Northeast Fisheries Science Center Reference Document 08-02

A Brief Description of the Discard Estimation for the National Bycatch Report

by S.E. Wigley, M.C. Palmer, J. Blaylock, and P.J. Rago

January 2008

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List of Acronyms

CV	=	coefficient of variation
DAS	=	days-at-sea
MA	=	Mid-Atlantic
NE	=	New England
NEFOP	=	Northeast Fisheries Observer Program
NOAA	=	National Ocean and Atmospheric Administration
SARC	=	Stock Assessment Review Committee
SAW	=	Stock Assessment Workshop
VMS	=	vessel monitoring system
VTR	=	vessel trip report

INTRODUCTION

NOAA Fisheries is currently preparing a National Bycatch Report summarizing estimates of discards, by species, which occurred in 2005 in all federally managed fisheries in the United States. This document briefly describes the methods used to estimate the discards of finfish and shellfish in 2005 in fisheries in the Northeast Region, which will be included in the National Bycatch Report. The regional analysis involved 33 species and 77 fleets (Tables 1 and 2). Stock components were not considered in the analyses, and only fleets for which discard estimates could actually be derived will be included in the National Bycatch Report.

The discard estimation process used a stratification approach broad enough to encompass all species, and employed a combined ratio method using a discard-to-kept weight ratio. The discard estimates derived will not necessarily directly correspond with those contained in individual stock assessments due to differences in stratification and estimation methods. However, the various estimates should be of the same order of magnitude.

DATA SOURCES

Northeast Fisheries Observer Program Data

Northeast Fisheries Observer Program (NEFOP) data were used to calculate discard ratios. Only observed hauls from observer trips in 2005 for which a 'complete' sampling protocol were analyzed. Training trips, aborted trips, and hauls with no catch reported were eliminated from the data set. Species hail weights with discard reason '039' (previously discarded) were also excluded. Conversion factors were applied to convert any dressed weight data to live weight equivalents. Observer trips were assigned to fleet sectors using the NEFOP program codes:

NEFOP program code	Fleet sector
130	US/CAN Resource Sharing area
140	Haddock longline Hook sector
150	B-day
201-204	Scallop access areas
000	Open area

Vessel Trip Report Data (VTR)

As dealer records in the Northeast do not contain information on mesh size and area fished of the vessel trips involved in the purchases, these data could not be used to expand the observer discard ratios, by species and fleet, to calculate total discards. However, this information is recorded on Northeast Vessel Trip Reports (VTRs); thus, the VTR data were used to expand the NEFOP discard ratios to total discards. In the analysis, all of the commercial VTR trips in the 2005 database were used (excluding NY state [non-federal] vessels). As with the observer data, conversion factors were applied to convert various units of catch to pounds, live weight.

Surfclam Logbook and Dealer Data

The surfclam fishery has its own separate logbook system (different from the VTR system). As such, the data in the 2005 surfclam logbooks were used to augment the 2005 VTR data for the surfclam dredge fishery.

Days-At-Sea Data

VTR fishing trips were assigned to a fishery sector using the 2005 Days-At-Sea (DAS) database. It was assumed that all vessels that fished under a Special Area Access Program reported their participation (as required) either by the Days-At-Sea Call-In System or via the Vessel Monitoring System (VMS). The DAS database integrates both systems. Five access area classifications were used: 'closed area,' 'US/CAN resource sharing area,' 'B-day program,' 'hook sector,' and 'open area.' If a fishing trip was not assigned to one of the first four access area categories, it was assigned to the 'open area' category.

METHODS

In all of the analyses, the sampling unit was an individual fishing trip. Trips were partitioned into fleet sectors using six classification variables: calendar quarter, area fished, gear type, mesh size, access area, and trip category. Calendar quarter was based on the landed date of the fishing trip, and was used to capture seasonal variations in both fishing activity and discard rates. Area fished was based on statistical reporting area; trips where area fished was not recorded or was otherwise unknown were excluded. Two regional areas were defined: New England (NE) comprising statistical reporting areas <'600' (which includes Southern New England, Georges Bank, and the Gulf of Maine), and Mid-Atlantic (MA) comprising statistical areas >='600'. Gear type was based on Northeast gear codes (*negear)*. Some gear codes were combined into a single category (Table 2), and trips for which the gear was unknown were excluded. Mesh size groups were separately created for otter trawl and gillnet gear. For otter trawls, two mesh groups were formed: small mesh (less than 5.5 inches) and large mesh (5.5 inches and greater). For gillnet, three mesh groups were formed: small mesh (less than 5.5 inches); large mesh (between 5.5 and 7.99 inches); and extra large mesh (8 inches and greater). Five access area categories were used: 'closed area,' 'US/CAN,' 'B-day,' 'Hook,' and 'open area.' Sea scallop fishing trips were divided into General (Gen) and Limited (Lim) category trips.

DAS data (fishery codes, DAS codes, and access area codes) were used to assign all VTR trips into one of five access area categories. Vessel permit number and date landed were used to link VTR trips with the DAS trips. A detailed description of the methods developed (and obstacles encountered) to link the VTR and DAS databases is provided in Appendix B.

When one or no observer trips occurred in a calendar quarter, an imputation approach was employed to 'fill in' the missing (or incomplete) information using data from an adjoining stratum. In this imputation procedure, only the temporal stratification (*i.e.,* calendar quarter) was relaxed to half year, recognizing that seasonal variations occur for some species. When all quarterly cells were missing for a fleet, or sparse observer coverage existed across all quarter for the fleet, the fleet was subsequently eliminated from the analysis.

Discard Estimation

Total annual discards were estimated using a combined d/k ratio estimator (Cochran 1963) where *d* = discard pounds of a given species, and *k* = the kept pounds of all species. Total discards (in weight) of a species by a fleet were derived by multiplying the estimated discard rate for that particular species in that fleet by the corresponding fleet landings in the 2005 VTR database.

The combined ratio method is based on a ratio estimate pooled over all strata and all trips within a fleet.

The total discard (in pounds) of species *j* was defined as:

$$(1) \quad \hat{D}_j = \sum_{h=1}^{Q} K_h r_{c,j}$$

where

$$(2) \quad r_{c,j} = \frac{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

where

$\hat{D}_j$ is the total discarded pounds of species *j*;
K_h is the VTR total kept pounds in stratum *h*;
$r_{c,j}$ is the **combined ratio** of species *j*;
d_{jih} is the total discards (in pounds) of species *j* in trip *i* in stratum *h*;
k_{ih} is the kept pounds of all species on trip *i* in stratum *h*;
N_h is the number of VTR trips in stratum *h*; and
n_h is the number of observed trips in stratum *h*.

In Equation 2, the summation over strata *h* = 1 to Q occurs over calendar quarters. Equation 3 (below) requires a more explicit definition of the stratum designation as the summation over quarters relies on the annual combined ratio defined in Equation 2.

The variance of $\hat{D}_j$ for species *j* was defined as:

$$(3) \quad V(\hat{D}_j) = \sum_{q=1}^{4} K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(d_{jiqh}^2 + \left(r_{c,j} \right)^2 k_{iqh}^2 - 2 r_{c,j}\, d_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right]$$

where

$\hat{D}_j$ is the total discards (in pounds) of species *j*;

K_{qh} is the VTR total kept pounds in quarter *q* and stratum *h*;
$r_{c,j}$ is the **combined ratio** of species *j*;
d_{jiqh} is the total discards (in pounds) of species *j* in trip *i* in quarter *q* and stratum *h*;
k_{iqh} is the kept pounds of all species on trip *i* in quarter *q* and stratum *h*;
N_{qh} is the number of VTR 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 (CV) of $\hat{D}_j$ was defined as:

$$(4) \quad CV(\hat{D}_j) = \frac{\sqrt{V(\hat{D}_j)}}{\hat{D}_j}$$

All discards were assumed to result in 100% mortality. If survival ratios are used in a stock assessment, then a survival ratio are applied to the discard estimates presented here. Survival ratios are available for spiny dogfish and summer flounder (Appendix A Table A1).

Method Validation

Validation of the approach used to estimate total discards was performed by using this same approach to estimate the landings of each of the species in 2005, and comparing these estimates to the landings included in the VTR and Dealer databases.

To estimate landings using the NEFOP data, the same estimation method was used; however, the species-specific poundage discarded (d_j) was replaced with species-specific kept pounds (k_j).

$$(5) \quad \hat{L}_j = \sum_{h=1}^{Q} K_h r_{c,j}$$

where

$$(6) \quad r_{c,j} = \frac{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{k_{jih}}{n_h}}{\sum_{h=1}^{Q} N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

where

$\hat{L}_j$ is total kept pounds of species *j*;

K_h is the VTR total kept pounds in stratum *h*;
$r_{c,j}$ is the **combined ratio** of species *j*;
k_{jih} is the total kept pounds of species *j* in trip *i* in stratum *h*;
k_{ih} is the kept pounds of all species on trip *i* in stratum *h*;

N_h is the number of VTR trips in stratum h; and
n_h is the number of observed trips in stratum h.

In Equation 6, the summation over strata h = 1 to Q occurs over calendar quarters. Equation 7 (below) requires a more explicit definition of the stratum designation as the summation over quarters relies on an annual combined ratio defined in Equation 6.

The variance of $\hat{L}_j$ for species j was defined as:

$$(7)\quad V(\hat{L}_j) = \sum_{q=1}^{4} K_{qh}^2 \left(\frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left(\frac{\sum_{i=1}^{n_h} k_{iqh}}{n_{qh}} \right)^2} \left[\frac{\sum_{i=1}^{n_{qh}} \left(k_{jiqh}^2 + \left(r_{c,j} \right)^2 k_{iqh}^2 - 2 r_{c,j}\ k_{jiqh} k_{iqh} \right)}{n_{qh} - 1} \right]$$

where
$\hat{L}_j$ is the total kept pounds of species j;
K_{qh} is the VTR total kept pounds in quarter q and stratum h;
$r_{c,j}$ is the **combined ratio** of species j;
k_{jiqh} is the kept pounds of species j in trip i in quarter q and stratum h;
k_{iqh} is the kept pounds of all species on trip i in quarter q and stratum h;
N_{qh} is the number of VTR 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 $\hat{L}_j$ was defined as:

$$(8)\quad CV(\hat{L}_j) = \frac{\sqrt{V(\hat{L}_j)}}{\hat{L}_j}$$

For each species, 95% confidence intervals were calculated for the point estimate of total landings.

RESULTS AND DISCUSSION

Using the 2005 observer data, discards were estimated for 33 species in 25 of the 77 fleets examined (Tables 1, 2 and 5). A total of 3,565 trips[1] were observed in 2005, with the majority of these occurring in the otter trawl, gillnet, and sea scallop dredge fleets. Although observer coverage in 2005 was relatively high compared to previous years, some fleets had little or no observer coverage (Table 2). For some fleets with limited temporal coverage by observers, imputation was used to derive the discard estimates. However, using half-year estimates may not be appropriate for all species and, in some cases, quarterly discard ratios were based on very small sample sizes. This contributed to the lower precision (higher CVs) associated with several of these estimates (Table 6).

[1] Trips were partitioned when the trip characteristics fell into more than one fleet.

The 2005 VTR landings (all species combined, live weight), by fleet and quarter, were used to expand the discard ratios (Table 4). Total discards in 2005 (in metric tons), by species and fleet—with and without survival ratios applied— are presented in Table 5a and 5b, respectively. Because discards were not estimated for all fisheries (due to data limitations), the values in Table 5 underestimate the actual *total* discards in 2005.

Qualitative comparisons of the 2005 discard estimates (using both the annual totals and the totals for specific gear) with other recent discard estimates available for the same species indicated a similarity in order of magnitude. That is, the 2005 estimates approximate those derived from: (a) the Standardized Bycatch Reporting Methodology analysis, which used 2004 data (Wigley et al. 2007); (b) stock assessments conducted during the 2005 Groundfish Assessment Review Meeting; and (c) various SAW/SARC analyses.

For most species, the VTR and Dealer databases provide similar values for the 2005 landings (Table 7). VTR landings exceeded dealer landings in only six of the 39 species/species groups listed in Table 7. Moreover, when two of the six species (offshore hake and red hake) are combined with white hake, the resulting VTR landings differ only slightly from the dealer data (1,996 mt vs. 2,063 mt, respectively). For cases where the dealer landings exceeded the VTR landings (such as bluefish, scup, black sea bass, and monkfish), these discrepancies likely resulted from the inability to partition out the mandatory reporting landings (reflective of the VTR) from the state landings. The differences for monkfish likely reflect misreporting of monkfish product forms (i.e., tails vs. whole fish) in the VTR database.

The results of the validation exercise show that for most species and species groups, the estimated landings derived using the NEFOP dataset do not differ significantly from the VTR values, with the 95% confidence interval of the estimated landings encompassing the VTR landings (Table 7 and Figure 1). For three species (surfclams, ocean quahogs, and red crabs), the 95% confidence do not encompass the VTR or Dealer landings values. However, there was no observer coverage of the 2005 fisheries for any of these species, and it is therefore not surprising that the estimated landings of these species do not approximate the VTR landings. For the three hake species (red, white and offshore hake) and the two squid species (*Illex* and *Loligo*), there is some reporting of 'mixed' species such that the landings at the individual species level do not compare as favorably as at the combined (i.e., 'mixed hakes' or 'mixed squid') level (Table 7 and Figure 1).

The NEFOP, VTR, and DAS databases do not contain the requisite information to directly match trips (i.e., one-to-one match) across the three databases; hence, ad hoc methods were developed to accomplish matching. Some misclassification of trips to various fishery sectors is therefore inevitable, and some of these misclassifications are evident in Table 2. Two obvious examples of these misclassifications include: (a) VTR trips < NEFOP trips and (b) US/CAN area classification with MA area fished. Some misclassification may also be due to the limited auditing of the VTR data resulting in overlapping trip dates, incorrect gear codes, and/or incorrect area fished. With the NEFOP data, difficulties were sometimes encountered in identifying trips that 'flipped' between the B-day program and other programs. In addition, when trips were matched between the VTR and DAS databases, 80 VTR trips had conflicting DAS codes (these were resolved by using the DAS code associated with the longest days absent; see Appendix B). When inconsistencies occurred between VTR gear and DAS access area, the VTR information was assumed to be correct.

Another constraint was the lack of master conversion tables in the NEFOP and VTR databases. For the NEFOP, no master conversion factor table was available to convert dressed

weight to live weight; hence, a conversion factor table developed for another analysis was used. For the VTR data, a conversion between units of measure other than pounds (e.g. bushels, trays, bags, gallons, barrels) to pounds was needed. Again, a conversion factor table built for another analysis was thus used.[2]

In summary, a very broad stratification was used to encompass all species in the Northeast regional analysis. Discard estimates provided in this report will differ from discard estimates developed separately in stock assessments because of differences in estimation methods and in spatial/temporal/fleet stratification schemes.

[2] Since the National Bycatch analysis was conducted, a VTR conversion table has been created.

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Wigley SE, Rago PJ, Sosebee KA, Palka DL. 2007. The Analytic Component to the Standardized Bycatch Reporting Methodology Omnibus Amendment: Sampling Design, and Estimation of Precision and Accuracy (2nd Edition). Northeast Fish Sci Cent Ref Doc 07-09; 156 p. http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0709/

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We wish to thank all the NEFOP observers for their diligent efforts to collect the discard information used in this analysis.

Table 1. List of Northeast species, and their scientific name, examined for the National Bycatch Report. Skate species are not considered individually, but as a complex in this analysis.

	Species	Scientific Name
1	Bluefish	*Pomatomus saltatrix*
2	Atlantic Herring	*Clupea harengus*
3	Atlantic Salmon	*Salmo salar*
4	Deep Sea Red Crab	*Chaceon quinquedens*
5	Atlantic Sea Scallop	*Placopecten magellanicus*
6	Atlantic Mackerel	*Scomber scombrus*
7	Shortfinned Squid	*Illex illecebrosus*
8	Longfinned Squid	*Loligo pealeii*
9	Butterfish	*Peprilus triacanthus*
10	Monkfish	*Lophius americanus*
11	Atlantic Cod	*Gadus morhua*
12	Haddock	*Melanogrammus aeglefinus*
13	Yellowtail Flounder	*Limanda ferruginea*
14	American Plaice	*Hippoglossoides platessoides*
15	Witch Flounder	*Glyptocephalus cynoglossus*
16	Winter Flounder	*Pseudopleuronectes americanus*
17	Pollock	*Pollachius virens*
18	Acadian Redfish	*Sebastes fasciatus*
19	White Hake	*Urophycis tenuis*
20	Windowpane Flounder	*Scophthalmus aquosus*
21	Atlantic Halibut	*Hippoglossus hippoglossus*
22	Ocean Pout	*Macrozoarces americanus*
23	Silver Hake	*Merluccius bilinearis*
24	Offshore Hake	*Merluccius albidus*
25	Red Hake	*Urophycis chuss*
26	Skate Complex	
	Winter Skate	*Leucoraja ocellata*
	Thorny Skate	*Amblyraja radiata*
	Little Skate	*Leucoraja erinacea*
	Barndoor Skate	*Dipturus leavis*
	Smooth Skate	*Malacoraja senta*
	Clearnose Skate	*Raja eglanteria*
	Rosette Skate	*Leucoraja garmani*
27	Spiny Dogfish	*Squalus acanthias*
28	Summer Flounder (Fluke)	*Paralichthys dentatus*
29	Scup	*Stenotomus chrysops*
30	Black Sea Bass	*Centropristis striata*
31	Atlantic Surfclam	*Spisula solidissima*
32	Ocean Quahog	*Arctica islandica*
33	Tilefish	*Lopholatilus chamaeleonticeps*

Table 2. Number of Vessel Trip Report and Northeast Fisheries Observer Program trips by fleet and calendar quarter in 2005.

						Number of VTR trips in 2005					Number of NEFOP trips in 2005						
Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	QTR 1	QTR 2	QTR 3	QTR4	TOTAL	QTR 1	QTR 2	QTR 3	QTR4	TOTAL	VTR < NEFOP	Imputation / Comments
Longline	HOOK	NE	all	all	010	1			427	428				95	95		
Longline	OPEN	MA	all	all	010	10	5	8	19	42			1		1		no discard estimation
Longline	OPEN	NE	all	all	010	550	152	254	196	1,152	53	32	13	89	187		
Hand Line	OPEN	MA	all	all	020	86	778	1,777	958	3,599			1		1		no discard estimation
Hand Line	OPEN	NE	all	all	020	170	481	1,611	375	2,637	6	4	1		11		use q12 for q3 and q4
Harpoon	OPEN	MA	all	all	030			1		1							no discard estimation
Harpoon	OPEN	NE	all	all	030		5	13		18							no discard estimation
Longline, Pelagic	OPEN	MA	all	all	040	3	7	9		19							no discard estimation
Longline, Pelagic	OPEN	NE	all	all	040	3		1		4							no discard estimation
Otter Trawl	B	MA	large	all	050	1	1	1		3	1				1		no discard estimation
Otter Trawl	B	NE	small	all	050						12	5	4		21	X	no discard estimation
Otter Trawl	B	NE	large	all	050	161	84	186	14	445	106	62	42	3	213		
Otter Trawl	OPEN	MA	small	all	050	800	917	580	1,048	3,345	51	20	31	48	150		
Otter Trawl	OPEN	MA	large	all	050	1,357	3,156	4,337	1,608	10,458	12	10	35	16	73		
Otter Trawl	OPEN	NE	small	all	050	507	734	648	497	2,386	28	17	72	37	154		
Otter Trawl	OPEN	NE	large	all	050	2,164	2,667	4,863	2,806	12,500	95	62	277	181	615		
Otter Trawl	USCAN	MA	small	all	050			1	1	2							no discard estimation
Otter Trawl	USCAN	MA	large	all	050	1	1			2							no discard estimation
Otter Trawl	USCAN	NE	small	all	050	3	2	2	5	12	17	16	2	14	49	X	
Otter Trawl	USCAN	NE	large	all	050	288	373	188	388	1,237	133	163	46	118	460		
Scallop Trawl	CLOSED	MA	all	general	052			18	112	130				1	1		no discard estimation
Scallop Trawl	CLOSED	MA	all	limited	052	1	8	3	6	18							no discard estimation
Scallop Trawl	CLOSED	NE	all	limited	052			5	1	6							no discard estimation
Scallop Trawl	OPEN	MA	all	general	052	58	834	1,821	316	3,029	8	20	74	23	125		
Scallop Trawl	OPEN	MA	all	limited	052	9	31	19	12	71							no discard estimation
Scallop Trawl	OPEN	NE	all	general	052	13	2	15		30							no discard estimation
Scallop Trawl	OPEN	NE	all	limited	052			2		2							no discard estimation
Shrimp Trawl	OPEN	MA	all	all	058	4		4		8							no discard estimation
Shrimp Trawl	OPEN	NE	all	all	058	2,402			142	2,544	16				16		use q1 for q4
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110	313	392	689	492	1,886				1	1		no discard estimation
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110	50	263	121	373	807				1	1		no discard estimation
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	364	1,302	342	647	2,655	9	41	1	8	59		use q34 for q3
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110	2	5	4	10	21			2		2		no discard estimation
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	853	946	2,146	1,377	5,322	100	12	265	129	506		
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	531	1,385	1,676	1,137	4,729	36	24	211	100	371		
Purse Seine	OPEN	MA	all	all	121, 120			113	8	121							no discard estimation
Purse Seine	OPEN	NE	all	all	121, 120		26	156	33	215		2	17	4	23		
Scallop Dredge	CLOSED	MA	all	general	132	7	2	57	871	937				2	2		no discard estimation
Scallop Dredge	CLOSED	MA	all	limited	132	114	289	182	59	644	18	18	10	6	52		
Scallop Dredge	CLOSED	NE	all	general	132	8	18	181	297	504		2	9	1	12		use q2 for q1, q34 for q4
Scallop Dredge	CLOSED	NE	all	limited	132	93	39	486	161	779	9	1	26	18	54		
Scallop Dredge	OPEN	MA	all	general	132	1,085	2,365	3,468	1,853	8,771	7	15	47	22	91		
Scallop Dredge	OPEN	MA	all	limited	132	257	580	194	169	1,200	14	8	13	9	44		
Scallop Dredge	OPEN	NE	all	general	132	503	2,149	2,224	603	5,479	11	3			14		use q12 for q3, and for q4
Scallop Dredge	OPEN	NE	all	limited	132	91	59	131	159	440	2	5	9	5	21		
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	250	55	2	1	308	10	1			11		use q12 for q2, q3, and q4
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	38	154	319	224	735	7	30	42	29	108		

Table 2 *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	Number of VTR trips in 2005					Number of NEFOP trips in 2005					VTR < NEFOP	Imputation / Comments
						QTR 1	QTR 2	QTR 3	QTR4	TOTAL	QTR 1	QTR 2	QTR 3	QTR4	TOTAL		
Fish Pots/ Traps	OPEN	MA	all	all	181	16	395	445	322	1,178							no discard estimation
Fish Pots/ Traps	OPEN	NE	all	all	181	1	247	851	247	1,346			2		2		no discard estimation
Lobster Pots	OPEN	MA	all	all	200	217	799	1,442	593	3,051							no discard estimation
Lobster Pots	OPEN	NE	all	all	200	2,702	6,033	14,113	10,746	33,594		1	1	1	3		no discard estimation
Crab Pots	OPEN	MA	all	all	300	9	14	72	24	119							no discard estimation
Crab Pots	OPEN	NE	all	all	300	8	7	36	24	75							no discard estimation
Scottish Seine	OPEN	MA	all	all	360		7	2		9							no discard estimation
Scottish Seine	OPEN	NE	all	all	360		7	2		9							no discard estimation
Clam Quahog Dredge	OPEN	MA	all	all	400, 386	694	908	1,253	994	3,849	1		2	2	5		no discard estimation
Clam Quahog Dredge	OPEN	NE	all	all	400, 386	660	995	609	513	2,777	1				1		no discard estimation
Troll Line	OPEN	MA	all	all	060									2	2	X	no discard estimation
Floating Trap	OPEN	MA	all	all	080		21	2		23							no discard estimation
Floating Trap	OPEN	NE	all	all	080		21	113	18	152							no discard estimation
Danish Seine	OPEN	MA	all	all	160		1			1							no discard estimation
Pots + Traps	OPEN	NE	all	all	180	2				2							no discard estimation
Pots + Traps, Conch	OPEN	MA	all	all	183	57	187	53	448	745							no discard estimation
Pots + Traps, Conch	OPEN	NE	all	all	183		42	182	130	354							no discard estimation
Pots + Traps, Hagfish	OPEN	NE	all	all	186	13	51	51	17	132							no discard estimation
Pots + Traps, Shrimp	OPEN	NE	all	all	190	237				237							no discard estimation
Rakes	OPEN	MA	all	all	250		9			9							no discard estimation
Rakes	OPEN	NE	all	all	250			1		1							no discard estimation
Diving Gear	OPEN	MA	all	all	330			1		1							no discard estimation
Diving Gear	OPEN	NE	all	all	330		28	31	3	62							no discard estimation
Beam Trawl	OPEN	MA	all	all	350	25	50	85	34	194							no discard estimation
Beam Trawl	OPEN	NE	all	all	350	87	49	64	20	220							no discard estimation
Dredge, Other	OPEN	MA	all	all	381	326	1	5	140	472							no discard estimation
Dredge, Other	OPEN	NE	all	all	381	1				1	4	2		1	7	X	no discard estimation
Dredge, Mussel	OPEN	NE	all	all	385				6	6							no discard estimation
Dredge, Urchin	OPEN	MA	all	all	387				1	1							no discard estimation
Dredge, Urchin	OPEN	NE	all	all	387	9	19	8	19	55							no discard estimation
					TOTAL	18,215	30,158	48,279	31,704	128,356	767	576	1,256	966	3,565		

Table 3. Vessel Trip Report landings (live, mt) by fleet and calendar quarter in 2005.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL
Longline	HOOK	NE	all	all	010	0.7			608.3	**609.0**
Longline	OPEN	MA	all	all	010	60.2	40.3	75.2	61.8	**237.5**
Longline	OPEN	NE	all	all	010	438.9	225.8	319.2	261.8	**1,245.7**
Hand Line	OPEN	MA	all	all	020	7.3	41.8	130.1	88.7	**267.8**
Hand Line	OPEN	NE	all	all	020	22.0	31.2	170.5	51.5	**275.2**
Harpoon	OPEN	MA	all	all	030			0.2		**0.2**
Harpoon	OPEN	NE	all	all	030		1.1	3.2		**4.3**
Longline, Pelagic	OPEN	MA	all	all	040	3.2	6.6	6.7		**16.5**
Longline, Pelagic	OPEN	NE	all	all	040	0.2		4.1		**4.3**
Otter Trawl	B	MA	large	all	050	11.3	12.3	0.2		**23.8**
Otter Trawl	B	NE	small	all	050					
Otter Trawl	B	NE	large	all	050	1,769.5	1,296.6	2,400.9	117.3	**5,584.3**
Otter Trawl	OPEN	MA	small	all	050	9,891.2	7,188.1	8,432.0	5,944.4	**31,455.7**
Otter Trawl	OPEN	MA	large	all	050	4,549.5	2,809.6	3,550.5	2,102.1	**13,011.7**
Otter Trawl	OPEN	NE	small	all	050	3,836.7	3,143.5	3,333.1	4,116.5	**14,429.8**
Otter Trawl	OPEN	NE	large	all	050	5,230.9	4,807.7	5,569.0	4,149.8	**19,757.4**
Otter Trawl	USCAN	MA	small	all	050			0.4	1.8	**2.2**
Otter Trawl	USCAN	MA	large	all	050	13.2	3.0			**16.1**
Otter Trawl	USCAN	NE	small	all	050	44.2	28.9	24.1	21.1	**118.3**
Otter Trawl	USCAN	NE	large	all	050	3,371.3	4,803.5	2,447.6	4,203.4	**14,825.9**
Scallop Trawl	CLOSED	MA	all	general	052			21.1	126.9	**148.0**
Scallop Trawl	CLOSED	MA	all	limited	052	60.5	310.5	92.6	19.8	**483.4**
Scallop Trawl	CLOSED	NE	all	limited	052			274.4	118.2	**392.6**
Scallop Trawl	OPEN	MA	all	general	052	67.2	1,156.1	2,233.3	410.4	**3,866.9**
Scallop Trawl	OPEN	MA	all	limited	052	46.9	789.7	377.9	173.3	**1,387.7**
Scallop Trawl	OPEN	NE	all	general	052	14.7	2.6	28.4		**45.7**
Scallop Trawl	OPEN	NE	all	limited	052			75.0		**75.0**
Shrimp Trawl	OPEN	MA	all	all	058	2.2		3.9		**6.2**
Shrimp Trawl	OPEN	NE	all	all	058	1,883.9			133.7	**2,017.5**
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110	751.3	218.7	408.3	433.1	**1,811.4**
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110	114.5	205.8	59.6	305.3	**685.2**
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	343.6	1,537.6	358.8	607.7	**2,847.7**
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110	3.4	2.9	5.0	4.5	**15.7**
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	699.2	751.1	1,795.3	1,327.7	**4,573.2**
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	748.5	2,679.3	2,738.3	1,311.8	**7,477.9**
Purse Seine	OPEN	MA	all	all	121, 120			7,711.1	582.9	**8,293.9**
Purse Seine	OPEN	NE	all	all	121, 120		1,274.5	12,604.2	2,773.4	**16,652.1**
Scallop Dredge	CLOSED	MA	all	general	132	27.0	67.6	83.4	1,192.7	**1,370.6**
Scallop Dredge	CLOSED	MA	all	limited	132	4,761.6	16,003.1	6,015.8	656.5	**27,437.0**
Scallop Dredge	CLOSED	NE	all	general	132	88.1	35.8	559.7	386.4	**1,070.0**
Scallop Dredge	CLOSED	NE	all	limited	132	5,033.2	2,366.1	29,961.7	8,031.2	**45,392.2**
Scallop Dredge	OPEN	MA	all	general	132	1,788.5	3,612.4	4,886.7	2,609.3	**12,896.9**
Scallop Dredge	OPEN	MA	all	limited	132	14,796.2	42,223.4	9,889.0	5,596.1	**72,504.8**
Scallop Dredge	OPEN	NE	all	general	132	764.2	2,792.4	2,925.3	706.4	**7,188.3**
Scallop Dredge	OPEN	NE	all	limited	132	5,176.1	5,197.4	11,168.5	8,828.5	**30,370.5**
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	40,985.1	8,193.9	213.2	13.6	**49,405.8**
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	3,174.3	12,886.0	27,115.2	28,292.3	**71,467.8**

Table 3 *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL
Fish Pots/ Traps	OPEN	MA	all	all	181	5.2	136.8	130.3	126.8	**399.2**
Fish Pots/ Traps	OPEN	NE	all	all	181	20.6	44.1	134.4	45.9	**245.0**
Lobster Pots	OPEN	MA	all	all	200	33.3	152.7	315.2	338.3	**839.7**
Lobster Pots	OPEN	NE	all	all	200	1,547.1	1,629.8	2,851.6	3,305.2	**9,333.7**
Crab Pots	OPEN	MA	all	all	300	199.3	85.0	114.5	296.3	**695.1**
Crab Pots	OPEN	NE	all	all	300	211.8	125.5	381.7	307.2	**1,026.2**
Scottish Seine	OPEN	MA	all	all	360		3.1	0.6		**3.7**
Scottish Seine	OPEN	NE	all	all	360		1.6	0.6		**2.3**
Clam Quahog Dredge	OPEN	MA	all	all	400, 386	41,671.7	48,872.3	59,237.6	49,506.8	**199,288.4**
Clam Quahog Dredge	OPEN	NE	all	all	400, 386	8,546.8	9,972.5	4,436.9	7,411.1	**30,367.4**
Troll Line	OPEN	MA	all	all	060					
Floating Trap	OPEN	MA	all	all	080		67.1	1.1		**68.2**
Floating Trap	OPEN	NE	all	all	080		16.0	34.9	4.3	**55.1**
Danish Seine	OPEN	MA	all	all	160		1.8			**1.8**
Pots + Traps	OPEN	NE	all	all	180	3.6				**3.6**
Pots + Traps, Conch	OPEN	MA	all	all	183	61.7	107.4	63.1	314.3	**546.6**
Pots + Traps, Conch	OPEN	NE	all	all	183		12.6	78.0	53.7	**144.3**
Pots + Traps, Hagfish	OPEN	NE	all	all	186	106.4	277.5	306.1	132.6	**822.5**
Pots + Traps, Shrimp	OPEN	NE	all	all	190	116.8				**116.8**
Rakes	OPEN	MA	all	all	250		1.8			**1.8**
Rakes	OPEN	NE	all	all	250			1.0		**1.0**
Diving Gear	OPEN	MA	all	all	330			0.1		**0.1**
Diving Gear	OPEN	NE	all	all	330		2.6	2.3	0.1	**5.0**
Beam Trawl	OPEN	MA	all	all	350	66.4	39.1	196.9	15.5	**317.9**
Beam Trawl	OPEN	NE	all	all	350	137.5	84.0	42.2	25.9	**289.6**
Dredge, Other	OPEN	MA	all	all	381	159.4	0.3	340.2	64.5	**564.3**
Dredge, Other	OPEN	NE	all	all	381	0.6				**0.6**
Dredge, Mussel	OPEN	NE	all	all	385				32.8	**32.8**
Dredge, Urchin	OPEN	MA	all	all	387				23.6	**23.6**
Dredge, Urchin	OPEN	NE	all	all	387	1.7	50.8	27.1	6.4	**86.0**
					TOTAL	163,470.1	188,431.5	216,769.0	148,381.5	**717,052.1**

Table 4. Combined discard to kept (d/k) ratios, by species and fleet in 2005.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	BLUEFISH	ATLANTIC HERRING	ATLANTIC SALMON	DEEP SEA RED CRAB	ATLANTIC SEA SCALLOP	ATLANTIC MACKEREL	ILLEX SQUID	LOLIGO SQUID	BUTTERFISH	MONKFISH	ATLANTIC COD
Longline	HOOK	NE	all	all	010	0.000000	0.000021	0.000000	0.000000	0.000003	0.000000	0.000000	0.000000	0.000000	0.000009	0.002442
Longline	OPEN	MA	all	all	010											
Longline	OPEN	NE	all	all	010	0.000000	0.000000	0.000000	0.000000	0.000005	0.000000	0.000000	0.000000	0.000000	0.000005	0.036878
Hand Line	OPEN	MA	all	all	020											
Hand Line	OPEN	NE	all	all	020	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.084327
Otter Trawl	B	MA	large	all	050											
Otter Trawl	B	NE	small	all	050											
Otter Trawl	B	NE	large	all	050	0.000119	0.000001	0.000000	0.000001	0.002514	0.000016	0.000192	0.000045	0.000001	0.012609	0.009661
Otter Trawl	OPEN	MA	small	all	050	0.000001	0.005771	0.000000	0.000012	0.000001	0.006752	0.044167	0.018770	0.021115	0.005194	0.000003
Otter Trawl	OPEN	MA	large	all	050	0.000592	0.000000	0.000000	0.000147	0.000001	0.000005	0.000014	0.000050	0.000290	0.002291	0.000000
Otter Trawl	OPEN	NE	small	all	050	0.000124	0.017495	0.000000	0.000002	0.000247	0.068156	0.013164	0.021422	0.021862	0.011477	0.003066
Otter Trawl	OPEN	NE	large	all	050	0.000314	0.000218	0.000000	0.002109	0.000775	0.000044	0.000309	0.000100	0.000030	0.018645	0.015409
Otter Trawl	USCAN	MA	small	all	050											
Otter Trawl	USCAN	MA	large	all	050											
Otter Trawl	USCAN	NE	small	all	050	0.000112	0.000034	0.000000	0.000001	0.000157	0.000019	0.000036	0.000063	<0.000001	0.007908	0.012990
Otter Trawl	USCAN	NE	large	all	050	0.000367	0.000170	0.000000	0.000002	0.002179	0.000022	0.000081	0.000042	0.000009	0.009751	0.017842
Scallop Trawl	CLOSED	MA	all	general	052											
Scallop Trawl	CLOSED	MA	all	limited	052											
Scallop Trawl	CLOSED	NE	all	limited	052											
Scallop Trawl	OPEN	MA	all	general	052	0.000000	0.000005	0.000000	0.000000	0.116429	0.000000	0.000024	0.000115	0.000013	0.015584	0.000000
Scallop Trawl	OPEN	MA	all	limited	052											
Scallop Trawl	OPEN	NE	all	general	052											
Scallop Trawl	OPEN	NE	all	limited	052											
Shrimp Trawl	OPEN	MA	all	all	058											
Shrimp Trawl	OPEN	NE	all	all	058	0.000000	0.004502	0.000000	0.000376	0.000049	0.000001	0.000152	0.000000	0.000561	0.000002	0.000001
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	0.000002	0.000000	0.000000	0.000000	0.000637	0.000614	0.000000	0.000000	0.000000	0.078339	0.000103
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	0.000001	0.000001	0.000000	0.000170	0.000002	0.000162	0.000000	0.000000	0.000000	0.000966	0.020068
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	0.000002	0.000047	0.000000	0.000040	0.000035	0.003392	0.000000	0.000000	0.000000	0.052085	0.004500
Purse Seine	OPEN	MA	all	all	121, 120											
Purse Seine	OPEN	NE	all	all	121, 120	0.000036	0.057654	0.000000	0.000000	0.000000	0.000015	0.000000	0.000000	0.000000	0.000000	0.000000
Scallop Dredge	CLOSED	MA	all	general	132											
Scallop Dredge	CLOSED	MA	all	limited	132	0.000000	0.000000	0.000000	0.000005	0.028827	0.000003	0.000044	0.000054	<0.000001	0.027964	0.000000
Scallop Dredge	CLOSED	NE	all	general	132	0.000000	0.000000	0.000000	0.000000	0.116681	0.000000	0.000000	0.000000	0.000000	0.030019	0.000000
Scallop Dredge	CLOSED	NE	all	limited	132	0.000000	0.000000	0.000000	0.000000	0.014833	0.000000	<0.000001	<0.000001	<0.000001	0.008153	0.000034
Scallop Dredge	OPEN	MA	all	general	132	0.000000	0.000000	0.000000	0.000000	0.008195	0.000000	<0.000001	0.000043	0.000000	0.008587	0.000000
Scallop Dredge	OPEN	MA	all	limited	132	0.000000	<0.000001	0.000000	0.000000	0.027919	0.000017	0.000004	0.000013	0.000001	0.012872	0.000000
Scallop Dredge	OPEN	NE	all	general	132	0.000000	0.000000	0.000000	0.000000	0.069518	0.000000	0.000000	0.000000	0.000000	0.000066	0.000006
Scallop Dredge	OPEN	NE	all	limited	132	0.000000	0.000000	0.000000	0.000000	0.036165	0.000002	<0.000001	0.000002	0.000000	0.009512	0.000034
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	0.000000	0.005682	0.000000	0.000000	0.000000	0.006765	0.000000	0.000000	0.000000	0.000014	0.000000
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	0.000008	0.022124	0.000000	0.000000	0.000000	0.000098	0.000016	<0.000001	0.000000	0.000003	0.000008

Table 4 *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	HADDOCK	YELLOWTAIL FLOUNDER	AMERICAN PLAICE	WITCH FLOUNDER	WINTER FLOUNDER	POLLOCK	ACADIAN REDFISH	WHITE HAKE	WINDOWPANE FLOUNDER	ATLANTIC HALIBUT	OCEAN POUT
Longline	HOOK	NE	all	all	010	0.050454	0.000000	0.000014	0.000003	0.000000	0.000012	0.000240	0.000002	0.000000	0.000523	0.000021
Longline	OPEN	MA	all	all	010											
Longline	OPEN	NE	all	all	010	0.029346	0.000011	0.000002	0.000000	0.000000	0.000162	0.000300	0.000877	0.000002	0.000077	0.002396
Hand Line	OPEN	MA	all	all	020											
Hand Line	OPEN	NE	all	all	020	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Otter Trawl	B	MA	large	all	050											
Otter Trawl	B	NE	small	all	050											
Otter Trawl	B	NE	large	all	050	0.008137	0.007710	0.000001	0.000002	0.000450	0.000463	0.002423	0.000378	0.011626	0.000182	0.000002
Otter Trawl	OPEN	MA	small	all	050	0.000135	0.000267	0.000061	0.000001	0.000823	<0.000001	0.000036	0.000742	0.000002	0.000000	<0.000001
Otter Trawl	OPEN	MA	large	all	050	0.000000	0.000013	0.000002	0.000160	0.000001	0.000000	0.000000	<0.000001	0.006452	0.000000	0.000000
Otter Trawl	OPEN	NE	small	all	050	0.006539	0.000002	0.002368	0.003670	0.003226	0.000000	0.000126	0.004859	0.000001	0.000042	0.000002
Otter Trawl	OPEN	NE	large	all	050	0.000001	0.012632	0.009710	0.005048	0.006017	0.000336	0.000002	0.000350	0.008017	0.000234	0.003326
Otter Trawl	USCAN	MA	small	all	050											
Otter Trawl	USCAN	MA	large	all	050											
Otter Trawl	USCAN	NE	small	all	050	0.004579	0.012656	0.002952	0.003859	0.000002	0.000841	0.000302	0.000475	0.024715	0.000267	0.004056
Otter Trawl	USCAN	NE	large	all	050	0.016206	0.007445	0.002509	0.002403	0.000906	0.000555	0.000002	0.000391	0.020217	0.000191	0.002916
Scallop Trawl	CLOSED	MA	all	general	052											
Scallop Trawl	CLOSED	MA	all	limited	052											
Scallop Trawl	CLOSED	NE	all	limited	052											
Scallop Trawl	OPEN	MA	all	general	052	0.000015	0.000007	0.000003	0.000039	0.000000	0.000000	0.000005	0.000096	0.000001	0.000000	0.000124
Scallop Trawl	OPEN	MA	all	limited	052											
Scallop Trawl	OPEN	NE	all	general	052											
Scallop Trawl	OPEN	NE	all	limited	052											
Shrimp Trawl	OPEN	MA	all	all	058											
Shrimp Trawl	OPEN	NE	all	all	058	0.000026	0.000001	0.008954	0.000002	0.006425	0.000056	0.000540	0.000490	0.000344	0.000037	0.000045
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000025	0.000000	0.000000
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	0.000688	0.002589	0.000267	0.000293	0.000915	0.007397	0.000461	0.002404	0.000005	0.000172	0.000141
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	0.000254	0.000318	0.000139	0.000021	0.000261	0.000002	0.000290	0.000001	0.000004	0.000446	0.000186
Purse Seine	OPEN	MA	all	all	121, 120											
Purse Seine	OPEN	NE	all	all	121, 120	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Scallop Dredge	CLOSED	MA	all	general	132											
Scallop Dredge	CLOSED	MA	all	limited	132	0.000001	0.000002	0.000001	0.000615	0.000025	0.000000	0.000000	0.000001	0.000005	0.000000	0.000006
Scallop Dredge	CLOSED	NE	all	general	132	0.000183	0.000001	0.000000	0.000000	0.000001	0.000000	0.000000	0.002137	0.000200	0.000000	0.000032
Scallop Dredge	CLOSED	NE	all	limited	132	0.000053	0.002721	0.000057	0.000111	0.000001	<0.000001	0.000000	0.000041	0.000199	0.000000	0.000026
Scallop Dredge	OPEN	MA	all	general	132	0.000000	0.000016	0.000000	0.000018	0.000402	0.000000	0.000000	0.000000	0.000001	0.000000	0.000011
Scallop Dredge	OPEN	MA	all	limited	132	0.000000	0.000013	0.000017	0.000203	0.000055	0.000000	0.000004	0.000004	0.000203	<0.000001	0.000019
Scallop Dredge	OPEN	NE	all	general	132	0.000000	0.000666	0.000016	0.000000	0.000001	0.000000	0.000000	0.000000	0.000002	0.000000	0.000085
Scallop Dredge	OPEN	NE	all	limited	132	0.000027	0.003226	0.000143	0.000382	0.000002	0.000000	0.000000	0.000019	0.003559	<0.000001	0.000015
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	0.000000	0.000000	0.000000	0.000000	0.000000	0.000004	0.000000	0.000000	0.000000	0.000000	0.000000
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	0.000820	<0.000001	<0.000001	<0.000001	<0.000001	0.000072	0.000054	0.000006	0.000000	0.000000	0.000000

Table 4 *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	SILVER HAKE	OFFSHORE HAKE	RED HAKE	SKATES	SPINY DOGFISH	SUMMER FLOUNDER	SCUP	BLACK SEA BASS	ATLANTIC SURFCLAM	OCEAN QUAHOG	TILEFISH
Longline	HOOK	NE	all	all	010	0.000027	0.000000	0.000002	0.049613	0.018025	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Longline	OPEN	MA	all	all	010											
Longline	OPEN	NE	all	all	010	0.000001	0.000000	0.000645	0.082932	0.123285	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Hand Line	OPEN	MA	all	all	020											
Hand Line	OPEN	NE	all	all	020	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Otter Trawl	B	MA	large	all	050											
Otter Trawl	B	NE	small	all	050											
Otter Trawl	B	NE	large	all	050	0.002391	<0.000001	0.002287	0.689058	0.013183	0.015029	0.000002	<0.000001	0.000007	0.000073	0.000007
Otter Trawl	OPEN	MA	small	all	050	0.025822	0.000300	0.025370	0.060448	0.066613	0.008202	0.002740	0.002057	0.000065	0.000001	0.000074
Otter Trawl	OPEN	MA	large	all	050	0.000185	0.000000	0.000189	0.287851	0.076849	0.006483	0.028854	0.000388	0.000035	0.000005	0.000000
Otter Trawl	OPEN	NE	small	all	050	0.127592	0.000000	0.041409	0.048823	0.059649	0.009384	0.000001	0.000099	0.000000	0.000003	0.000002
Otter Trawl	OPEN	NE	large	all	050	0.000001	0.000003	0.000793	0.257634	0.120370	0.008370	0.003242	0.000462	0.000239	0.000203	0.000020
Otter Trawl	USCAN	MA	small	all	050											
Otter Trawl	USCAN	MA	large	all	050											
Otter Trawl	USCAN	NE	small	all	050	0.000001	0.000000	0.002347	0.513126	0.047456	0.013074	<0.000001	0.000000	0.000305	0.000010	0.000010
Otter Trawl	USCAN	NE	large	all	050	0.000974	0.000005	0.002528	0.600657	0.022799	0.016452	0.000002	0.000000	0.000041	0.000230	0.000000
Scallop Trawl	CLOSED	MA	all	general	052											
Scallop Trawl	CLOSED	MA	all	limited	052											
Scallop Trawl	CLOSED	NE	all	limited	052											
Scallop Trawl	OPEN	MA	all	general	052	0.000244	0.000000	0.000045	0.052965	0.002817	0.000137	<0.000001	0.000036	0.000003	0.000572	0.000000
Scallop Trawl	OPEN	MA	all	limited	052											
Scallop Trawl	OPEN	NE	all	general	052											
Scallop Trawl	OPEN	NE	all	limited	052											
Shrimp Trawl	OPEN	MA	all	all	058											
Shrimp Trawl	OPEN	NE	all	all	058	0.012592	0.000000	0.000245	0.002971	0.000015	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	0.000006	0.000000	0.000000	0.100619	0.045004	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	0.000184	0.000010	0.000092	0.012221	0.416483	<0.000001	0.000000	0.000000	0.000000	0.000000	0.000000
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	0.000019	0.000000	0.000003	0.087407	0.049099	0.002889	0.000000	0.000000	<0.000001	0.000000	0.000430
Purse Seine	OPEN	MA	all	all	121, 120											
Purse Seine	OPEN	NE	all	all	121, 120	0.000000	0.000000	0.000000	<0.000001	0.000267	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Scallop Dredge	CLOSED	MA	all	general	132											
Scallop Dredge	CLOSED	MA	all	limited	132	0.000070	0.000000	0.000115	0.092185	0.000474	0.005025	0.000037	0.000059	0.000000	0.000006	0.000000
Scallop Dredge	CLOSED	NE	all	general	132	0.000044	0.000000	0.000433	0.029956	0.000106	0.000943	0.000000	0.000000	0.003495	0.000000	0.000000
Scallop Dredge	CLOSED	NE	all	limited	132	0.000088	0.000000	0.000800	0.026305	0.000186	0.000376	0.000000	0.000000	0.000004	0.000026	0.000000
Scallop Dredge	OPEN	MA	all	general	132	0.000014	0.000000	0.000023	0.102820	0.000001	0.002449	0.000001	0.000037	0.000036	0.000046	0.000000
Scallop Dredge	OPEN	MA	all	limited	132	0.000072	0.000000	0.000047	0.048632	0.000187	0.003140	0.000006	0.000035	0.000000	0.000127	0.000000
Scallop Dredge	OPEN	NE	all	general	132	0.000000	0.000000	0.000000	0.021081	0.000000	0.000024	0.000000	0.000000	0.000769	0.006094	0.000000
Scallop Dredge	OPEN	NE	all	limited	132	0.000166	0.000000	0.000589	0.057082	0.000187	0.002007	0.000001	0.000000	0.000118	0.000011	0.000000
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	0.000000	0.000000	0.000000	0.000000	0.003207	0.000000	0.000111	0.000000	0.000000	0.000000	0.000000
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	0.000142	0.000000	0.000006	<0.000001	0.002713	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Table 5a. Total discards (**with** survival ratios applied; in live, mt) by species and fleet in 2005**.**

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	BLUEFISH	ATLANTIC HERRING	ATLANTIC SALMON	DEEP SEA RED CRAB	ATLANTIC SEA SCALLOP	ATLANTIC MACKEREL	ILLEX SQUID	LOLIGO SQUID	BUTTERFISH	MONKFISH	ATLANTIC COD	
Longline	HOOK	NE	all	all	0.00	0.01	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	<0.01	1.49	
Longline	OPEN	MA	all	all												
Longline	OPEN	NE	all	all	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	<0.01	45.94	
Hand Line	OPEN	MA	all	all												
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.21	
Otter Trawl	B	MA	large	all												
Otter Trawl	B	NE	small	all												
Otter Trawl	B	NE	large	all	0.67	5.67	0.00	6.05	14.04	0.09	1.07	0.25	<0.01	70.41	53.95	
Otter Trawl	OPEN	MA	small	all	34.73	181.53	0.00	0.38	42.75	212.40	1389.30	590.43	664.19	163.39	0.10	
Otter Trawl	OPEN	MA	large	all	7.70	0.00	0.00	1.91	13.96	0.06	0.18	0.66	3.78	29.81	0.00	
Otter Trawl	OPEN	NE	small	all	1.78	252.46	0.00	22.54	3.56	983.48	189.95	309.12	315.46	165.61	44.24	
Otter Trawl	OPEN	NE	large	all	6.21	4.30	0.00	41.67	15.32	0.86	6.11	1.98	0.59	368.38	304.43	
Otter Trawl	USCAN	MA	small	all												
Otter Trawl	USCAN	MA	large	all												
Otter Trawl	USCAN	NE	small	all	0.01	<0.01	0.00	0.12	0.02	<0.01	<0.01	<0.01	<0.01	0.94	1.54	
Otter Trawl	USCAN	NE	large	all	5.44	2.52	0.00	28.07	32.30	0.32	1.20	0.63	0.13	144.57	264.52	
Scallop Trawl	CLOSED	MA	all	general												
Scallop Trawl	CLOSED	MA	all	limited												
Scallop Trawl	CLOSED	NE	all	limited												
Scallop Trawl	OPEN	MA	all	general	0.00	0.02	0.00	0.00	450.22	0.00	0.09	0.44	0.05	60.26	0.00	
Scallop Trawl	OPEN	MA	all	limited												
Scallop Trawl	OPEN	NE	all	general												
Scallop Trawl	OPEN	NE	all	limited												
Shrimp Trawl	OPEN	MA	all	all												
Shrimp Trawl	OPEN	NE	all	all	0.00	9.08	0.00	0.76	0.10	2.76	0.31	0.00	1.13	3.49	2.65	
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	4.96	0.00	0.00	0.00	1.81	1.75	0.00	0.00	0.00	223.09	0.29	
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all												
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	6.01	4.75	0.00	0.78	<0.01	0.74	0.00	0.00	0.00	4.42	91.78	
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	14.28	0.35	0.00	0.30	0.26	25.37	0.00	0.00	0.00	389.49	33.65	
Purse Seine	OPEN	MA	all	all												
Purse Seine	OPEN	NE	all	all	0.60	960.05	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	
Scallop Dredge	CLOSED	MA	all	general												
Scallop Dredge	CLOSED	MA	all	limited	0.00	0.00	0.00	0.14	790.91	0.09	1.20	1.48	0.01	767.25	0.00	
Scallop Dredge	CLOSED	NE	all	general	0.00	0.00	0.00	0.00	124.85	0.00	0.00	0.00	0.00	32.12	0.00	
Scallop Dredge	CLOSED	NE	all	limited	0.00	0.00	0.00	0.00	673.30	0.00	<0.01	0.01	<0.01	370.09	1.55	
Scallop Dredge	OPEN	MA	all	general	0.00	0.00	0.00	0.00	105.69	0.00	<0.01	0.56	0.00	110.74	0.00	
Scallop Dredge	OPEN	MA	all	limited	0.00	0.03	0.00	0.00	2024.29	1.26	0.32	0.94	0.08	933.29	0.00	
Scallop Dredge	OPEN	NE	all	general	0.00	0.00	0.00	0.00	499.72	0.00	0.00	0.00	0.00	0.47	0.04	
Scallop Dredge	OPEN	NE	all	limited	0.00	0.00	0.00	0.00	1098.35	0.07	<0.01	0.05	0.00	288.88	1.04	
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	280.73	0.00	0.00	0.00	334.23	0.00	0.00	0.00	0.72	0.00	
Mid-water paired & single Trawl	OPEN	NE	all	all	0.57	1581.12	0.00	0.00	0.00	7.04	1.14	0.02	0.00	0.25	0.56	
				Total Discards	82.96	3282.63	0.00	102.72	5891.47	1570.77	1590.87	906.57	985.43	4127.64	870.98	

Table 5a *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	HADDOCK	YELLOWTAIL FLOUNDER	AMERICAN PLAICE	WITCH FLOUNDER	WINTER FLOUNDER	POLLOCK	ACADIAN REDFISH	WHITE HAKE	WINDOWPANE FLOUNDER	ATLANTIC HALIBUT	OCEAN POUT
Longline	HOOK	NE	all	all	30.72	0.00	<0.01	<0.01	0.00	<0.01	0.15	1.01	0.00	0.32	0.01
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	36.56	0.01	<0.01	0.00	0.00	0.20	0.37	1.09	<0.01	0.10	2.98
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	45.44	43.05	8.11	10.41	2.51	2.58	13.53	2.11	64.92	1.02	11.06
Otter Trawl	OPEN	MA	small	all	4.25	8.40	1.91	32.87	25.90	0.02	1.13	23.35	53.83	0.00	0.03
Otter Trawl	OPEN	MA	large	all	0.00	0.17	0.03	2.08	13.99	0.00	0.00	<0.01	83.96	0.00	0.00
Otter Trawl	OPEN	NE	small	all	94.36	26.68	34.17	52.96	46.55	0.00	1.82	70.11	16.32	0.60	27.09
Otter Trawl	OPEN	NE	large	all	20.33	249.58	191.84	99.73	118.88	6.64	34.42	6.92	158.40	4.62	65.71
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	0.54	1.50	0.35	0.46	0.23	0.10	0.04	0.06	2.92	0.03	0.48
Otter Trawl	USCAN	NE	large	all	240.26	110.38	37.19	35.62	13.44	8.23	23.21	5.80	299.74	2.82	43.23
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	0.06	0.03	0.01	0.15	0.00	0.00	0.02	0.37	5.16	0.00	0.48
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	0.05	2.08	18.07	3.27	12.96	0.11	1.09	0.99	0.69	0.08	0.09
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	3.15	11.84	1.22	1.34	4.19	33.83	2.11	10.99	0.02	0.79	0.64
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	1.90	2.38	1.04	0.16	1.95	13.65	2.17	10.79	0.03	3.34	1.39
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	0.03	0.05	0.04	16.89	0.69	0.00	0.00	0.03	0.13	0.00	0.16
Scallop Dredge	CLOSED	NE	all	general	0.20	1.55	0.00	0.00	1.37	0.00	0.00	2.29	0.21	0.00	0.03
Scallop Dredge	CLOSED	NE	all	limited	2.42	123.52	2.59	5.04	47.99	0.03	0.00	1.88	9.03	0.00	1.16
Scallop Dredge	OPEN	MA	all	general	0.00	0.20	0.00	0.24	5.19	0.00	0.00	0.00	15.30	0.00	0.15
Scallop Dredge	OPEN	MA	all	limited	0.00	0.95	1.26	14.72	3.95	0.00	0.30	0.29	14.73	0.01	1.39
Scallop Dredge	OPEN	NE	all	general	0.00	4.79	0.11	0.00	9.61	0.00	0.00	0.00	12.16	0.00	0.61
Scallop Dredge	OPEN	NE	all	limited	0.83	97.98	4.34	11.59	49.20	0.00	0.00	0.57	108.09	<0.01	0.46
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
Mid-water paired & single Trawl	OPEN	NE	all	all	58.60	<0.01	0.05	0.02	<0.01	5.16	3.86	0.44	0.00	0.00	0.00
				Total Discards	539.69	685.15	302.33	287.53	358.60	70.76	84.22	139.10	845.72	13.72	157.16

Table 5a *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	SILVER HAKE	OFFSHORE HAKE	RED HAKE	SKATES	SPINY DOGFISH	SUMMER FLOUNDER	SCUP	BLACK SEA BASS	ATLANTIC SURFCLAM	OCEAN QUAHOG	TILEFISH
Longline	HOOK	NE	all	all	0.02	0.00	1.03	30.21	2.74	0.00	0.00	0.00	0.00	0.00	0.00
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	<0.01	0.00	0.80	103.30	38.39	0.00	0.00	0.00	0.00	0.00	0.00
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	13.35	<0.01	12.77	3847.90	36.81	67.14	<0.01	<0.01	0.04	0.41	0.04
Otter Trawl	OPEN	MA	small	all	812.24	9.45	798.02	1901.43	1047.67	206.41	86.17	64.70	2.04	0.05	2.34
Otter Trawl	OPEN	MA	large	all	2.41	0.00	2.45	3745.42	499.97	67.48	375.44	5.04	0.45	0.07	0.00
Otter Trawl	OPEN	NE	small	all	1841.12	0.00	597.52	704.51	430.36	108.33	14.78	1.43	0.00	0.05	24.36
Otter Trawl	OPEN	NE	large	all	21.39	0.06	15.66	5090.18	1189.10	132.29	64.05	9.13	4.72	4.01	0.39
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	0.15	0.00	0.28	60.70	2.81	1.24	<0.01	0.00	0.04	<0.01	<0.01
Otter Trawl	USCAN	NE	large	all	14.44	0.08	37.48	8905.25	169.01	195.13	0.02	0.00	0.61	3.41	0.00
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	0.94	0.00	0.18	204.81	5.45	0.42	<0.01	0.14	0.01	2.21	0.00
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	25.40	0.00	0.49	5.99	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	0.02	0.00	0.00	286.53	38.45	2.57	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	0.84	0.05	0.42	55.89	571.40	<0.01	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	0.14	0.00	0.02	653.63	110.15	17.28	0.00	0.00	<0.01	0.00	3.22
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	0.00	0.00	0.00	0.01	2.22	0.00	0.00	0.00	0.00	0.00	0.00
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	1.91	0.00	3.17	2529.27	9.76	110.30	1.02	1.62	0.00	0.16	0.00
Scallop Dredge	CLOSED	NE	all	general	0.05	0.00	0.46	32.05	0.09	0.81	0.00	0.00	3.74	0.00	0.00
Scallop Dredge	CLOSED	NE	all	limited	3.98	0.00	36.30	1194.02	6.33	13.66	0.00	0.00	0.20	1.18	0.00
Scallop Dredge	OPEN	MA	all	general	0.18	0.00	0.29	1326.06	11.00	25.27	0.01	0.47	0.47	0.59	0.00
Scallop Dredge	OPEN	MA	all	limited	5.25	0.00	3.43	3526.06	10.18	182.16	0.40	2.53	0.00	9.21	0.00
Scallop Dredge	OPEN	NE	all	general	0.00	0.00	0.00	151.54	0.00	0.14	0.00	0.00	5.53	43.81	0.00
Scallop Dredge	OPEN	NE	all	limited	5.03	0.00	17.89	1733.60	4.26	48.77	0.04	0.00	3.60	0.32	0.00
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	0.00	0.00	0.00	79.23	0.00	5.49	0.00	0.00	0.00	0.00
Mid-water paired & single Trawl	OPEN	NE	all	all	10.12	0.00	0.42	0.02	96.96	0.00	0.00	0.00	0.00	0.00	0.00
				Total Discards	2759.00	9.64	1529.10	36088.40	4362.33	1179.41	547.43	85.07	21.43	65.47	30.34

Table 5b. Total discards (**without** survival ratios applied; in live, mt), by species and fleet in 2005.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	BLUEFISH	ATLANTIC HERRING	ATLANTIC SALMON	DEEP SEA RED CRAB	ATLANTIC SEA SCALLOP	ATLANTIC MACKEREL	ILLEX SQUID	LOLIGO SQUID	BUTTERFISH	MONKFISH	ATLANTIC COD	
Longline	HOOK	NE	all	all	0.00	0.01	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	<0.01	1.49	
Longline	OPEN	MA	all	all												
Longline	OPEN	NE	all	all	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	<0.01	45.94	
Hand Line	OPEN	MA	all	all												
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.21	
Otter Trawl	B	MA	large	all												
Otter Trawl	B	NE	small	all												
Otter Trawl	B	NE	large	all	0.67	5.67	0.00	6.05	14.04	0.09	1.07	0.25	<0.01	70.41	53.95	
Otter Trawl	OPEN	MA	small	all	34.73	181.53	0.00	0.38	42.75	212.40	1389.30	590.43	664.19	163.39	0.10	
Otter Trawl	OPEN	MA	large	all	7.70	0.00	0.00	1.91	13.96	0.06	0.18	0.66	3.78	29.81	0.00	
Otter Trawl	OPEN	NE	small	all	1.78	252.46	0.00	22.54	3.56	983.48	189.95	309.12	315.46	165.61	44.24	
Otter Trawl	OPEN	NE	large	all	6.21	4.30	0.00	41.67	15.32	0.86	6.11	1.98	0.59	368.38	304.43	
Otter Trawl	USCAN	MA	small	all												
Otter Trawl	USCAN	MA	large	all												
Otter Trawl	USCAN	NE	small	all	0.01	<0.01	0.00	0.12	0.02	<0.01	<0.01	<0.01	<0.01	0.94	1.54	
Otter Trawl	USCAN	NE	large	all	5.44	2.52	0.00	28.07	32.30	0.32	1.20	0.63	0.13	144.57	264.52	
Scallop Trawl	CLOSED	MA	all	general												
Scallop Trawl	CLOSED	MA	all	limited												
Scallop Trawl	CLOSED	NE	all	limited												
Scallop Trawl	OPEN	MA	all	general	0.00	0.02	0.00	0.00	450.22	0.00	0.09	0.44	0.05	60.26	0.00	
Scallop Trawl	OPEN	MA	all	limited												
Scallop Trawl	OPEN	NE	all	general												
Scallop Trawl	OPEN	NE	all	limited												
Shrimp Trawl	OPEN	MA	all	all												
Shrimp Trawl	OPEN	NE	all	all	0.00	9.08	0.00	0.76	0.10	2.76	0.31	0.00	1.13	3.49	2.65	
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	4.96	0.00	0.00	0.00	1.81	1.75	0.00	0.00	0.00	223.09	0.29	
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all												
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	6.01	4.75	0.00	0.78	<0.01	0.74	0.00	0.00	0.00	4.42	91.78	
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	14.28	0.35	0.00	0.30	0.26	25.37	0.00	0.00	0.00	389.49	33.65	
Purse Seine	OPEN	MA	all	all												
Purse Seine	OPEN	NE	all	all	0.60	960.05	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	
Scallop Dredge	CLOSED	MA	all	general												
Scallop Dredge	CLOSED	MA	all	limited	0.00	0.00	0.00	0.14	790.91	0.09	1.20	1.48	0.01	767.25	0.00	
Scallop Dredge	CLOSED	NE	all	general	0.00	0.00	0.00	0.00	124.85	0.00	0.00	0.00	0.00	32.12	0.00	
Scallop Dredge	CLOSED	NE	all	limited	0.00	0.00	0.00	0.00	673.30	0.00	<0.01	0.01	<0.01	370.09	1.55	
Scallop Dredge	OPEN	MA	all	general	0.00	0.00	0.00	0.00	105.69	0.00	<0.01	0.56	0.00	110.74	0.00	
Scallop Dredge	OPEN	MA	all	limited	0.00	0.03	0.00	0.00	2024.29	1.26	0.32	0.94	0.08	933.29	0.00	
Scallop Dredge	OPEN	NE	all	general	0.00	0.00	0.00	0.00	499.72	0.00	0.00	0.00	0.00	0.47	0.04	
Scallop Dredge	OPEN	NE	all	limited	0.00	0.00	0.00	0.00	1098.35	0.07	<0.01	0.05	0.00	288.88	1.04	
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	280.73	0.00	0.00	0.00	334.23	0.00	0.00	0.00	0.72	0.00	
Mid-water paired & single Trawl	OPEN	NE	all	all	0.57	1581.12	0.00	0.00	0.00	7.04	1.14	0.02	0.00	0.25	0.56	
				Total Discards	82.96	3282.63	0.00	102.72	5891.47	1570.77	1590.87	906.57	985.43	4127.64	870.98	

Table 5b *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	HADDOCK	YELLOWTAIL FLOUNDER	AMERICAN PLAICE	WITCH FLOUNDER	WINTER FLOUNDER	POLLOCK	ACADIAN REDFISH	WHITE HAKE	WINDOWPANE FLOUNDER	ATLANTIC HALIBUT	OCEAN POUT	
Longline	HOOK	NE	all	all	30.72	0.00	<0.01	<0.01	0.00	<0.01	0.15	1.01	0.00	0.32	0.01	
Longline	OPEN	MA	all	all												
Longline	OPEN	NE	all	all	36.56	0.01	<0.01	0.00	0.00	0.20	0.37	1.09	<0.01	0.10	2.98	
Hand Line	OPEN	MA	all	all												
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Otter Trawl	B	MA	large	all												
Otter Trawl	B	NE	small	all												
Otter Trawl	B	NE	large	all	45.44	43.05	8.11	10.41	2.51	2.58	13.53	2.11	64.92	1.02	11.06	
Otter Trawl	OPEN	MA	small	all	4.25	8.40	1.91	32.87	25.90	0.02	1.13	23.35	53.83	0.00	0.03	
Otter Trawl	OPEN	MA	large	all	0.00	0.17	0.03	2.08	13.99	0.00	0.00	<0.01	83.96	0.00	0.00	
Otter Trawl	OPEN	NE	small	all	94.36	26.68	34.17	52.96	46.55	0.00	1.82	70.11	16.32	0.60	27.09	
Otter Trawl	OPEN	NE	large	all	20.33	249.58	191.84	99.73	118.88	6.64	34.42	6.92	158.40	4.62	65.71	
Otter Trawl	USCAN	MA	small	all												
Otter Trawl	USCAN	MA	large	all												
Otter Trawl	USCAN	NE	small	all	0.54	1.50	0.35	0.46	0.23	0.10	0.04	0.06	2.92	0.03	0.48	
Otter Trawl	USCAN	NE	large	all	240.26	110.38	37.19	35.62	13.44	8.23	23.21	5.80	299.74	2.82	43.23	
Scallop Trawl	CLOSED	MA	all	general												
Scallop Trawl	CLOSED	MA	all	limited												
Scallop Trawl	CLOSED	NE	all	limited												
Scallop Trawl	OPEN	MA	all	general	0.06	0.03	0.01	0.15	0.00	0.00	0.02	0.37	5.16	0.00	0.48	
Scallop Trawl	OPEN	MA	all	limited												
Scallop Trawl	OPEN	NE	all	general												
Scallop Trawl	OPEN	NE	all	limited												
Shrimp Trawl	OPEN	MA	all	all												
Shrimp Trawl	OPEN	NE	all	all	0.05	2.08	18.07	3.27	12.96	0.11	1.09	0.99	0.69	0.08	0.09	
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all												
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all												
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	3.15	11.84	1.22	1.34	4.19	33.83	2.11	10.99	0.02	0.79	0.64	
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	1.90	2.38	1.04	0.16	1.95	13.65	2.17	10.79	0.03	3.34	1.39	
Purse Seine	OPEN	MA	all	all												
Purse Seine	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Scallop Dredge	CLOSED	MA	all	general												
Scallop Dredge	CLOSED	MA	all	limited	0.03	0.05	0.04	16.89	0.69	0.00	0.00	0.03	0.13	0.00	0.16	
Scallop Dredge	CLOSED	NE	all	general	0.20	1.55	0.00	0.00	1.37	0.00	0.00	2.29	0.21	0.00	0.03	
Scallop Dredge	CLOSED	NE	all	limited	2.42	123.52	2.59	5.04	47.99	0.03	0.00	1.88	9.03	0.00	1.16	
Scallop Dredge	OPEN	MA	all	general	0.00	0.20	0.00	0.24	5.19	0.00	0.00	0.00	15.30	0.00	0.15	
Scallop Dredge	OPEN	MA	all	limited	0.00	0.95	1.26	14.72	3.95	0.00	0.30	0.29	14.73	0.01	1.39	
Scallop Dredge	OPEN	NE	all	general	0.00	4.79	0.11	0.00	9.61	0.00	0.00	0.00	12.16	0.00	0.61	
Scallop Dredge	OPEN	NE	all	limited	0.83	97.98	4.34	11.59	49.20	0.00	0.00	0.57	108.09	<0.01	0.46	
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	
Mid-water paired & single Trawl	OPEN	NE	all	all	58.60	<0.01	0.05	0.02	<0.01	5.16	3.86	0.44	0.00	0.00	0.00	
				Total Discards	539.69	685.15	302.33	287.53	358.60	70.76	84.22	139.10	845.72	13.72	157.16	

Table 5b *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	SILVER HAKE	OFFSHORE HAKE	RED HAKE	SKATES	SPINY DOGFISH	SUMMER FLOUNDER	SCUP	BLACK SEA BASS	ATLANTIC SURFCLAM	OCEAN QUAHOG	TILEFISH
Longline	HOOK	NE	all	all	0.02	0.00	1.03	30.21	10.98	0.00	0.00	0.00	0.00	0.00	0.00
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	<0.01	0.00	0.80	103.30	153.57	0.00	0.00	0.00	0.00	0.00	0.00
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	13.35	<0.01	12.77	3847.90	73.62	83.93	<0.01	<0.01	0.04	0.41	0.04
Otter Trawl	OPEN	MA	small	all	812.24	9.45	798.02	1901.43	2095.35	258.01	86.17	64.70	2.04	0.05	2.34
Otter Trawl	OPEN	MA	large	all	2.41	0.00	2.45	3745.42	999.93	84.35	375.44	5.04	0.45	0.07	0.00
Otter Trawl	OPEN	NE	small	all	1841.12	0.00	597.52	704.51	860.72	135.41	14.78	1.43	0.00	0.05	24.36
Otter Trawl	OPEN	NE	large	all	21.39	0.06	15.66	5090.18	2378.20	165.37	64.05	9.13	4.72	4.01	0.39
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	0.15	0.00	0.28	60.70	5.61	1.55	<0.01	0.00	0.04	<0.01	<0.01
Otter Trawl	USCAN	NE	large	all	14.44	0.08	37.48	8905.25	338.01	243.91	0.02	0.00	0.61	3.41	0.00
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	0.94	0.00	0.18	204.81	10.89	0.53	<0.01	0.14	0.01	2.21	0.00
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	25.40	0.00	0.49	5.99	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	0.02	0.00	0.00	286.53	128.16	3.21	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	0.84	0.05	0.42	55.89	1904.67	<0.01	0.00	0.00	0.00	0.00	0.00
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	0.14	0.00	0.02	653.63	367.16	21.60	0.00	0.00	<0.01	0.00	3.22
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	0.00	0.00	0.00	0.01	4.44	0.00	0.00	0.00	0.00	0.00	0.00
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	1.91	0.00	3.17	2529.27	13.01	137.87	1.02	1.62	0.00	0.16	0.00
Scallop Dredge	CLOSED	NE	all	general	0.05	0.00	0.46	32.05	0.11	1.01	0.00	0.00	3.74	0.00	0.00
Scallop Dredge	CLOSED	NE	all	limited	3.98	0.00	36.30	1194.02	8.45	17.08	0.00	0.00	0.20	1.18	0.00
Scallop Dredge	OPEN	MA	all	general	0.18	0.00	0.29	1326.06	14.66	31.58	0.01	0.47	0.47	0.59	0.00
Scallop Dredge	OPEN	MA	all	limited	5.25	0.00	3.43	3526.06	13.57	227.70	0.40	2.53	0.00	9.21	0.00
Scallop Dredge	OPEN	NE	all	general	0.00	0.00	0.00	151.54	0.00	0.18	0.00	0.00	5.53	43.81	0.00
Scallop Dredge	OPEN	NE	all	limited	5.03	0.00	17.89	1733.60	5.67	60.96	0.04	0.00	3.60	0.32	0.00
Mid-water paired & single Trawl	OPEN	MA	all	all	0.00	0.00	0.00	0.00	158.45	0.00	5.49	0.00	0.00	0.00	0.00
Mid-water paired & single Trawl	OPEN	NE	all	all	10.12	0.00	0.42	0.02	193.92	0.00	0.00	0.00	0.00	0.00	0.00
				Total Discards	2759.00	9.64	1529.10	36088.40	9739.19	1474.26	547.43	85.07	21.43	65.47	30.34

Table 6. Precision (coefficient of variation [CV]) of total discard weight.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	BLUEFISH	ATLANTIC HERRING	ATLANTIC SALMON	DEEP SEA RED CRAB	ATLANTIC SEA SCALLOP	ATLANTIC MACKEREL	ILLEX SQUID	LOLIGO SQUID	BUTTERFISH	MONKFISH	ATLANTIC COD
Longline	HOOK	NE	all	all	*	0.876	*	*	0.883	*	*	*	*	0.874	0.108
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	*	*	*	*	0.688	*	*	*	*	0.827	0.267
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	*	*	*	*	*	*	*	*	*	*	0.423
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	0.331	0.401	*	0.193	0.317	0.329	0.222	0.358	0.268	0.114	0.222
Otter Trawl	OPEN	MA	small	all	0.420	0.528	*	0.618	0.365	0.636	0.412	0.265	0.295	0.193	0.543
Otter Trawl	OPEN	MA	large	all	1.074	*	*	0.729	0.834	0.709	1.290	0.595	0.982	0.520	*
Otter Trawl	OPEN	NE	small	all	0.402	1.034	*	0.805	0.670	0.571	0.316	0.338	0.414	0.180	0.583
Otter Trawl	OPEN	NE	large	all	0.541	0.294	*	0.315	0.255	0.450	0.303	0.469	0.263	0.162	0.203
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	1.150	0.149	*	0.181	0.193	0.142	0.172	0.342	0.180	0.080	0.126
Otter Trawl	USCAN	NE	large	all	0.258	0.242	*	0.135	0.196	0.186	0.215	0.229	0.690	0.071	0.115
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	*	1.001	*	*	0.135	*	0.478	0.405	0.523	0.107	*
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	*	0.325	*	1.120	0.727	0.547	1.120	*	0.593	1.021	0.362
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	0.330	*	*	*	0.555	0.735	*	*	*	0.309	0.675
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	0.419	0.400	*	0.446	0.434	0.484	*	*	*	0.255	0.116
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	0.255	0.337	*	0.501	0.394	0.660	*	*	*	0.191	0.174
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	1.110	0.616	*	*	*	0.995	*	*	*	*	*
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	*	*	*	0.578	0.228	0.473	0.497	0.387	0.520	0.108	*
Scallop Dredge	CLOSED	NE	all	general	*	*	*	*	0.171	*	*	*	*	0.179	*
Scallop Dredge	CLOSED	NE	all	limited	*	*	*	*	0.303	*	1.071	0.866	0.540	0.193	0.268
Scallop Dredge	OPEN	MA	all	general	*	*	*	*	0.352	*	1.046	0.435	*	0.182	*
Scallop Dredge	OPEN	MA	all	limited	*	0.973	*	*	0.375	1.127	0.641	0.389	0.699	0.224	*
Scallop Dredge	OPEN	NE	all	general	*	*	*	*	0.319	*	*	*	*	0.542	0.778
Scallop Dredge	OPEN	NE	all	limited	*	*	*	*	0.503	1.141	0.874	0.623	*	0.336	1.014
Mid-water paired & single Trawl	OPEN	MA	all	all	*	0.688	*	*	*	0.832	*	*	*	0.863	*
Mid-water paired & single Trawl	OPEN	NE	all	all	0.480	0.493	*	*	*	0.813	0.517	0.582	*	0.468	0.486

Note: * = CV is null (bycatch ratio = 0); blank = little or no observer coverage

Table 6 *continued*.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	HADDOCK	YELLOWTAIL FLOUNDER	AMERICAN PLAICE	WITCH FLOUNDER	WINTER FLOUNDER	POLLOCK	ACADIAN REDFISH	WHITE HAKE	WINDOWPANE FLOUNDER	ATLANTIC HALIBUT	OCEAN POUT
Longline	HOOK	NE	all	all	0.077	*	0.599	0.885	*	0.697	0.226	0.180	*	0.308	0.680
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	0.169	0.693	0.648	*	*	0.577	0.254	0.231	0.748	0.362	0.325
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	*	*	*	*	*	*	*	*	*	*	*
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	0.154	0.182	0.108	0.101	0.220	0.380	0.295	0.172	0.127	0.229	0.141
Otter Trawl	OPEN	MA	small	all	0.596	0.581	0.612	0.276	0.824	0.626	0.349	0.455	0.402	*	0.433
Otter Trawl	OPEN	MA	large	all	*	1.122	1.365	0.727	0.907	*	*	1.411	0.871	*	*
Otter Trawl	OPEN	NE	small	all	0.520	0.416	0.454	0.281	0.467	*	0.506	0.848	0.527	0.606	0.676
Otter Trawl	OPEN	NE	large	all	0.223	0.135	0.131	0.123	0.180	0.309	0.230	0.342	0.287	0.253	0.202
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	0.107	0.116	0.115	0.135	0.124	0.404	0.145	0.148	0.146	0.144	0.088
Otter Trawl	USCAN	NE	large	all	0.108	0.097	0.100	0.076	0.302	0.317	0.140	0.196	0.100	0.122	0.109
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	0.593	0.568	0.959	0.413	*	*	1.006	0.531	0.297	*	0.423
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	0.565	0.310	0.187	0.783	0.403	0.688	1.074	0.473	0.310	0.953	0.795
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	*	*	*	*	*	*	*	*	1.000	*	*
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	0.359	0.578	0.258	0.704	0.622	0.115	0.203	0.242	0.460	1.500	1.111
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	0.227	0.869	0.527	0.533	0.759	0.195	0.782	0.315	0.510	0.388	0.804
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	*	*	*	*	*	*	*	*	*	*	*
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	0.828	0.445	0.717	0.163	1.090	*	*	0.714	0.602	*	0.538
Scallop Dredge	CLOSED	NE	all	general	0.557	0.159	*	*	0.793	*	*	0.176	1.050	*	0.872
Scallop Dredge	CLOSED	NE	all	limited	0.255	0.250	0.325	0.289	0.214	1.041	*	0.417	0.400	*	0.252
Scallop Dredge	OPEN	MA	all	general	*	0.575	*	0.648	0.443	*	*	*	0.204	*	0.653
Scallop Dredge	OPEN	MA	all	limited	*	0.655	0.755	0.450	0.468	*	0.824	0.938	0.350	1.078	0.615
Scallop Dredge	OPEN	NE	all	general	*	0.523	0.673	*	0.431	*	*	*	0.473	*	0.789
Scallop Dredge	OPEN	NE	all	limited	0.943	0.348	0.862	0.720	0.283	*	*	1.089	0.656	1.363	0.614
Mid-water paired & single Trawl	OPEN	MA	all	all	*	*	*	*	*	0.864	*	*	*	*	*
Mid-water paired & single Trawl	OPEN	NE	all	all	0.510	0.900	0.366	0.376	0.811	0.582	0.886	0.793	*	*	*

Note: * = CV is null (bycatch ratio = 0); blank = little or no observer coverage

Table 6 *continued*.

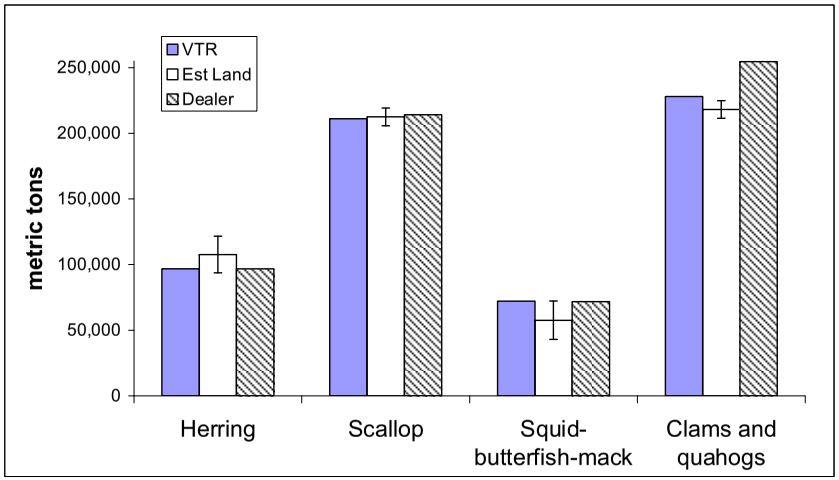
Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	SILVER HAKE	OFFSHORE HAKE	RED HAKE	SKATES	SPINY DOGFISH	SUMMER FLOUNDER	SCUP	BLACK SEA BASS	ATLANTIC SURFCLAM	OCEAN QUAHOG	TILEFISH
Longline	HOOK	NE	all	all	0.785	*	0.196	0.114	0.335	*	*	*	*	*	*
Longline	OPEN	MA	all	all											
Longline	OPEN	NE	all	all	0.550	*	0.274	0.196	0.210	*	*	*	*	*	*
Hand Line	OPEN	MA	all	all											
Hand Line	OPEN	NE	all	all	*	*	*	*	*	*	*	*	*	*	*
Otter Trawl	B	MA	large	all											
Otter Trawl	B	NE	small	all											
Otter Trawl	B	NE	large	all	0.278	0.619	0.188	0.107	0.296	0.153	0.631	0.620	0.850	0.581	0.526
Otter Trawl	OPEN	MA	small	all	0.286	0.624	0.266	0.314	0.269	0.259	0.333	0.348	1.954	0.886	0.418
Otter Trawl	OPEN	MA	large	all	1.157	*	1.074	1.009	0.609	0.623	0.746	0.678	0.740	0.810	*
Otter Trawl	OPEN	NE	small	all	0.274	*	0.202	0.284	0.252	0.389	0.433	0.322	*	1.522	0.900
Otter Trawl	OPEN	NE	large	all	0.210	0.650	0.166	0.113	0.158	0.305	0.812	0.522	1.408	1.198	1.294
Otter Trawl	USCAN	MA	small	all											
Otter Trawl	USCAN	MA	large	all											
Otter Trawl	USCAN	NE	small	all	0.399	*	0.529	0.056	0.687	0.141	0.287	*	0.178	0.164	0.417
Otter Trawl	USCAN	NE	large	all	0.242	0.652	0.217	0.049	0.220	0.098	0.714	*	0.288	0.187	*
Scallop Trawl	CLOSED	MA	all	general											
Scallop Trawl	CLOSED	MA	all	limited											
Scallop Trawl	CLOSED	NE	all	limited											
Scallop Trawl	OPEN	MA	all	general	0.376	*	0.511	0.112	0.616	0.556	1.142	0.484	0.959	0.737	*
Scallop Trawl	OPEN	MA	all	limited											
Scallop Trawl	OPEN	NE	all	general											
Scallop Trawl	OPEN	NE	all	limited											
Shrimp Trawl	OPEN	MA	all	all											
Shrimp Trawl	OPEN	NE	all	all	0.270	*	0.551	0.194	0.573	*	*	*	*	*	*
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all											
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	1.104	*	*	0.454	0.307	0.341	*	*	*	*	*
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all											
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	0.243	0.427	0.367	0.592	0.119	0.908	*	*	*	*	*
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	0.290	*	0.622	0.435	0.175	0.264	*	*	0.931	*	0.530
Purse Seine	OPEN	MA	all	all											
Purse Seine	OPEN	NE	all	all	*	*	*	1.155	0.467	*	*	*	*	*	*
Scallop Dredge	CLOSED	MA	all	general											
Scallop Dredge	CLOSED	MA	all	limited	0.212	*	0.358	0.128	0.323	0.174	0.410	0.275	*	0.721	*
Scallop Dredge	CLOSED	NE	all	general	0.565	*	0.514	0.087	1.066	1.077	*	*	0.184	*	*
Scallop Dredge	CLOSED	NE	all	limited	0.312	*	0.263	0.100	0.340	0.224	*	*	0.797	0.540	*
Scallop Dredge	OPEN	MA	all	general	0.642	*	0.928	0.109	0.313	0.209	0.831	0.362	0.693	0.919	*
Scallop Dredge	OPEN	MA	all	limited	0.464	*	0.488	0.132	0.293	0.220	0.614	0.689	*	0.723	*
Scallop Dredge	OPEN	NE	all	general	*	*	*	0.382	*	0.781	*	*	0.778	0.734	*
Scallop Dredge	OPEN	NE	all	limited	0.692	*	0.591	0.202	0.381	0.434	0.756	*	1.363	0.756	*
Mid-water paired & single Trawl	OPEN	MA	all	all	*	*	*	*	0.414	*	0.819	*	*	*	*
Mid-water paired & single Trawl	OPEN	NE	all	all	0.659	*	0.724	0.937	0.451	*	*	*	*	*	*

Note: * = CV is null (bycatch ratio = 0); blank = little or no observer coverage

Table 7. Vessel Trip Report landings, Dealer landings and estimated landings for 2005 based on Northeast Fisheries Observer Program data with associated coefficient of variation, and 95% confidence intervals of estimated landings. Landings in live mt.

	Species	VTR Landings	Dealer Landings	Estimated Landings	CV	CI-Lower	CI-Upper
	American plaice	1,303	1,350	1,416	0.145	1,014	1,818
	Bluefish	1,450	2,975	2,009	0.028	1,898	2,120
	Blk Sea Bass	1,069	1,310	699	0.209	413	985
	Butterfish	310	437	187	0.244	98	277
*	Surf clam	112,820	140,865	14,916	1.195	0	49,852
	Cod	5,130	6,311	6,289	0.047	5,708	6,871
	Dogfish	814	1,127	1,332	0.226	741	1,924
	Fluke	7,157	7,826	7,249	0.155	5,052	9,446
	Haddock	6,234	7,581	6,170	0.044	5,633	6,708
	Halibut	7	17	20	0.204	12	28
	Herring	96,735	96,788	107,601	0.066	93,646	121,555
**	Illex	10,900	12,032	5,198	0.446	654	9,743
**	Loligo	16,465	16,983	21,150	0.117	16,307	25,993
	Mackerel	44,427	42,209	31,018	0.232	16,909	45,126
	Monkfish	13,230	19026	17,097	0.034	15,951	18,243
**	Offshore Hake	225	14	0	0.518	0	0
	Ocean pout	5	4	1	1.222	0	3
	Pollock	5,398	6,509	4,890	0.095	3,979	5,801
*	Ocean quahog	115,112	113,792	203,214	0.091	167,040	239,387
*	Red crab	1,657	2,014	0	0.366	0	0
	Redfish	494	564	433	0.153	303	562
**	Red hake	558	430	125	0.251	63	186
	Scallop	210,984	214,010	212,442	0.016	205,732	219,151
	Scup	2,899	4,268	2,079	0.349	655	3,502
	Silver Hake	7,666	7,498	7,012	0.221	3,980	10,044
	Skate Complex	11,733	14,080	14,991	0.119	11,505	18,476
	Tilefish	759	676	512	0.230	281	743
**	White hake	1,280	2,670	1,869	0.152	1,313	2,425
	Windowpane	82	89	135	0.511	0	271
	Winter fld	3,477	3,667	3,186	0.093	2,606	3,767
	Witch fld	2,545	2,652	2,663	0.084	2,226	3,101
	Yellowtail fld	3,947	4,118	3,784	0.061	3,330	4,238
	All species	717,052		700,277			
	Total of single species	686,870	733,890	679,688			
	Fluke-Scup-BSB	11,125	13,404	10,026	0.145	7,174	12,878
	Groundfish-large mesh	29,900	35,531	30,858	0.029	29,117	32,600
	Groundfish-small mesh	8,449	7,941	7,137	0.218	4,093	10,180
	Squid-butterfish-mack	72,104	71,661	57,556	0.130	42,913	72,199
	Clams and quahogs	227,932	254,657	218,130	0.016	211,433	224,827
	Squids (Illex and Loligo)	27,365	29,015	26,348			

* these species have gear-specific, directed fisheries that were not observed in 2005.
** potential 'mixed' species: squid unknown and red, offshore and white hake mix.



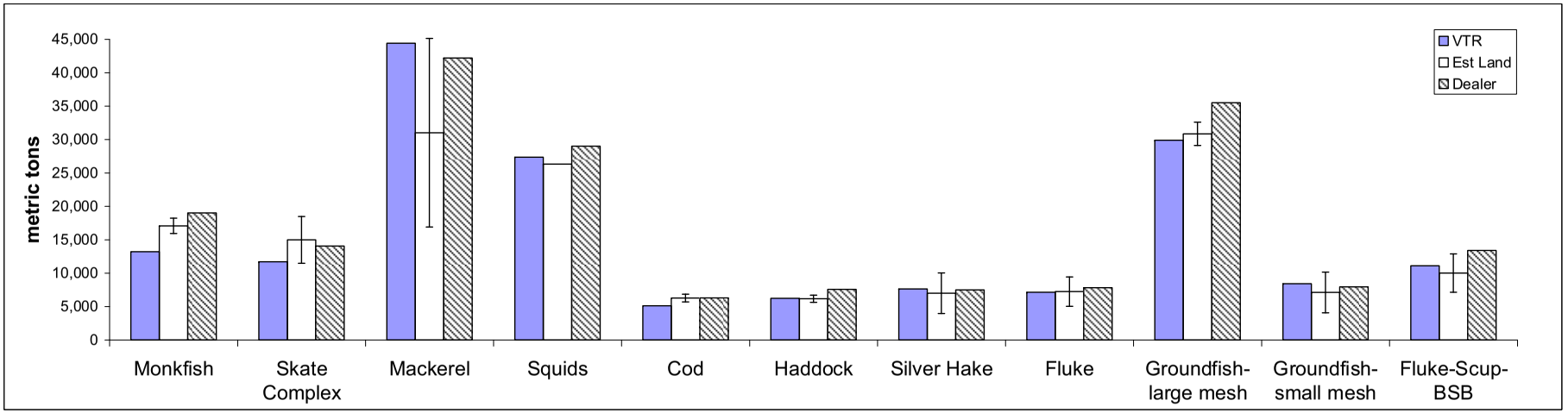
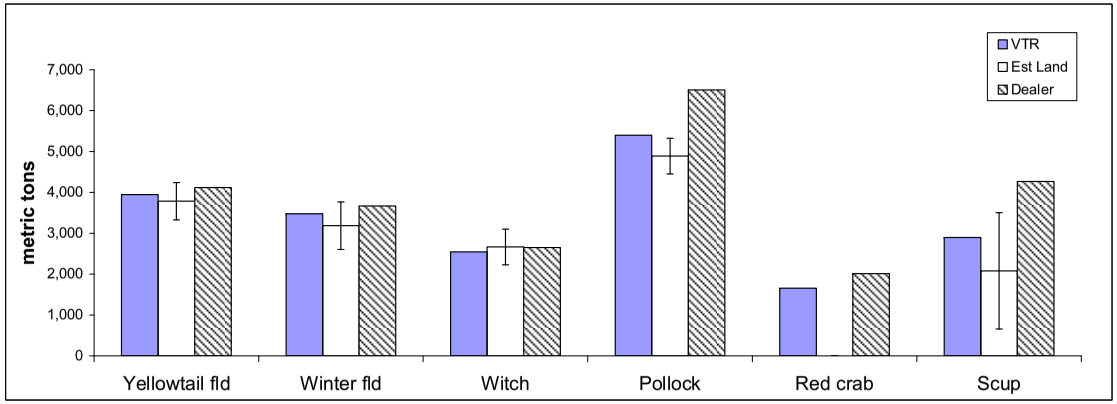
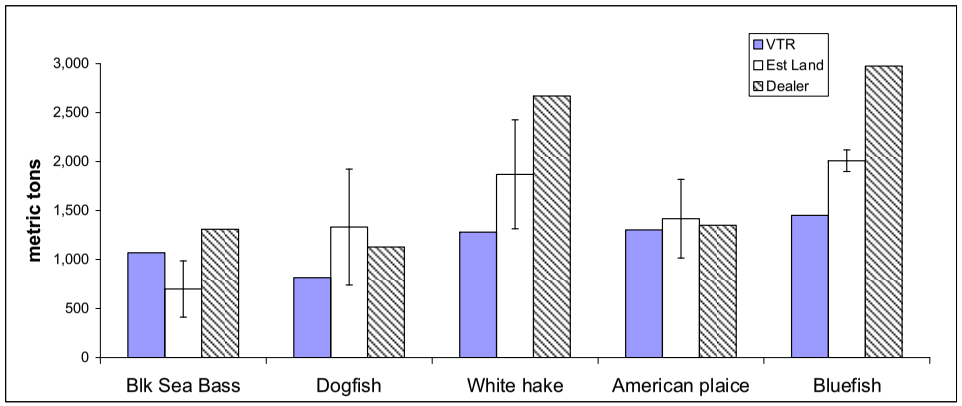


Figure 1. Vessel Trip Reports landings (solid shaded bar), estimated landings (open bar) based on Northeast Fisheries Observer Program data, and Dealer landings (hatched bar) in 2005, by species/species group.





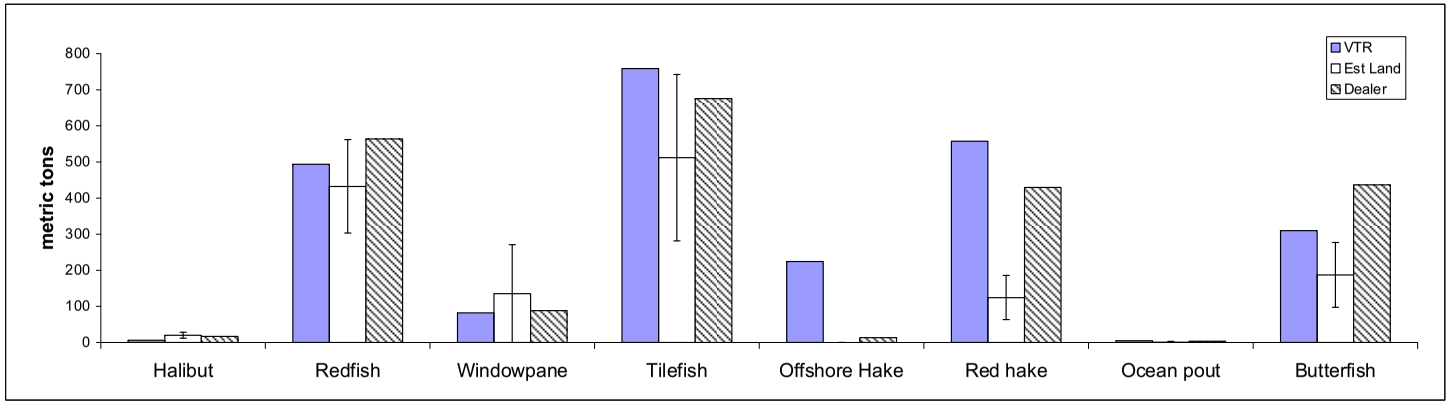


Figure 1 *continued*.

APPENDIX A

Table A1. Survival ratios for spiny dogfish and summer flounder, by fleet.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	SPINY DOGFISH	SUMMER FLOUNDER	
Longline	HOOK	NE	all	all	010	0.75	0.20	
Longline	OPEN	MA	all	all	010	0.75	0.20	
Longline	OPEN	NE	all	all	010	0.75	0.20	
Hand Line	OPEN	MA	all	all	020	0.90	0.20	
Hand Line	OPEN	NE	all	all	020	0.90	0.20	
Harpoon	OPEN	MA	all	all	030	0.00	0.20	
Harpoon	OPEN	NE	all	all	030	0.00	0.20	
Longline, Pelagic	OPEN	MA	all	all	040	0.75	0.20	
Longline, Pelagic	OPEN	NE	all	all	040	0.75	0.20	
Otter Trawl	B	MA	large	all	050	0.50	0.20	
Otter Trawl	B	NE	small	all	050	0.50	0.20	
Otter Trawl	B	NE	large	all	050	0.50	0.20	
Otter Trawl	OPEN	MA	small	all	050	0.50	0.20	
Otter Trawl	OPEN	MA	large	all	050	0.50	0.20	
Otter Trawl	OPEN	NE	small	all	050	0.50	0.20	
Otter Trawl	OPEN	NE	large	all	050	0.50	0.20	
Otter Trawl	USCAN	MA	small	all	050	0.50	0.20	
Otter Trawl	USCAN	MA	large	all	050	0.50	0.20	
Otter Trawl	USCAN	NE	small	all	050	0.50	0.20	
Otter Trawl	USCAN	NE	large	all	050	0.50	0.20	
Scallop Trawl	CLOSED	MA	all	general	052	0.50	0.20	
Scallop Trawl	CLOSED	MA	all	limited	052	0.50	0.20	
Scallop Trawl	CLOSED	NE	all	limited	052	0.50	0.20	
Scallop Trawl	OPEN	MA	all	general	052	0.50	0.20	
Scallop Trawl	OPEN	MA	all	limited	052	0.50	0.20	
Scallop Trawl	OPEN	NE	all	general	052	0.50	0.20	
Scallop Trawl	OPEN	NE	all	limited	052	0.50	0.20	
Shrimp Trawl	OPEN	MA	all	all	058	0.50	0.20	
Shrimp Trawl	OPEN	NE	all	all	058	0.50	0.20	
Sink, Anchor, Drift Gillnet	OPEN	MA	small	all	100, 110	0.70	0.20	
Sink, Anchor, Drift Gillnet	OPEN	MA	large	all	100, 110	0.70	0.20	
Sink, Anchor, Drift Gillnet	OPEN	MA	xlg	all	100, 110	0.70	0.20	
Sink, Anchor, Drift Gillnet	OPEN	NE	small	all	100, 110	0.70	0.20	
Sink, Anchor, Drift Gillnet	OPEN	NE	large	all	100, 110	0.70	0.20	
Sink, Anchor, Drift Gillnet	OPEN	NE	xlg	all	100, 110	0.70	0.20	
Purse Seine	OPEN	MA	all	all	121, 120	0.50	0.20	
Purse Seine	OPEN	NE	all	all	121, 120	0.50	0.20	
Scallop Dredge	CLOSED	MA	all	general	132	0.25	0.20	
Scallop Dredge	CLOSED	MA	all	limited	132	0.25	0.20	
Scallop Dredge	CLOSED	NE	all	general	132	0.25	0.20	
Scallop Dredge	CLOSED	NE	all	limited	132	0.25	0.20	
Scallop Dredge	OPEN	MA	all	general	132	0.25	0.20	
Scallop Dredge	OPEN	MA	all	limited	132	0.25	0.20	
Scallop Dredge	OPEN	NE	all	general	132	0.25	0.20	
Scallop Dredge	OPEN	NE	all	limited	132	0.25	0.20	
Mid-water paired & single Trawl	OPEN	MA	all	all	170, 370	0.50	0.20	
Mid-water paired & single Trawl	OPEN	NE	all	all	170, 370	0.50	0.20	

Table A1 *continued*. Survival ratios for spiny dogfish and summer flounder, by fleet.

Gear Type	Access Area (Open-Closed)	Area Fished	Mesh Group	Trip Category (General/ Limited)	Gear Code(s)	SPINY DOGFISH	SUMMER FLOUNDER	
Fish Pots/ Traps	OPEN	MA	all	all	181	0.00	0.20	
Fish Pots/ Traps	OPEN	NE	all	all	181	0.00	0.20	
Lobster Pots	OPEN	MA	all	all	200	0.00	0.20	
Lobster Pots	OPEN	NE	all	all	200	0.00	0.20	
Crab Pots	OPEN	MA	all	all	300	0.00	0.20	
Crab Pots	OPEN	NE	all	all	300	0.00	0.20	
Scottish Seine	OPEN	MA	all	all	360	0.00	0.20	
Scottish Seine	OPEN	NE	all	all	360	0.00	0.20	
Clam Quahog Dredge	OPEN	MA	all	all	400, 386	0.00	0.20	
Clam Quahog Dredge	OPEN	NE	all	all	400, 386	0.00	0.20	
Troll Line	OPEN	MA	all	all	060	0.00	0.20	
Floating Trap	OPEN	MA	all	all	080	0.00	0.20	
Floating Trap	OPEN	NE	all	all	080	0.00	0.20	
Danish Seine	OPEN	MA	all	all	160	0.00	0.20	
Pots + Traps	OPEN	NE	all	all	180	0.00	0.20	
Pots + Traps, Conch	OPEN	MA	all	all	183	0.00	0.20	
Pots + Traps, Conch	OPEN	NE	all	all	183	0.00	0.20	
Pots + Traps, Hagfish	OPEN	NE	all	all	186	0.00	0.20	
Pots + Traps, Shrimp	OPEN	NE	all	all	190	0.00	0.20	
Rakes	OPEN	MA	all	all	250	0.00	0.20	
Rakes	OPEN	NE	all	all	250	0.00	0.20	
Diving Gear	OPEN	MA	all	all	330	0.00	0.20	
Diving Gear	OPEN	NE	all	all	330	0.00	0.20	
Beam Trawl	OPEN	MA	all	all	350	0.00	0.20	
Beam Trawl	OPEN	NE	all	all	350	0.00	0.20	
Dredge, Other	OPEN	MA	all	all	381	0.00	0.20	
Dredge, Other	OPEN	NE	all	all	381	0.00	0.20	
Dredge, Mussel	OPEN	NE	all	all	385	0.00	0.20	
Dredge, Urchin	OPEN	MA	all	all	387	0.00	0.20	
Dredge, Urchin	OPEN	NE	all	all	387	0.00	0.20	

APPENDIX B. METHOD TO ASSIGN DAS INFORMATION TO VTR TRIPS

Overview

Matching trips between databases can be accomplished multiple ways. A common way is to use exact matches between the vessel identifier and the sailing and/or landing dates (scenario 1 and 2). This method work reasonably well when the trip endpoints are in agreement across databases. When trip endpoints are not in agreement (e.g., Figure B1, scenario 3), a trip-midpoint matching process may improve the matching rate. The trip-midpoint method matches trips by finding trips in database (A) where the midpoint of the trip falls between the sailing and landing dates of trips in the other database (B). However, the trip-midpoint matching process is sensitive to which data set is used to define the start and end points of a trip and which data set's trip midpoint is being bracketed (e.g., Figure B1, scenario 4 where the first VTR trip [A] would not be matched if the process uses the sailing/landing dates from the VTR [A] and the midpoint from the other database [B]). One matching method that avoids this pitfall is to match trips that exhibit any degree of overlap. The disadvantage of this approach is that it increases the number

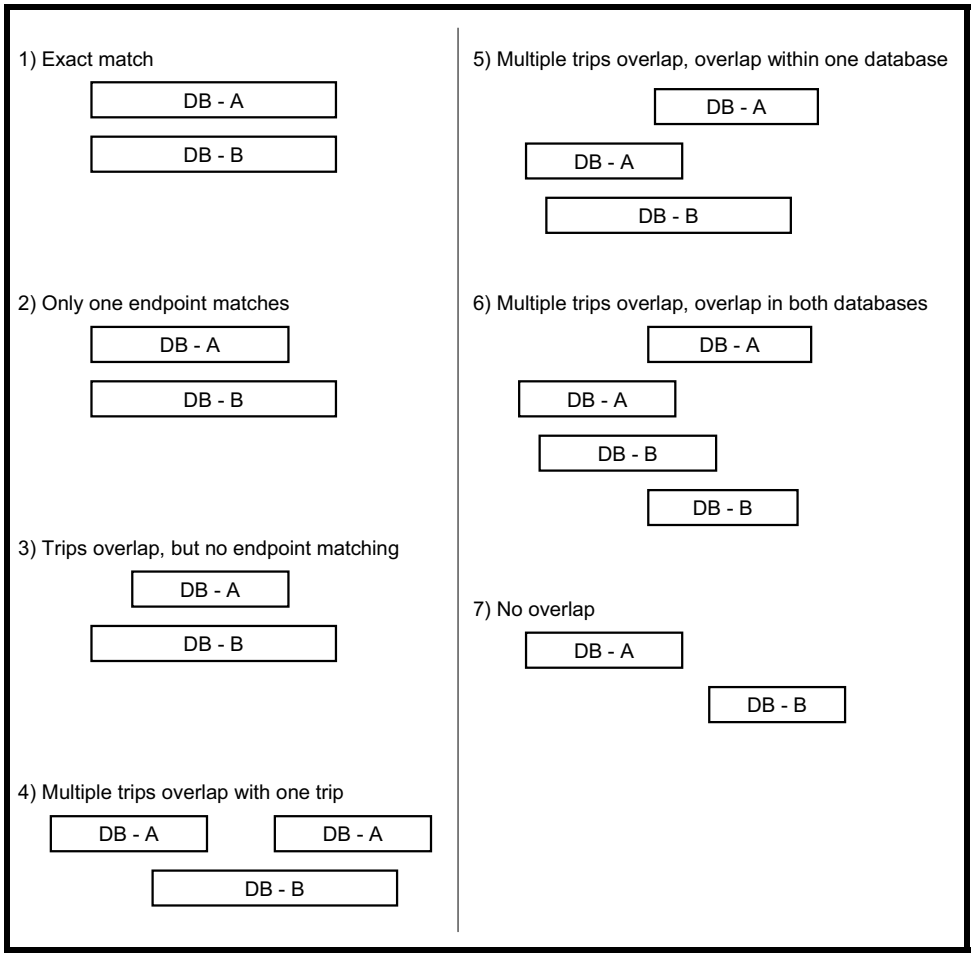


Figure B1. Agreement scenarios for matched trips between the Vessel Trip Report database (A) and other fisheries-dependent databases (B) (DB = database).

of multiple overlaps as seen in scenarios 4, 5 and 6. The important questions to ask are: "can multiple matches be removed from the particular analysis?", and/or, "are multiple matches likely to influence the results of the particular analysis?" If the answer to these questions is "No." then the overlap method is more likely to produce a larger matched data set compared to either the midpoint-matching process or the more traditional, exact matches (e.g., Figure B1, scenarios 1 and 2).

All matching processes will fail when trips that are true matches do not exhibit any overlap in the dates from the respective databases (e.g., Figure B1 scenario 7). This situation is almost always caused by incorrect data entry of trip times in either of the two databases. Because the VTR database contains self-reported data that is manually entered and only a limited amount of post-processing data auditing occurs, it is a reasonable assumption that the dates of VTR trips are less accurate than those of the other fisheries-dependent databases (e.g., Northeast Fisheries Observer Program [NEFOP], Days-At-Sea [DAS], Vessel Monitoring System [VMS], etc.).

VTR data conditioning

Examination of days absent (DA) from the VTR database revealed the presence of negative DA for approximately 1 % of the overall trips (1,227 of 123,766 trips) in 2005 (Figure B2). All negative DA values are false. When negative DA values were less than -1.0 days, it was

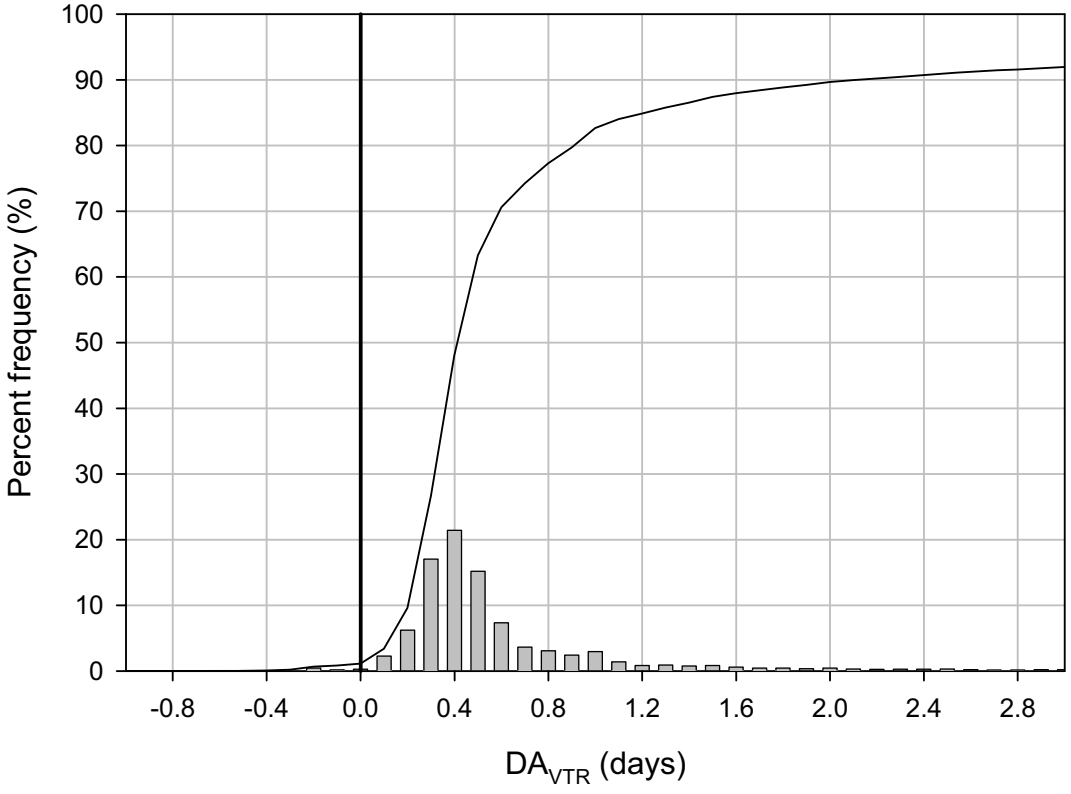


Figure B2. Percent frequency distribution of days absent from Vessel Trip Report (VTR) trips in 2005. Note: x-axis has been truncated at 3 days absent.

assumed that these were day trips with the times incorrectly entered. To correct for this, all trips with DA <= 0 were assigned new start and end times of 00:00:01 and 11:59:59 (local times) on the start and end dates respectively. Artificially increasing the duration of these trips in the VTR database resulted in a higher incidence of the situation observed in scenario 6 above. Because these were generally day boats, taking a single trip per day, this was only an issue if a vessel had a negative DA trip and another fishing trip existed for the same day (i.e., multiple trips on the same day). It should be noted that there were instances of multiple trips within the same day in the VTR data (1,038 of 123,766 trips) in 2005. If any of these trips have negative DA, then this last assumption was violated, however the impact was small (37 trips out of 123,766 trips) in 2005. This assumption would also have been violated if any of the negative DA trips had sailing dates that different from landing dates, however in 2005 there were no occurrences of this situation.

In addition to the concern that adjustment of the times of sailing and landing associated with negative DA trips would result in overlapping trips, there is also the possibility of overlapping trips in the rest of the trips (Figure B1, scenario 5). No adjustment was made for these, but their presence is recognized. The number of overlapping trips was less than 2.4 % of the total trips (2,910 of 123,766 trips) in 2005.

When matching two datasets for which optimization of the match rate is critical, it is important to have a reference match rate from another dataset to provide a point of reference.

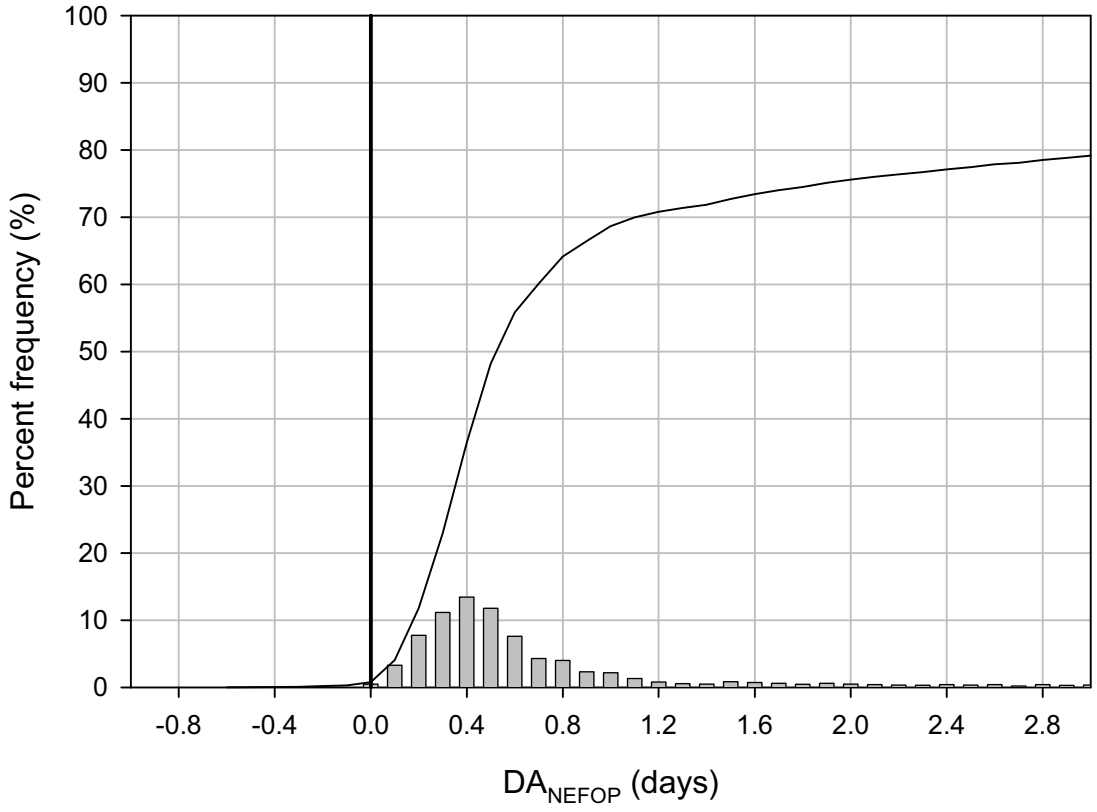


Figure B3. Percent frequency distribution of days absent from the Northeast Fisheries Observer Program (NEFOP) trips in 2005. Note: x-axis has been truncated at 3 days absent.

For example, when matching DAS data to VTR data and only a 90 % match rate can be obtained, it may be that there is 10 % underreporting of VTRs such that a better match is not possible. To provide a reference point for this analysis, the NEFOP data were examined.

Northeast Fisheries Observer Program (NEFOP) data conditioning

The NEFOP data identifies vessel using vessel hull number but not permit number. Permit numbers had to be assigned to the NEFOP data to facilitate matches with other databases. This was accomplished using the PERMIT database and matching on the sailing and landings dates. An inability to match NEFOP hull numbers to the PERMIT database truncated the 2005 NEFOP data set[3] from 4,469 to 4,133. Furthermore, all trips with DA <= 0 were deleted (a reduction to 4,118 trips for 2005 data; Figure B3). An assumption was made that all remaining dates in the NEFOP dataset were valid and the match rate was assessed on the remaining trips (match rate among valid NEFOP trips). There were 2 overlapping NEFOP trips in the 2005 data.

Days-At-Sea data conditioning

No data conditioning was performed on the DAS data set (Figure B4).

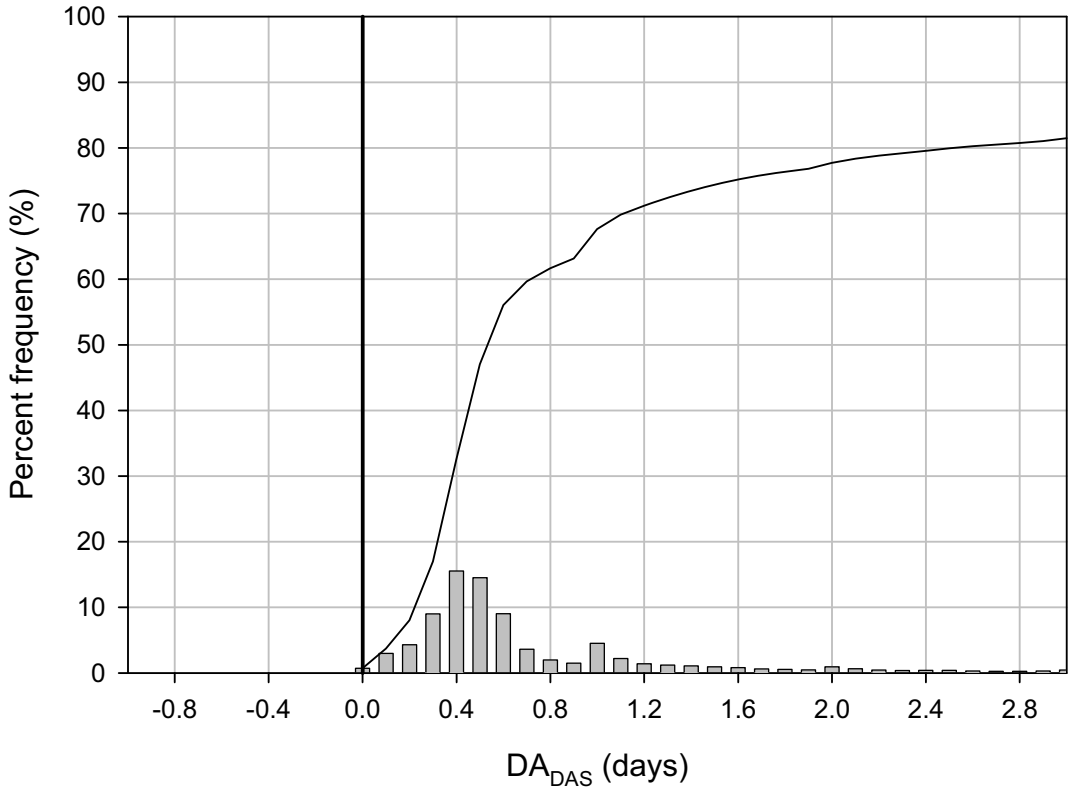


Figure B4. Percent frequency distribution of days absent from Days-At-Sea (DAS) trips in 2005. Note: x-axis has been truncated at 3 days absent.

[3] The join to acquire permit was checked to ensure only one permit was assigned to a given trip.

Match between VTR and NEFOP databases

In 2005, 3,642 of 4,118 NEFOP trips could be matched to a VTR trip (88.4 % match rate). There were a total of 3,713 matched records. Of the 3,713 matched records there were 8 VTR trips that matched multiple NEFOP trips and 70 NEFOP trips that matched multiple VTR trips (Figure B1, scenario 4).

Match between VTR and DAS databases

31,274 of 33,952 DAS trips could be matched to a VTR trip (92.1 % match rate). There were a total of 32,088 matched records resulting in the assignment of DAS information to 31,362 trips. Of the 32,088 matched records there were 644 VTR trips that matched multiple DAS trips and 631 DAS trips that matched multiple VTR trips (Figure B1, scenario 4).

Based on the match results between VTR and NEFOP, the 92.1 % matching rate of DAS trips appears acceptable. There are four likely reasons for the non-matching of the remaining 7.9 % of the DAS trips in the 2005 data:

1) Under-reporting of VTRs (i.e., fishing occurred but no VTR was submitted/received for the trip);
2) A VTR was not required for the trip (i.e., vessel was only setting gear or returned to port prior to engaging in fishing activity due to bad weather, mechanical breakdown or some other reason);
3) A trip-stub exists in the DAS database that belongs to a longer DAS trip, but was not correctly assigned to a VTR trip because it falls outside of the sailing/landing dates reported on the VTR; and
4) Due to incorrect reporting of trip dates to either database, a true match could not be determined when one exists (Figure B1, scenario 7).

For the purposes of this analysis, the critical issue was to correctly assign the appropriate DAS information (fishery code, DAS category code and access area) to the VTR trip. So long as VTR trips were matched with the appropriate DAS information, it was unimportant that a DAS transaction could not be matched to a particular VTR trip (i.e., reason 3 given above).

It was important to ensure that the overlapping matches identified above (644 VTR trips matching multiple DAS trips and 631 DAS trips matching multiple VTR trips) did not result in conflicts with the assignment of DAS information to VTR trips. This was determined by looking for VTR trips with multiple DAS code combinations (fishery_code||das_category||access_area). In the 2005 data there were 80 VTR trips (< 0.3 % of total 31,362 assigned VTR trips) that were assigned conflicting VTR information resulting in 167 conflicting records requiring modification to reduce the conflict and assign a single DAS designation to these trips. Based on a visual inspection of these 167 conflicting records a decision was been made to use the DAS designation with the longest days absent for a particular VTR trip. If a tie was encountered in the days absent then the last DAS designation for a particular VTR trip was used.

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