1,977	500	5,975	44,916	136,825
FLOUNDER, YELLOWTAIL	1	1,375	4,633	30	3,834	91,623	101,496
MONKFISH (ANGLER, GOOSEFISH)	9,368	43,446	341	0	23,475	14,187	90,817
SKATE, WINTER (BIG)	2,105	10,700	357	693	21,087	51,773	86,715
SKATE, NK	1,770	235	1,500	0	8,766	70,805	83,076
FLOUNDER, WINTER (BLACKBACK)	5	174	67	420	9,461	54,546	64,673
COD, ATLANTIC	12,712	1,591	41	339	32,955	16,339	63,977
FLOUNDER, AMERICAN PLAICE	876	2,681	54	0	24,635	1,898	30,144
FLOUNDER, WITCH (GREY SOLE)	14,813	1,415	105	0	9,583	3,331	29,247
LOBSTER, AMERICAN	1,785	2,130	34	0	13,902	3,776	21,627
SKATE, BARNDOOR	98	434	306	0	515	10,369	11,722
CRAB, JONAH	11	9,310	0	0	24	157	9,502
POLLOCK	873	1,344	0	0	6,226	238	8,681
HAKE, WHITE	191	930	0	0	4,400	9	5,530
FLOUNDER, SAND DAB (WINDOWPANE)	0	3	136	15	70	3,813	4,037
SCALLOP, SEA	0	112	1	0	303	3,289	3,705
RAVEN, SEA	114	114	217	10	711	2,515	3,681
DOGFISH, SPINY	185	186	0	0	2,895	201	3,467
FLOUNDER, FOURSPOT	0	42	210	0	51	2,238	2,541
HAKE, RED (LING)	8	7	138	0	1,393	218	1,764
HERRING, ATLANTIC	0	1,482	0	0	4	0	1,486
STARFISH, SEASTAR,NK	6	717	2	0	11	713	1,449
FLOUNDER, SUMMER (FLUKE)	0	89	80	10	24	955	1,158
OCEAN POUT	9	41	8	0	128	804	990
Grand Total	53,400	193,142	10,349	2,035	218,374	518,947	996,247

Table 75 – Catch composition (pounds, live weight) for seven trips that made tows with and without the separator panel, CY 2005 (Source: NMFS OBDBS as of December 12, 2005)

COMNAME	Without Separator	With Separator	Grand Total
HADDOCK	17,679	40,893	58,572
SKATE, WINTER (BIG)	21,960	14,207	36,167
FLOUNDER, YELLOWTAIL	23,750	5,560	29,310
COD, ATLANTIC	12,920	16,146	29,066
MONKFISH (ANGLER, GOOSEFISH)	17,117	6,489	23,606
SKATE, LITTLE	14,346	5,754	20,100
SKATE, NK	2,875	14,163	17,038
FLOUNDER, WINTER (BLACKBACK)	1,494	13,209	14,703
FLOUNDER, AMERICAN PLAICE	10,462	1,416	11,878
LOBSTER, AMERICAN	7,109	3,359	10,468
FLOUNDER, WITCH (GREY SOLE)	4,135	1,715	5,850
POLLOCK	4,300	623	4,923
HAKE, WHITE	3,490	469	3,959
SCALLOP, SEA	2,766	150	2,916
DOGFISH, SPINY	1,893	98	1,991
HAKE, RED (LING)	1,410	0	1,410
SKATE, BARNDOOR	1,083	24	1,107
RAVEN, SEA	365	394	759
FLOUNDER, FOURSPOT	618	1	619
FLOUNDER, SAND DAB (WINDOWPANE)	48	407	455
OCEAN POUT	213	101	314
LUMPFISH	276	12	288
HALIBUT, ATLANTIC	0	263	263
FLOUNDER, SUMMER (FLUKE)	50	63	113
WOLFFISH, ATLANTIC	25	33	58
Grand Total	150,384	125,549	275,933

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Appendix G
Example Discard Report

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National Marine Fisheries Service

EXAMPLE DISCARD REPORT

DATE: SEMI-ANNUAL OR ANNUAL

1.0 INTRODUCTION/SUMMARY

- Include a general description of NMFS Observer Program by Quarter – number of trips observed, fisheries of particular interest/focus, etc.
- Discuss funding issues and other related issues/developments
- Provide projections on coverage across fisheries for upcoming quarters

2.0 OBSERVER DATA FOR FISHERY X

2.1 SUMMARY OF OBSERVED TRIPS IN FISHERY X

- Information could be provided for the quarters in question as well as across the entire year to date.

EXAMPLE TABLES:

Gear Type	Area	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
GEAR 1	XXX					
	XXX					
	XXX					
GEAR 2	XXX					
	XXX					
	XXX					
GEAR 3	XXX					
	XXX					
	XXX					
Totals						

Table F-1. Number of NMFS Observer Days Scheduled for Fishery X during YEAR by Area, Gear, and Quarter.

NMFS SEA SAMPLING BY QUARTER		1	2	3	4
GEAR 1	Observed Trips				
	Total Trips (VTR)				
	% Trips Observed				
GEAR 2	Observed Trips				
	Total Trips (VTR)				
	% Trips Observed				
GEAR 3	Observed Trips				
	Total Trips (VTR)				
	% Trips Observed				
Total No. Observed Trips YTD					
Total No. Trips YTD (VTR)					
Total % Observed Trips YTD					

Table F-2. Distribution of NMFS' Sea Sampling Trips in Fishery X by Gear Type and Quarter (Expressed as Percentage of Total Trips as Reported in the VTRs).

STATISTICAL AREA	GEAR 1	GEAR 2	GEAR 3
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
XXX			
Unknown			

Table F-3. Distribution of NMFS' Sea Sampling Trips by Gear Type and Statistical Area in Fishery X.

2.2 OBSERVER DATA BY GEAR TYPE AND AREA IN FISHERY X

- Information could be provided for the quarters in question as well as across the entire year to date.

SPECIES CAUGHT	DISCARD LBS.	KEPT LBS.	TOTAL CATCH LBS.
Species X			
Species X			
Species X			
Species X			
Species X			
Species X			
Species X			
Species X			
Species X			
Species X			
GRAND TOTAL			

Table F-4. Catch and Discards (Lbs.) of All Species on X# Observed Gear Type Trips in Fishery X for Quarter X.

AREA:		Stat Area	Stat Area	Stat Area	Stat Area	Stat Area
Species X	Kept Lbs					
	Discard Lbs					
Species X	Kept Lbs					
	Discard Lbs					
Species X	Kept Lbs					
	Discard Lbs					
Species X	Kept Lbs					
	Discard Lbs					
Species X	Kept Lbs					
	Discard Lbs					

Table F-5. Observed Catch (Kept Fish and Discards) by Statistical Area on X# Observed Gear Type Trips Fishery X for Quarter X.

- Repeat above tables for entire year to date.

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Appendix H
Draft Proposed Regulations

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TITLE 50--Wildlife and Fisheries

CHAPTER VI--FISHERY CONSERVATION AND MANAGEMENT, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

PART 648--FISHERIES OF THE NORTHEASTERN UNITED STATES

Subpart B—Management Measures for the Atlantic Mackerel, Squid, and Butterfish Fisheries

In § 648.21, paragraph (c) is revised to read as follows:

§ 648.21 Procedures for determining initial annual amounts.

(c) *Recommended measures.* * * *

(13) Changes, as appropriate, to the Northeast Region SBRM, including the coefficient of variation (CV) based performance standard, fishery stratification, and/or reports.

* * * * *

In § 648.24, paragraph (a) is revised to read as follows:

§ 648.24 Framework adjustments to management measures.

(a) *Within season management action.* * * *

(1) *Adjustment process.* The Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second Council meeting. The Council's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Minimum fish size, maximum fish size, gear restrictions, gear requirements or prohibitions, permitting restrictions, recreational possession limit, recreational seasons, closed areas, commercial seasons, commercial trip limits, commercial quota system including commercial quota allocation procedure and possible quota set asides to mitigate bycatch, recreational harvest limit, annual specification quota setting process, FMP Monitoring Committee composition and process, description and identification of essential fish habitat (and fishing gear management measures that impact EFH), description and identification of habitat areas of particular concern, overfishing definition and related thresholds and targets, regional gear restrictions, regional season restrictions (including option to split seasons), restrictions on vessel size (LOA and GRT) or shaft horsepower, changes to the Northeast Region SBRM (including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs), any other management measures currently included in the FMP, set aside quota for scientific research, regional management, and process for inseason adjustment to the annual specification.

* * * * *

Subpart D—Management Measures for the Atlantic Sea Scallop Fishery

In § 648.55, paragraph (e) is revised to read as follows:

§ 648.55 Framework adjustments to management measures.

* * * * *

(e) * * *

(31) Changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs.

(32) Any other management measures currently included in the FMP.

* * * * *

Subpart E—Management Measures for the Atlantic Surf Clam and Ocean Quahog Fisheries

In § 648.77, paragraph (a) is revised to read as follows:

§ 648.77 Framework adjustments to management measures.

(a) *Within season management action.* * * *

(1) *Adjustment process.* The Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting, and prior to and at the second Council meeting. The Council's recommendations on adjustments or additions to management measures must come from one or more of the following categories: The overfishing definition (both the threshold and target levels), description and identification of EFH (and fishing gear management measures that impact EFH), habitat areas of particular concern, set-aside quota for scientific research, VMS, OY range, suspension or adjustment of the surfclam minimum size limit, and changes to the Northeast Region SBRM (including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs).

* * * * *

Subpart F—Management Measures for the NE Multispecies and Monkfish Fisheries

In § 648.90, paragraphs (a), (b), and (c) are revised to read as follows:

§ 648.90 NE multispecies assessment, framework procedures and specifications, and flexible area action system. * * *

(a) * * *

(2) *Biennial review.* (i) Beginning in 2005, the NE Multispecies PDT shall meet on or before September 30 every other year, unless otherwise specified in paragraph (a)(3) of this section, under the conditions specified in that paragraph, to perform a review of the fishery, using the most current scientific information available provided primarily from the NEFSC. Data provided by states, ASMFC, the USCG, and other sources may also be considered by the PDT. Based on this review, the PDT will develop target TACs for the upcoming fishing year(s) and develop options for Council consideration, if necessary, on any changes, adjustments, or additions to DAS allocations, closed areas, or on other measures necessary to achieve the FMP goals and objectives, including changes to the Northeast Region SBRM. For the 2005 biennial review, an updated groundfish assessment, peer-reviewed by independent scientists, will be conducted to facilitate the PDT review for the biennial adjustment, if needed, for the 2006 fishing year. Amendment 13 biomass and fishing mortality targets may not be modified by the 2006 biennial adjustment unless review of all valid pertinent scientific work during the 2005 review process justifies consideration.

(ii) * * *

(iii) Based on this review, the PDT shall recommend target TACs and develop options necessary to achieve the FMP goals and objectives, which may include a preferred option. The PDT must demonstrate through analyses and documentation that the options they develop are expected to meet the FMP goals and objectives. The PDT may review the performance of different user groups or fleet Sectors in developing options. The range of options developed by the PDT may include any of the management measures in the

FMP, including, but not limited to: Target TACs, which must be based on the projected fishing mortality levels required to meet the goals and objectives outlined in the FMP for the 10 regulated species, Atlantic halibut (if able to be determined), and ocean pout; DAS changes; possession limits; gear restrictions; closed areas; permitting restrictions; minimum fish sizes; recreational fishing measures; description and identification of EFH; fishing gear management measures to protect EFH; designation of habitat areas of particular concern within EFH; and changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs. In addition, the following conditions and measures may be adjusted through future framework adjustments: Revisions to status determination criteria, including, but not limited to, changes in the target fishing mortality rates, minimum biomass thresholds, numerical estimates of parameter values, and the use of a proxy for biomass; DAS allocations (such as the category of DAS under the DAS reserve program, etc.) and DAS baselines, etc.; modifications to capacity measures, such as changes to the DAS transfer or DAS leasing measures; calculation of area-specific TACs, area management boundaries, and adoption of area-specific management measures; Sector allocation requirements and specifications, including establishment of a new Sector; measures to implement the U.S./Canada Resource Sharing Understanding, including any specified TACs (hard or target); changes to administrative measures; additional uses for Regular B DAS; future uses for C DAS; reporting requirements; the GOM Inshore Conservation and Management Stewardship Plan; GB Cod Gillnet Sector allocation; allowable percent of TAC available to a Sector through a Sector allocation; categorization of DAS; DAS leasing provisions; adjustments for steaming time; adjustments to the Handgear A permit; gear requirements to improve selectivity, reduce bycatch, and/or reduce impacts of the fishery on EFH; SAP modifications; and any other measures currently included in the FMP.

* * * * *

(b) *Small mesh species*— * * *

(ii) The WMC shall recommend management options necessary to achieve FMP goals and objectives pertaining to small-mesh multispecies, which may include a preferred option. The WMC must demonstrate through analyses and documentation that the options it develops are expected to meet the FMP goals and objectives. The WMC may review the performance of different user groups or fleet Sectors in developing options. The range of options developed by the WMC may include any of the management measures in the FMP, including, but not limited to: Annual target TACs, which must be based on the projected fishing mortality levels required to meet the goals and objectives outlined in the FMP for the small-mesh multispecies; possession limits; gear restrictions; closed areas; permitting restrictions; minimum fish sizes; recreational fishing measures; description and identification of EFH; fishing gear management measures to protect EFH; designation of habitat areas of particular concern within EFH; changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs; and any other management measures currently included in the FMP.

* * * * *

(c) *Within season management action for NE multispecies, including small-mesh NE multispecies.* * * *

(1) *Adjustment process.* (i) After a management action has been initiated, the Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council shall provide the public with advance notice of the availability of both the proposals and the analyses and opportunity to comment on them prior to and at the second Council meeting. The Council's recommendation on adjustments or additions to management measures, other than to address gear conflicts, must come from one or more of the following categories: DAS changes, effort monitoring, data reporting, possession limits, gear restrictions, closed areas, permitting restrictions, crew limits, minimum fish sizes, onboard observers, minimum hook size and hook style, the use of crucifer in the hook-gear fishery, fleet Sector shares, recreational fishing measures, area closures and other appropriate measures to mitigate marine mammal entanglements and interactions, description and identification of EFH, fishing gear management measures to protect EFH, designation of habitat areas of particular concern within EFH, changes to the Northeast Region SBRM, and any other management measures currently included in the FMP. In addition, the Council's recommendation on adjustments or additions to management measures pertaining to small-mesh NE multispecies, other than to address gear conflicts, must come from one or

more of the following categories: Quotas and appropriate seasonal adjustments for vessels fishing in experimental or exempted fisheries that use small mesh in combination with a separator trawl/grate (if applicable), modifications to separator grate (if applicable) and mesh configurations for fishing for small-mesh NE multispecies, adjustments to whiting stock boundaries for management purposes, adjustments for fisheries exempted from minimum mesh requirements to fish for small-mesh NE multispecies (if applicable), season adjustments, declarations, participation requirements for the Cultivator Shoal Whiting Fishery Exemption Area, and changes to the Northeast Region SBRM (including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs.

* * * * *

In § 648.96, paragraphs (a), (b), and (c) are revised to read as follows:

§ 648.96 Monkfish annual adjustment process and framework specifications.

(a) *General.* The Monkfish Monitoring Committee (MFMC) shall meet on or before November 15 of each year to develop target TACs for the upcoming fishing year in accordance with paragraph (b)(1) of this section, and options for NEFMC and MAFMC consideration on any changes, adjustment, or additions to DAS allocations, trip limits, size limits, the Northeast Region SBRM (including the CV-based performance standard, fishery stratification, and/or reports), or other measures necessary to achieve the Monkfish FMP's goals and objectives. The MFMC shall review available data pertaining to discards and landings, DAS, and other measures of fishing effort; stock status and fishing mortality rates; enforcement of and compliance with management measures; and any other relevant information.

(b) *Annual Adjustment Procedures*— * * *

(5) *Annual review process.* The Monkfish Monitoring Committee (MFMC) shall meet on or before November 15 of each year to develop options for the upcoming fishing year, as needed, and options for NEFMC and MAFMC consideration on any changes, adjustment, or additions to DAS allocations, trip limits, size limits, the Northeast Region SBRM (including the CV-based performance standard, fishery stratification, and/or reports), or other measures necessary to achieve the Monkfish FMP's goals and objectives. The MFMC shall review available data pertaining to discards and landings, DAS, and other measures of fishing effort; stock status and fishing mortality rates; enforcement of and compliance with management measures; and any other relevant information.

* * * * *

(c) *Annual and in-season framework adjustments to management measures*—(1) *Annual framework process.* (i) Based on their annual review, the MFMC may develop and recommend, in addition to the target TACs and management measures established under paragraph (b) of this section, other options necessary to achieve the Monkfish FMP's goals and objectives, which may include a preferred option. The MFMC must demonstrate through analysis and documentation that the options it develops are expected to meet the Monkfish FMP goals and objectives. The MFMC may review the performance of different user groups or fleet sectors in developing options. The range of options developed by the MFMC may include any of the management measures in the Monkfish FMP, including, but not limited to: Closed seasons or closed areas; minimum size limits; mesh size limits; net limits; liver-to-monkfish landings ratios; annual monkfish DAS allocations and monitoring; trip or possession limits; blocks of time out of the fishery; gear restrictions; transferability of permits and permit rights or administration of vessel upgrades, vessel replacement, or permit assignment; measures to minimize the impact of the monkfish fishery on protected species; gear requirements or restrictions that minimize bycatch or bycatch mortality; transferable DAS programs; changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs; and other frameworkable measures included in §§648.55 and 648.90.

* * * * *

Subpart G—Management Measures for the Summer Flounder Fisheries

In § 648.100, paragraphs (a) and (b) are revised to read as follows:

§ 648.100 Catch quotas and other restrictions.

(a) *Review.* The Summer Flounder Monitoring Committee shall review each year the following data, subject to availability, unless a TAL has already been established for the upcoming calendar year as part of a multiple-year specification process, provided that new information does not require a modification to the multiple-year quotas, to determine the annual allowable levels of fishing and other restrictions necessary to achieve, with at least a 50-percent probability of success, a fishing mortality rate (F) that produces the maximum yield per recruit (F_{max}): Commercial, recreational, and research catch data; current estimates of fishing mortality; stock status; recent estimates of recruitment; virtual population analysis results; levels of noncompliance by fishermen or individual states; impact of size/mesh regulations; discards; sea sampling and winter trawl survey data or, if sea sampling data are unavailable, length frequency information from the winter trawl survey and mesh selectivity analyses; impact of gear other than otter trawls on the mortality of summer flounder; and any other relevant information.

(b) *Recommended measures on an annual basis.* * * *

(12) Changes, as appropriate, to the Northeast Region SBRM, including the CV-based performance standard, fishery stratification, and/or reports.

* * * * *

In § 648.108, paragraph (a) is revised to read as follows:

§ 648.108 Framework adjustments to management measures.

(a) *Within season management action.* * * *

(1) *Adjustment process.* The Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second Council meeting. The Council's recommendations on adjustments or additions to management measures must come from one or more of the following categories: Minimum fish size, maximum fish size, gear restrictions, gear requirements or prohibitions, permitting restrictions, recreational possession limit, recreational seasons, closed areas, commercial seasons, commercial trip limits, commercial quota system including commercial quota allocation procedure and possible quota set asides to mitigate bycatch, recreational harvest limit, annual specification quota setting process, FMP Monitoring Committee composition and process, description and identification of essential fish habitat (and fishing gear management measures that impact EFH), description and identification of habitat areas of particular concern, overfishing definition and related thresholds and targets, regional gear restrictions, regional season restrictions (including option to split seasons), restrictions on vessel size (LOA and GRT) or shaft horsepower, operator permits, changes to the Northeast Region SBRM (including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs), any other commercial or recreational management measures, any other management measures currently included in the FMP, and set aside quota for scientific research.

* * * * *

Subpart H—Management Measures for the Scup Fishery

In § 648.120, paragraphs (a) and (b) are revised to read as follows:

§ 648.120 Catch quotas and other restrictions.

(a) *Review.* The Scup Monitoring Committee shall review each year the following data, subject to availability, unless a TAL already has been established for the upcoming calendar year as part of a multiple-year specification process, provided that new information does not require a modification to the multiple-year quotas: Commercial, recreational, and research data; current estimates of fishing mortality; stock status; recent estimates of recruitment; virtual population analysis results; levels of noncompliance by fishermen or individual states; impact of size/mesh regulations; impact of gear on the mortality of scup; discards; and any other relevant information. This review will be conducted to determine the allowable levels of fishing and other restrictions necessary to achieve the F that produces the maximum yield per recruit (F_{max}).

(b) *Recommended measures.* * * *

(13) Changes, as appropriate, to the Northeast Region SBRM, including the CV-based performance standard, fishery stratification, and/or reports.

* * * * *

Subpart I—Management Measures for the Black Sea Bass Fishery

In § 648.140, paragraphs (a) and (b) are revised to read as follows:

§ 648.140 Catch quotas and other restrictions.

(a) *Review.* The Black Sea Bass Monitoring Committee shall review each year the following data, subject to availability, unless a TAL already has been established for the upcoming calendar year as part of a multiple-year specification process, provided that new information does not require a modification to the multiple-year quotas, to determine the allowable levels of fishing and other restrictions necessary to result in a target exploitation rate of 23 percent (based on F_{max}) in 2003 and subsequent years: Commercial, recreational, and research catch data; current estimates of fishing mortality; stock status; recent estimates of recruitment; virtual population analysis results; levels of noncompliance by fishermen or individual states; impact of size/mesh regulations; discards; sea sampling and winter trawl survey data, or if sea sampling data are unavailable, length frequency information from the winter trawl survey and mesh selectivity analyses; impact of gear other than otter trawls, pots and traps on the mortality of black sea bass; and any other relevant information.

(b) *Recommended measures.* * * *

(12) Changes, as appropriate, to the Northeast Region SBRM, including the CV-based performance standard, fishery stratification, and/or reports.

* * * * *

Subpart J—Management Measures for the Atlantic Bluefish Fishery

In § 648.160, paragraphs (a) and (b) are revised to read as follows:

§ 648.160 Catch quotas and other restrictions. * * *

(a) *Annual review.* On or before August 15 of each year, the Bluefish Monitoring Committee will meet to determine the total allowable level of landings (TAL) and other restrictions necessary to achieve the target fishing mortality rate (F) specified in the Fishery Management Plan for Atlantic Bluefish for the upcoming fishing year or the estimated F for the fishing year preceding the Council submission of the recommended specifications, whichever F is lower. In determining the TAL and other restrictions necessary to achieve the specified F, the Bluefish Monitoring Committee will review the following data, subject to availability: Commercial, recreational, and research catch data; current estimates of fishing mortality; stock status; recent estimates of recruitment; virtual population analysis results; levels of noncompliance by fishermen or individual states; impact of size/mesh regulations; discards; sea sampling data; impact of gear other than otter trawls and gill nets on the mortality of bluefish; and any other relevant information.

(b) *Recommended measures.* * * *

(9) Changes, as appropriate, to the Northeast Region SBRM, including the CV-based performance standard, fishery stratification, and/or reports.

* * * * *

In § 648.165, paragraph (a) is revised to read as follows:

§ 648.165 Framework specifications.

(a) *Within season management action.* * * *

(1) *Adjustment process.* After a management action has been initiated, the Council shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Council shall provide the public with advance notice of the availability of both the proposals and the analysis and the opportunity to comment on them prior to and at the second Council meeting. The Council's recommendation on adjustments or additions to management measures must come from one or more of the following categories: Minimum fish size, maximum fish size, gear restrictions, gear requirements or prohibitions, permitting restrictions, recreational possession limit, recreational season, closed areas, commercial season, description and identification of essential fish habitat (EFH), fishing gear management measures to protect EFH, designation of habitat areas of particular concern within EFH, changes to the Northeast Region SBRM (including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports and/or industry-funded observers or observer set-aside programs), and any other management measures currently included in the FMP.

* * * * *

Subpart K–Management Measures for the Atlantic Herring Fishery

In § 648.200, paragraph (b) is revised to read as follows:

§ 648.200 Specifications.

* * * * *

(b) *Guidelines*. As the basis for its recommendations under paragraph (a) of this section, the PDT shall review available data pertaining to: Commercial and recreational catch data; current estimates of fishing mortality; discards; stock status; recent estimates of recruitment; virtual population analysis results and other estimates of stock size; sea sampling and trawl survey data or, if sea sampling data are unavailable, length frequency information from trawl surveys; impact of other fisheries on herring mortality; and any other relevant information. * * *

* * * * *

In § 648.206, paragraph (b) is revised to read as follows:

§ 648.206 Framework provisions.

* * * * *

(b) *Possible framework adjustment measures*. * * *

(29) Changes, as appropriate, to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs; and

(30) Any other measure currently included in the FMP.

* * * * *

Subpart L—Management Measures for the Spiny Dogfish Fishery

In § 648.230, paragraphs (a) and (b) are revised to read as follows:

§ 648.230 Catch quotas and other restrictions.

(a) *Process for setting specifications*. The Spiny Dogfish Monitoring Committee will review the following data at least every 5 years, subject to availability, to determine the total allowable level of landings (TAL) and other restrictions necessary to assure that a target fishing mortality rate specified in the Spiny Dogfish Fishery Management Plan will not be exceeded in each year for which TAL and any other measures are recommended: Commercial and recreational catch data; discards; current estimates of F; stock status; recent estimates of recruitment; virtual population analysis results; levels of noncompliance by fishermen or individual states; impact of size/mesh regulations; sea sampling data; impact of gear other than otter trawls and gill nets on the mortality of spiny dogfish; and any other relevant information.

(b) *Recommended measures*. * * *

(5) Changes to the Northeast Region SBRM, including the CV-based performance standard, fishery stratification, and/or reports; or

(6) Other gear restrictions.

* * * * *

In § 648.237, paragraph (a) is revised to read as follows:

§ 648.237 Framework provisions.

(a) *Within season management action.* * * *

(1) *Adjustment process.* After the Councils initiate a management action, they shall develop and analyze appropriate management actions over the span of at least two Council meetings. The Councils shall provide the public with advance notice of the availability of both the proposals and the analysis for comment prior to, and at, the second Council meeting. The Councils' recommendation on adjustments or additions to management measures must come from one or more of the following categories: Minimum fish size; maximum fish size; gear requirements, restrictions or prohibitions (including, but not limited to, mesh size restrictions and net limits); regional gear restrictions; permitting restrictions and reporting requirements; recreational fishery measures (including possession and size limits and season and area restrictions); commercial season and area restrictions; commercial trip or possession limits; fin weight to spiny dogfish landing weight restrictions; onboard observer requirements; commercial quota system (including commercial quota allocation procedures and possible quota set-asides to mitigate bycatch, conduct scientific research, or for other purposes); recreational harvest limit; annual quota specification process; FMP Monitoring Committee composition and process; description and identification of essential fish habitat; description and identification of habitat areas of particular concern; overfishing definition and related thresholds and targets; regional season restrictions (including option to split seasons); restrictions on vessel size (length and GRT) or shaft horsepower; target quotas; measures to mitigate marine mammal entanglements and interactions; regional management; changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside program; any other management measures currently included in the Spiny Dogfish FMP; and measures to regulate aquaculture projects.

* * * * *

Subpart M—Management Measures for the Atlantic Deep-Sea Red Crab Fishery

In § 648.260, paragraph (b) is revised to read as follows:

§ 648.260 Specifications.

* * * * *

(b) *Development of specifications.* In developing the management measures and specifications, the PDT shall review at least the following data, if available: Commercial catch data; current estimates of fishing mortality and catch-per-unit-effort (CPUE); discards; stock status; recent estimates of recruitment; virtual population analysis results and other estimates of stock size; sea sampling, port sampling, and survey data or, if sea sampling data are unavailable, length frequency information from port sampling and/or surveys; impact of other fisheries on the mortality of red crabs; and any other relevant information. * * *

Subpart N—Management Measures for the Tilefish Fishery

In § 648.293, paragraph (a) is revised to read as follows:

§ 648.293 Framework specifications.

(a) *Within-season management action.* * * *

(1) *Specific management measures.* * * *

(xiv) Habitat areas of particular concern,

(xv) Set-aside quotas for scientific research, and

(xvi) Changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs.

* * * * *

Subpart O—Management Measures for the NE Skate Complex Fisheries

In § 648.321, paragraph (b) is revised to read as follows:

§ 648.321 Framework adjustment process.

* * * * *

(b) *Possible framework adjustment measures.* * * *

(19) OY and/or MSY specifications;

(20) Changes to the Northeast Region SBRM, including the CV-based performance standard, the means by which discard data are collected/obtained, fishery stratification, reports, and/or industry-funded observers or observer set-aside programs; and

(21) Any other measures contained in the FMP.

* * * * *

Proposed Regulations for Industry-Funded Observer Program Provisions

Subpart A—General Provisions

In § 648.11, paragraphs (h) and (i) are revised to read as follows:

§ 648.11 At-sea sea sampler/observer coverage.

* * * * *

(h) *Observer service provider approval and responsibilities.*

(1) *General*. An entity seeking to provide observer services must apply for and obtain approval from NMFS following submission of a complete application to The Observer Program Branch Chief, 25 Bernard St Jean Drive, East Falmouth, MA 02536. A list of approved observer service providers shall be distributed to vessel owners and shall be posted on the NMFS/NEFOP website at http://www.nefsc.noaa.gov/femad/fsb/.

(2) *Existing observer service providers*. Observer service providers that currently deploy certified observers in the Northeast must submit an application containing the information specified in paragraph (h)(3) of this section, excluding any information specified in paragraph (h)(3) of this section that has already been submitted to NMFS.

(3) *Contents of application*. An application to become an approved observer service provider shall contain the following:

(i) Identification of the management, organizational structure, and ownership structure of the applicant's business, including identification by name and general function of all controlling management interests in the company, including but not limited to owners, board members, officers, authorized agents, and staff. If the applicant is a corporation, the articles of incorporation must be provided. If the applicant is a partnership, the partnership agreement must be provided.

(ii) The permanent mailing address, phone and fax numbers where the owner(s) can be contacted for official correspondence, and the current physical location, business mailing address, business telephone and fax numbers, and business e-mail address for each office.

(iii) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, that they are free from a conflict of interest as described under paragraph (h)(6) of this section.

(iv) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, describing any criminal convictions, Federal contracts they have had, and the performance rating they received on the contract, and previous decertification action while working as an observer or observer service provider.

(v) A description of any prior experience the applicant may have in placing individuals in remote field and/or marine work environments. This includes, but is not limited to, recruiting, hiring, deployment, and personnel administration.

(vi) A description of the applicant's ability to carry out the responsibilities and duties of a fishery observer services provider as set out under paragraph (h)(2) of this section, and the arrangements to be used.

(vii) Evidence of holding adequate insurance to cover injury, liability, and accidental death for observers during their period of employment (including during training). Workers' Compensation and Maritime Employer's Liability insurance must be provided to cover the observer, vessel owner, and observer provider. The minimum coverage required is $5 million. Observer service providers shall provide copies of the insurance policies to observers to display to the vessel owner, operator, or vessel manager, when requested.

(viii) Proof that its observers, either contracted or employed by the service provider, are compensated with salaries that meet or exceed the U.S. Department of Labor (DOL) guidelines for observers. Observers shall be compensated as a Fair Labor Standards Act (FLSA) non-exempt employees. Observer providers shall provide any other benefits and personnel services in accordance with the terms of each observer's contract or employment status.

(ix) The names of its fully equipped, NMFS/NEFOP certified observers on staff or a list of its training candidates (with resumes) and a request for an appropriate NMFS/NEFOP Observer Training class. The NEFOP training has a minimum class size of eight individuals, which may be split among multiple vendors requesting training. Requests for training classes with less than eight individuals will be delayed until further requests make up the full training class size. Requests for training classes must be made 30 days in advance of the requested date and must have a complete roster of trainees at that time.

(x) An Emergency Action Plan (EAP) describing its response to an 'at sea' emergency with an observer, including, but not limited to, personal injury, death, harassment, or intimidation.

(4) *Application evaluation*.

(i) NMFS shall review and evaluate each application submitted under paragraphs (h)(2) and (h)(3) of this section. Issuance of approval as an observer provider shall be based on completeness of the application, and a determination of the applicant's ability to perform the duties and responsibilities of a fishery observer service provider as demonstrated in the application information. A decision to approve or deny an application shall be made by NMFS within 15 business days of receipt of the application by NMFS.

(ii) If NMFS approves the application, the observer service provider's name will be added to the list of approved observer service providers found on NMFS/NEFOP website specified in paragraph (h)(1) of this section and in any outreach information to the industry. Approved observer service providers shall be notified in writing and provided with any information pertinent to its participation in the fishery observer program.

(iii) An application shall be denied if NMFS determines that the information provided in the application is not complete or the evaluation criteria are not met. NMFS shall notify the applicant in writing of any deficiencies in the application or information submitted in support of the application. An applicant who receives a denial of his or her application may present additional information to rectify the deficiencies specified in the written denial, provided such information is submitted to NMFS within 30 days of the applicant's receipt of the denial notification from NMFS. In the absence of additional information, and after 30 days from an applicant's receipt of a denial, an observer provider is required to resubmit an application containing all of the information required under the application process specified in paragraph (h)(3) of this section to be re-considered for being added to the list of approved observer service providers.

(5) *Responsibilities of observer service providers*.

(i) An observer service provider must provide observers certified by NMFS/NEFOP pursuant to paragraph (i) of this section for deployment in a fishery when contacted and contracted by the owner, operator, or vessel manager of a vessel fishing unless the observer service provider refuses to deploy an observer on a requesting vessel for any of the reasons specified at paragraph (viii) of this section. An approved observer service provider must maintain a minimum of eight appropriately-trained NEFOP certified observers in order to remain approved; should a service provider cadre drop below eight, the provider must submit the appropriate number of candidates for the next available training class. Failure to do so shall be cause for suspension of their approved status until rectified.

(ii) An observer service provider must provide to each of its observers:

(A) All necessary transportation, including arrangements and logistics, of observers to the initial location of deployment, to all subsequent vessel assignments, and to any debriefing locations, if necessary;

(B) Lodging, per diem, and any other services necessary for observers assigned to a fishing vessel or to attend an appropriate NMFS/NEFOP Observer Training class;

(C) The required observer equipment, in accordance with equipment requirements listed on the NMFS/NEFOP website specified in paragraph (h)(1) of this section, prior to any deployment and/or prior to NMFS observer certification training; and

(D) Individually assigned communication equipment, in working order, such as a cell phone or pager, for all necessary communication. An observer service provider may alternatively compensate observers for the use of the observer's personal cell phone or pager for communications made in support of, or necessary for, the observer's duties.

(iii) *Observer deployment logistics*. Each approved observer service provider must assign an available certified observer to a vessel upon request. Each approved observer service provider must provide for access by industry 24 hours per day, 7 days per week, to enable an owner, operator, or manager of a vessel to secure observer coverage when requested. The telephone system must be monitored a minimum of four times daily to ensure rapid response to industry requests. Observer service providers approved under paragraph (h) of this section are required to report observer deployments to NMFS daily for the purpose of determining whether the predetermined coverage levels are being achieved in the appropriate fishery.

(iv) *Observer deployment limitations*. Unless alternative arrangements are approved by NMFS, an observer provider must not deploy any observer on the same vessel for two or more consecutive deployments, and not more than twice in any given month. A certified observer's first deployment and the resulting data shall be immediately edited, and approved, by NMFS prior to any further deployments of that observer.

(v) *Communications with observers*. An observer service provider must have an employee responsible for observer activities on call 24 hours a day to handle emergencies involving observers or problems concerning observer logistics, whenever observers are at sea, stationed shoreside, in transit, or in port awaiting vessel assignment.

(vi) *Observer training requirements*. The following information must be submitted to NMFS to request a certified observer training class at least 30 days prior to the beginning of the proposed training class: Date of requested training; a list of observer candidates, with a minimum of eight individuals; observer candidate resumes; and a statement signed by the candidate, under penalty of perjury, that discloses the candidate's criminal convictions, if any. All observer trainees must complete a basic cardiopulmonary resuscitation/first aid course prior to the beginning of a NMFS/NEFOP Observer Training class. NMFS may reject a candidate for training if the candidate does not meet the minimum qualification requirements as outlined by NMFS National Minimum Eligibility Standards for observers as described in paragraph (i)(1) of this section.

(vii) *Reports*.

(A) *Observer deployment reports*. The observer service provider must report to NMFS when, where, to whom, and to what fishery an observer has been deployed, within 24 hours of their departure. The observer service provider must ensure that the observer reports back to NMFS its Observer Contract (OBSCON) data, as described in the certified observer training, within 12 hours of landing. OBSCON data are to be submitted electronically or by other means as specified by NMFS. The observer service provider shall provide the raw (unedited) data collected by the observer to NMFS within 72 hours of the trip landing.

(B) *Safety refusals*. The observer service provider must report to NMFS any trip that has been refused due to safety issues, e.g., failure to hold a valid USCG Commercial Fishing Vessel Safety Examination Decal or to meet the safety requirements of the observer's pre-trip vessel safety checklist, within 24 hours of the refusal.

(C) *Biological samples*. The observer service provider must ensure that biological samples, including whole marine mammals, sea turtles, and sea birds, are stored/handled properly and transported to NMFS within 7 days of landing.

(D) *Observer debriefing*. The observer service provider must ensure that the observer remains available to NMFS, including NMFS Office for Law Enforcement, for debriefing for at least two weeks following any observed trip. If requested by NMFS, an observer that is at sea during the 2-week period must contact NMFS upon his or her return.

(E) *Observer availability report*. The observer service provider must report to NMFS any occurrence of inability to respond to an industry request for observer coverage due to the lack of available observers on staff by 5 pm, Eastern Standard Time, of any day on which the provider is unable to respond to an industry request for observer coverage.

(F) *Other reports*. The observer provider must report possible observer harassment, discrimination, concerns about vessel safety or marine casualty, observer illness or injury, and any information, allegations, or reports regarding observer conflict of interest or breach of the standards of behavior must be submitted to NMFS within 24 hours of the event or within 24 hours of learning of the event.

(viii) *Refusal to deploy an observer*.

(A) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider does not have an available observer within 72 hours of receiving a request for an observer from a vessel.

(B) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider has determined that the requesting vessel is inadequate or unsafe pursuant to the reasons described at §600.746.

(C) The observer service provider may refuse to deploy an observer on a fishing vessel that is otherwise eligible to carry an observer for any other reason including failure to pay for previous observer deployments, provided the observer service provider has received prior written confirmation from NMFS authorizing such refusal.

(6) *Limitations on conflict of interest.* An observer service provider:

(i) Must not have a direct or indirect interest in a fishery managed under Federal regulations, including, but not limited to, a fishing vessel, fish dealer, fishery advocacy group, and/or fishery research;

(ii) Must assign observers without regard to any preference by representatives of vessels other than when an observer will be deployed; and

(iii) Must not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts fishing or fishing related activities that are regulated by NMFS, or who has interests that may be substantially affected by the performance or nonperformance of the official duties of observer providers.

(7) *Removal of observer service provider from the list of approved observer service providers*. An observer provider that fails to meet the requirements, conditions, and responsibilities specified in paragraphs (h)(5) and (h)(6) of this section shall be notified by NMFS, in writing, that it is subject to removal from the list of approved observer service providers. Such notification shall specify the reasons for the pending removal. An observer service provider that has received notification that it is subject to removal from the list of approved observer service providers may submit information to rebut the reasons for removal from the list. Such rebuttal must be submitted within 30 days of notification received by the observer service provider that the observer service provider is subject to removal and must be accompanied by written evidence that clearly disproves the reasons for removal. NMFS shall review information rebutting the pending removal and shall notify the observer service provider within 15 days of receipt of the rebuttal whether or not the removal is warranted. If no response to a pending removal is received by NMFS, the observer service provider shall be automatically removed from the list of approved observer service providers. The decision to remove the observer service provider from the list, either after reviewing a rebuttal, or if no rebuttal is

submitted, shall be the final decision of NMFS and the Department of Commerce. Removal from the list of approved observer service providers does not necessarily prevent such observer service provider from obtaining an approval in the future if a new application is submitted that demonstrates that the reasons for removal are remedied. Certified observers under contract with an observer service provider that has been removed from the list of approved service providers must complete their assigned duties for any fishing trips on which the observers are deployed at the time the observer service provider is removed from the list of approved observer service providers. An observer service provider removed from the list of approved observer service providers is responsible for providing NMFS with the information required in paragraph (h)(5)(vii) of this section following completion of the trip. NMFS may consider, but is not limited to, the following in determining if an observer service provider may remain on the list of approved observer service providers:

(i) Failure to meet the requirements, conditions, and responsibilities of observer service providers specified in paragraphs (h)(5) and (h)(6) of this section;

(ii) Evidence of conflict of interest as defined under paragraph (h)(3) of this section;

(iii) Evidence of criminal convictions related to:

(A) Embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; or

(B) The commission of any other crimes of dishonesty, as defined by state law or Federal law that would seriously and directly affect the fitness of an applicant in providing observer services under this section;

(iv) Unsatisfactory performance ratings on any Federal contracts held by the applicant; and

(v) Evidence of any history of decertification as either an observer or observer provider.

(i) *Observer certification.*

(1) To be certified, employees or sub-contractors operating as observers for observer service providers approved under paragraph (h) of this section must meet NMFS National Minimum Eligibility Standards for observers. NMFS National Minimum Eligibility Standards are available at the National Observer Program website: http://www.st.nmfs.gov/st4/nop/.

(2) *Observer training*. In order to be deployed on any fishing vessel, a candidate observer must have passed an appropriate NMFS/NEFOP Observer Training course. If a candidate fails training, the candidate shall be notified in writing on or before the last day of training. The notification will indicate the reasons the candidate failed the training. Observer training shall include an observer training trip, as part of the observer's training, aboard a fishing vessel with a trainer. A certified observer's first deployment and the resulting data shall be immediately edited, and approved, by NMFS prior to any further deployments of that observer.

(3) *Observer requirements*. All observers must:

(i) Have a valid NMFS/NEFOP fisheries observer certification pursuant to paragraph (i)(1) of this section;

(ii) Be physically and mentally capable of carrying out the responsibilities of an observer on board fishing vessels, pursuant to standards established by NMFS. Such standards are available from NMFS/NEFOP website specified in paragraph (h)(1) of this section and shall be provided to each approved observer service provider; and

(iii) Have successfully completed all NMFS-required training and briefings for observers before deployment, pursuant to paragraph (i)(2) of this section.

(iv) Hold a current Red Cross (or equivalence) CPR/first aid certification.

(4) *Probation and decertification*. NMFS has the authority to review observer certifications and issue observer certification probation and/or decertification as described in NMFS policy found on the NMFS/NEFOP website specified in paragraph (h)(1) of this section.

(5) *Issuance of decertification*. Upon determination that decertification is warranted under paragraph (i)(3) of this section, NMFS shall issue a written decision to decertify the observer to the observer and approved observer service providers via certified mail at the observer's most current address provided to NMFS. The decision shall identify whether a certification is revoked and shall identify the specific reasons for the action taken. Decertification is effective immediately as of the date of issuance, unless the decertification official notes a compelling reason for maintaining certification for a specified period and under specified conditions. Decertification is the final decision of NMFS and the Department of Commerce and may not be appealed.

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MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

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