

Appendices

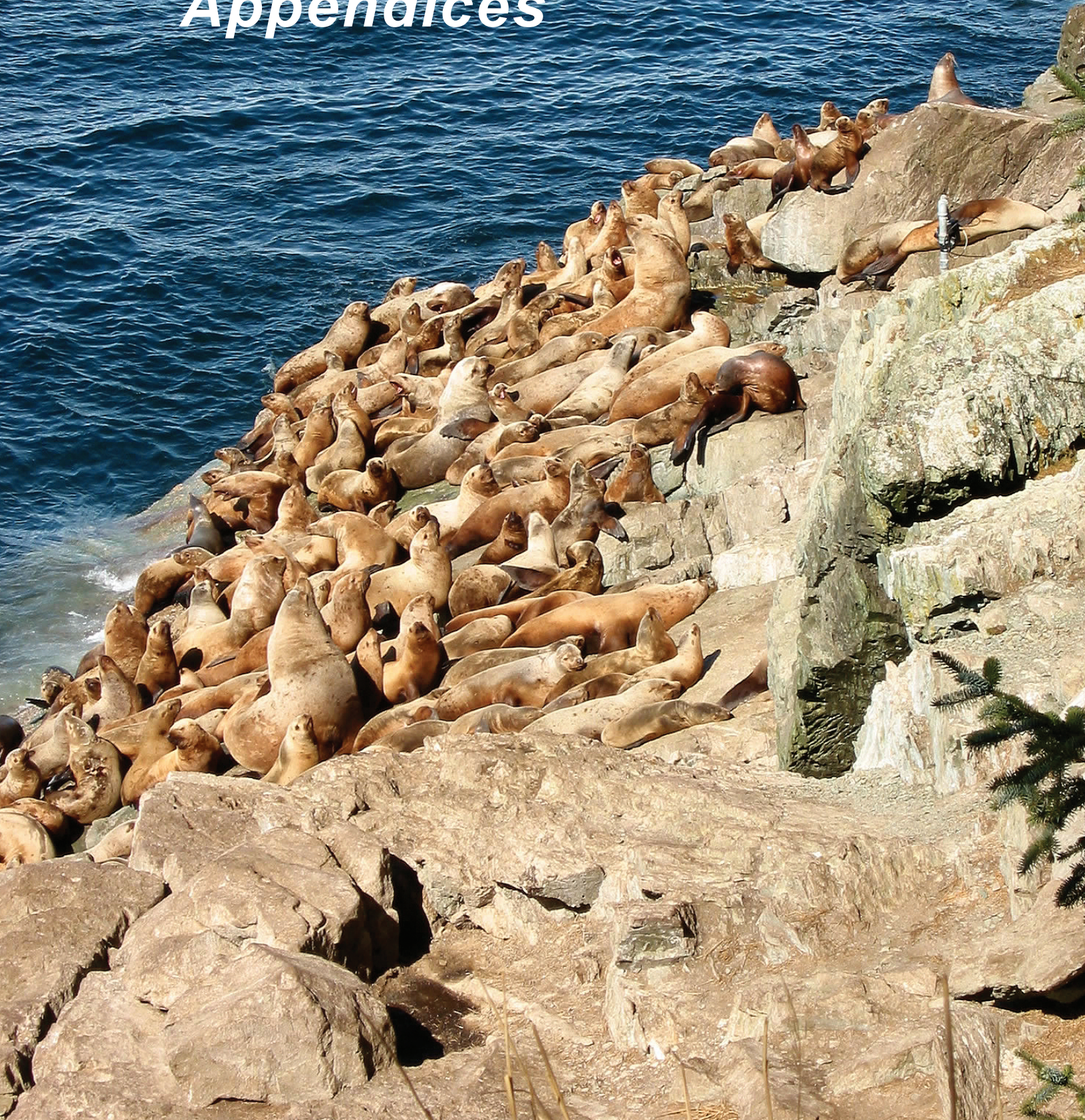


Photo on previous page: Steller sea lions hauled out on rocky shore. Credit: NOAA.

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Acronyms Used in the U.S. National Bycatch Report

ACCSP	Atlantic Coastal Cooperative Statistics Program
ACL	annual catch limit
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center [of NMFS]
AKR	Alaska Regional Office [of NMFS]
AIDCP	Agreement on the International Dolphin Conservation Program
ALWTRP	Atlantic Large Whale Take Reduction Plan
AMMOP	Alaska Marine Mammal Observer Program
A-SHOP	At-Sea Hake Observer Program
ASMFC	Atlantic States Marine Fisheries Commission
ATCA	Atlantic Tunas Convention Act
BCC	Birds of Conservation Concern
BDTRP	Bottlenose Dolphin Take Reduction Plan
BiOp	Biological Opinion
BRD	bycatch reduction device
B Reg	B Regular [days at sea]
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System [Alaska]
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CDFG	California Department of Fish and Game
CDQ	Community Development Quota [western Alaska]
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
CNMI	Commonwealth of the Northern Mariana Islands
CPS	coastal pelagic species
CPUE	catch per unit of effort
CV	coefficient of variation
DAS	days at sea
DMR	discard mortality rate
DPS	distinct population segment
EEZ	exclusive economic zone
EIS	environmental impact statement
EM	electronic monitoring
EPO	eastern Pacific Ocean
ESA	Endangered Species Act
ETP	eastern tropical Pacific
FAD	fish-aggregating device
FAO	Food and Agriculture Organization of the United Nations
FFA	Forum Fisheries Agency
FMP	fishery management plan
FSSI	Fish Stock Sustainability Index
FTE	full-time equivalent
GAM	generalized additive model
GLM	generalized linear model
GMFMC	Gulf of Mexico Fisheries Management Council
GMT	groundfish management team
GOA	Gulf of Alaska
GPS	global positioning system
GSI	genetic stock identification

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GSMFC	Gulf States Marine Fisheries Commission
GulffIN	Gulf of Mexico Fisheries Information Network
HAPC	habitat area of particular concern
HMS	highly migratory species
HRM	hooking release mortality
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IERS	Interagency Electronic Reporting Program [Alaska]
IFQ	individual fishing quota
IPHC	International Pacific Halibut Commission
IPOA	international plan of action
IT	information technology
ITQ	individual transferable quota
ITS	incidental take statement
LAPP	limited-access privilege program
LCR	Lower Columbia River [Chinook salmon population]
LCS	large coastal species [shark complex]
LME	large marine ecosystem
LOA	length overall [vessel]
MAFMC	Mid-Atlantic Fishery Management Council
MBTA	Migratory Bird Treaty Act
MMAF	Marine Mammal Authorization Program
MMHSRP	Marine Mammal Health and Stranding Response Program
MMPA	Marine Mammal Protection Act
MP	millions of pounds
MPA	marine protected area
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSRA	Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006
NAFO	Northwest Atlantic Fisheries Organization
NCRPP	Northeast Cooperative Research Partners Program
NED	Northeast Distant [fishing area]
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center [of NMFS]
NERO	Northeast Regional Office [of NMFS]
NMFS	National Marine Fisheries Service, aka NOAA Fisheries
NMML	National Marine Mammal Lab
NOAA	National Oceanic and Atmospheric Administration
NOP	National Observer Program
NPFMC	North Pacific Fishery Management Council
NPGOP	North Pacific Groundfish Observer Program
NPOA	National Plan of Action
NWFSC	Northwest Fisheries Science Center [of NMFS]
NWHI	Northwestern Hawaiian Islands
ODFW	Oregon Department of Fish and Wildlife
OFL	optimal fishing level
OY	optimum yield
PacFIN	Pacific Fisheries Information Network
PBR	potential biological removal
PFMC	Pacific Fishery Management Council
PIFSC	Pacific Islands Fisheries Science Center [of NMFS]
PIRO	Pacific Islands Regional Office [of NMFS]
PLL	Pelagic Longline Logbook [program]
PLTRT	Pelagic Longline Take Reduction Team
POP	Pelagic Observer Program
PR	protected resources

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PSC	prohibited species catch
PSGNA	Pamlico Sound Gillnet Restricted Area
PSMFC	Pacific States Marine Fisheries Commission
RFMO	regional fisheries management organization
RPA	reasonable and prudent alternatives
RPM	reasonable and prudent measures
SAFE	stock assessment and fishery valuation [report]
SAFMC	South Atlantic Fishery Management Council
SAP	special-access program
SBRM	standardized bycatch reporting methodology
SCRS	Standing Committee on Research and Statistics
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center [of NMFS]
SERO	Southeast Regional Office [of NMFS]
SFA	Sustainable Fisheries Act
SWFSC	Southwest Fisheries Science Center [of NMFS]
TAC	total allowable catch
TED	turtle excluder device
TRP	take-reduction plan
TRT	take-reduction team
URI	University of Rhode Island
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UWR	Upper Willamette River [Chinook salmon population]
V	variance
VMS	vessel monitoring system
VTR	vessel trip report
WCGOP	West Coast Groundfish Observer Program
WCPFC	Western and Central Pacific Fishery Commission
WDFW	Washington Department of Fish and Wildlife
WPFMC	Western Pacific Fishery Management Council
WWF	World Wildlife Fund
ZMRG	Zero Mortality Rate Goal

APPENDIX B DOMESTIC STATUTES AND REGULATIONS AND INTERNATIONAL AGREEMENTS

DOMESTIC STATUTES AND REGULATIONS

Endangered Species Act

The Endangered Species Act (ESA) requires the Federal government to protect and conserve species and populations that are endangered or threatened with extinction, and to conserve the ecosystems on which these species depend. Some threatened and endangered species, including all sea turtle species and certain species of salmon, seabirds, and marine mammals, are captured as bycatch in the Nation's fisheries. The ESA requires development of a recovery plan that identifies criteria and actions to recover each listed species. Recovery plans for marine species generally include reducing incidental capture of protected species in fishing operations as a first-priority action that is necessary to prevent extinction or irreversible declines. In some cases, fisheries can be restricted or terminated because they are likely to jeopardize the continued existence of a species. Other provisions of the ESA ensure that sources of mortality for protected species are identified and minimized or mitigated.

ESA Section 9 prohibits the take of endangered species within the United States or the territorial sea of the United States, and on the high seas. "Take" is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 U.S.C. 1536(18)). NMFS has issued regulations, pursuant to 4(d) of the ESA, extending the prohibition of take, with exceptions, to threatened species. The ESA does allow for exceptions to the take prohibitions. NMFS may grant exceptions to the take prohibitions with an incidental take statement or an incidental take permit issued under Section 7 or 10, respectively. Of particular relevance for fisheries bycatch is Section 7, which provides that "Each Federal agency shall . . . insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species" (16 U.S.C. §1536(a)(2)).

Under Section 7(a)(2) of the ESA, Federal agencies must consult with NOAA Fisheries on activities that may affect a listed species. For commercial fisheries, NMFS must formally consult with itself on the effects fisheries management plans may have on listed species and their critical habitat. These Section 7 Consultations are designed to assist Federal agencies in fulfilling their duty to ensure their actions are not likely to jeopardize the continued existence of a species or destroy or adversely modify critical habitat. Should an action be determined by NMFS to be likely to

jeopardize a species or adversely modify critical habitat, NMFS will suggest Reasonable and Prudent Alternatives (RPAs) that would not violate Section 7(a)(2). Biological Opinions document NMFS' opinion as to whether a Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of critical habitat. Where appropriate, biological opinions include an incidental take statement that provides an exemption for the take of listed species while specifying the amount or extent of take allowed, the RPMs necessary to minimize impacts from the Federal action, and the Terms and Conditions with which the action agency must comply.

In 2007, the NMFS Office of Protected Resources developed a regulation requiring U.S. fishing vessels, recreational or commercial, operating in U.S. territorial waters, the U.S. EEZ or on the high seas, or vessels otherwise subject to the jurisdiction of the U.S. where sea turtles may be present and interactions likely to occur, to carry observers when requested to do so by NMFS. Previous ESA regulations allowed only for limited, temporary monitoring of vessels suspected of sea turtle interactions, usually only after an emergency event, such as a mass sea turtle stranding, or under a Biological Opinion. Consequently, NMFS relied on the MSA to observe sea turtles as they are considered "fish" under the MSA, and relied on the Marine Mammal Protection Agency (MMPA), which allowed sea turtle interactions to be recorded although the primary authority was to observe marine mammal interactions. This approach did not always allow the agency to monitor fisheries it needed to monitor or to design monitoring programs to optimize collection of sea turtle bycatch data. The 2007 regulation will enable NMFS to learn more about interactions between fishing operations and sea turtles, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address sea turtle bycatch may be necessary.

Magnuson-Stevens Fishery Conservation and Management Act

In 1996 Congress passed the Sustainable Fisheries Act which made major revisions to the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1801 et seq.) including significant new provisions on bycatch. Congress defined the term bycatch (see 16 U.S.C. 1802(2)) and required that bycatch be minimized to the extent practicable. Although the bycatch reduction and monitoring requirement described in the 1996 MSA amendments applied to a broad range of living marine species, including finfish, shellfish, sea turtles, and deep-water corals, they did not apply to marine mammals or seabirds.

Under MSA National Standard 9, "conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be

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avoided, minimize the mortality of such bycatch” (16 U.S.C. § 1851(9)). MSA section 303 of the 1996 MSA expands on this requirement by mandating that fishery management plans “establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided” (16 U.S.C. § 1853(11)).

NMFS regulations provide the following guidance on factors that should be considered in determining the practicability of a particular management action to minimize bycatch or the mortality of bycatch. They state: “A determination of whether a conservation or management measure minimizes bycatch or bycatch mortality to the extent practicable, consistent with other national standards and maximization of net benefits to the Nation, should consider the following factors: (A) Population effects for bycatch species; (B) Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem); (C) Changes in the bycatch of other species of fish and the resulting population and ecosystem effects; (D) Effects on marine mammals and birds; (E) Changes in fishing, processing, disposal, and marketing costs; (F) Changes in fishing practices and behavior of fishermen; (G) Changes in research, administration, and enforcement costs and management effectiveness; (H) Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources; (I) Changes in the distribution of benefits and costs; and (J) Social effects.” (50 CFR 600.350(d)(3))

The 2007 Magnuson-Stevens Reauthorization Act (MSRA) expanded upon the bycatch provisions of the MSA with a focus on international conservation, seabirds, and bycatch reduction engineering. The MSRA amendments established a Bycatch Reduction Engineering Program to minimize bycatch, seabird interactions, bycatch mortality, and post-release mortality in federally managed fisheries through the development of bycatch reduction devices and other gear modifications. The MSRA amendments also authorized regional fishery management councils to include incentives in their fishery management plans to reduce total bycatch and seabird interactions, amounts, bycatch rates, and post-release mortality in federally managed fisheries by incorporating bycatch into quotas, and by adding measures to promote the use of gear with verifiable and monitored low bycatch and seabird interactions, as well as measures to reduce bycatch and seabird interactions, bycatch mortality, post-release mortality, or regulatory discards in the fishery. (16 U.S.C. §1865).

International provisions of the MSRA amend the MSA to strengthen the United States’s commitment to monitoring and reducing bycatch (16 U.S.C. §1826). These amendments require the Secretary of State to ensure that “statistically reliable monitoring by the U.S. is carried out, through

the use of on-board observers or through dedicated platforms provided by foreign nations that are parties to the agreement, of all target and non-target fish species, marine mammals, sea turtles, and seabirds entangled or killed by large-scale driftnets used by fishing vessels of foreign nations that are parties to the agreement” and that “the taking of non-target fish species, marine mammals, sea turtles, seabirds, and endangered species or other species protected by international agreements to which the U.S. is a party is minimized and does not pose a threat to existing fisheries or the long-term health of living marine resources.”

In addition, the MSRA also amends the High Seas Driftnet Fishing Moratorium Protection Act to require the Secretary to identify and certify nations whose vessels engage in illegal, unreported and unregulated fishing practices, and/or bycatch of protected living marine resources, in certain areas, and facilitate international cooperation and provide assistance for monitoring and reducing bycatch of living marine resources. (16 U.S.C. §1826d-k).

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) seeks to maintain marine mammal stocks at optimum sustainable population levels, principally by regulating the human-induced mortality and serious injury of marine mammals. This includes fishing-related mortality and serious injury. Although the MMPA prohibits the take of marine mammals, it provides exceptions for incidental take during the operation of commercial fishing, as well as other activities. Take is defined in the MMPA as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal” (16 U.S.C. § 1362 (13)). In 1994, Congress amended the MMPA to include Section 118, which established a regime to regulate the take of marine mammals incidental to commercial fishing so that it does not occur at a level that jeopardizes a marine mammal stock’s ability to reach its “optimum sustainable population,” defined as “the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element” (16 U.S.C. § 1362(9)).

Section 118 of the MMPA requires that NMFS classify each U.S. commercial fishery according to whether there is a frequent (Category I), occasional (Category II), or a remote (Category III) likelihood of incidental mortality and serious injury of marine mammals. It also has provisions for the establishment of take reduction teams to develop take reduction plans (TRPs) for those fisheries with the greatest impact on marine mammal stocks (i.e., to assist in the recovery or prevent the depletion of strategic marine mammal stocks that interact with Category I and II fisheries). Participants in Category I or II fisheries are required to reg-

ister with NMFS, take on board an observer if requested by NMFS, and comply with all applicable TRP regulations. All fishermen, including those participating in Category III fisheries, are required to report the incidental mortality and serious injury of marine mammals should it occur during commercial fishing operations.

The MMPA establishes both a short-term (six-month) and a long-term (five-year) goal for marine mammal bycatch reduction. Take reduction plans are required to reduce, within six months of implementation, the incidental mortality or serious injury of marine mammals incidentally taken in the course of commercial fishing operations to levels less than a stock's potential biological removal (PBR) level. Within five years of implementation, TRPs are required to reduce the mortality or serious injury of marine mammals incidentally taken in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate (commonly referred to as the Zero Mortality Rate Goal or ZMRG), taking into account the economics of the fishery, the availability of existing technology, and existing state or regional fishery management plans (16 U.S.C. § 1387(f)).

Migratory Bird Treaty Act

In 1918, the United States affirmed or implemented commitments to four international conventions (with Canada, Japan, Mexico, and Russia) under the Migratory Bird Treaty Act (MBTA). The MBTA is a domestic regulation for the protection of shared migratory bird resources, including seabirds administered by the U.S. Department of the Interior through the U.S. Fish and Wildlife Service (USFWS). Each of the conventions protects selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle). The Fish and Wildlife Conservation Act of 1980, as amended, requires the USFWS to monitor and assess migratory non-game birds, determine the effects of human activities, and identify populations of migratory birds that, without additional conservation measures, are likely to become candidates for listing under the ESA. In response, the USFWS released a report entitled *Birds of Conservation Concern 2002*, which identifies bird species (not already listed under the ESA) that represent the agency's highest conservation priorities. Provisions on seabird bycatch were also strengthened in 2006 under the MSRA, as described previously.

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Section 202(h)(1) of the Magnuson-Stevens Fishery Conservation and Management Act calls on the Secretary of State, in cooperation with the Secretary of Commerce, to seek to secure international agreements to establish standards and measures for bycatch reduction that are comparable to the standards and measures applicable to U.S. fishermen, if they conclude that it is necessary and appropriate. Similar provisions are also contained in both the Marine Mammal Protection Act and the Endangered Species Act. Full summaries of the international fisheries agreements in which the U.S. has interests can be found at the NMFS Office of International Affairs website: <http://www.nmfs.noaa.gov/ia/intlagree/>. A brief discussion of international agreements with bycatch provisions is presented here.

Commission for the Conservation of Antarctic Marine Living Resources

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established in 1982 by the Convention on the Conservation of Antarctic Living Marine Resources to protect and conserve the living marine resources in the waters surrounding Antarctica (the domestic implementing legislation is the Antarctic Marine Living Resources Convention Act of 1984, 16 U.S.C. 2431 et seq.). CCAMLR restricts catch and bycatch in fish, krill, and crab fisheries. The Commission has also required fishing gear and time modifications to minimize seabird bycatch in some longline fisheries, and has endorsed the recommendations of its Scientific Committee regarding the reduction of seal bycatch through the use of excluder devices. More information can be found on the CCAMLR website: <http://www.ccamlr.org/>.

FAO Code of Conduct for Responsible Fisheries

More than 170 Members of the United Nations Food and Agriculture Organization (FAO) adopted the Code of Conduct for Responsible Fisheries in 1995. The Code of Conduct is voluntary and consists of a collection of principles, goals, and elements for action. Among other things, the Code of Conduct maintains that fishing methods and gear should be selective and designed to minimize waste and promote high survival rates for escaping fish. The Code of Conduct states that appropriate measures should be taken to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species (both fish and non-fish species), and negative impacts on associated or dependent species, in particular endangered species. Where appropriate, such measures may include technical measures related to fish size, mesh size, or gear, discards, closed seasons, and areas and zones reserved for selected fisheries,

particularly artisanal fisheries. Such measures should be applied, where appropriate, to protect juveniles and spawners. NMFS has been very active in promoting implementation of FAO's International Plan of Action (IPOA) for Reducing Incidental Catch of Seabirds in Longline Fisheries and the FAO IPOA for the Conservation and Management of Sharks, both of which have developed out of the Code of Conduct. More information on the IPOAs can be found at the following website: <http://www.nmfs.noaa.gov/ia/>.

Inter-American Tropical Tuna Commission

The Inter-American Tropical Tuna Commission (IATTC) contains several provisions that pertain to reducing bycatch of dolphins, seabirds, sea turtles, and finfish (the domestic implementing statute is the Tuna Conventions Act of 1950, 64 Stat. 777, as amended: 16 U.S.C., 951 et seq.). IATTC includes parties to the Agreement on the International Dolphin Conservation Program (AIDCP). The AIDCP is a legally binding instrument for dolphin conservation and ecosystem management in the eastern tropical Pacific Ocean (ETP). The objectives of the Agreement are to reduce incidental dolphin mortalities in the tuna purse seine fishery through setting annual limits, seeking alternative means of capturing large yellowfin tunas not in association with dolphins, and ensuring long-term sustainability of tuna stocks and marine resources in the ETP. The IATTC has also adopted several resolutions pertaining to sea turtle bycatch. More information can be found on the IATTC website: <http://www.iatcc.org/HomeENG.htm>.

International Commission for the Conservation of Atlantic Tunas

The International Commission for the Conservation of Atlantic Tunas (ICCAT) is a regional fishery management organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas. The U.S. implementing statute for ICCAT is the Atlantic Tunas Convention Act (ATCA) of 1975 (16 U.S.C. 971 et. seq.). ICCAT member countries have agreed on several non-binding bycatch data-sharing resolutions; studied bycatch of sharks and sea turtles; and required the live release of certain species (e.g., Atlantic blue and white marlins). ICCAT has also agreed to non-binding information-sharing measures on the safe release and avoidance of bycatch of sea turtles. ICCAT has passed resolutions to encourage its members to report on the implementation of their seabird bycatch plans of action under the FAO IPOA, and to share data on incidental take of seabirds. In 2007, ICCAT adopted a binding resolution on reducing the incidental bycatch of seabirds in longline fisheries. This resolution includes mandatory requirements for seabird avoidance measures and the collection of seabird bycatch data. Additional information can be found on the ICCAT website: <http://www.iccat.int/en/>.

International Pacific Halibut Commission

The International Pacific Halibut Commission (IPHC) was established in 1923 by a Convention between the United States and Canada (the domestic implementing legislation is the Northern Pacific Halibut Act of 1982, 16 U.S.C. 773, 773a–773k). The purpose of the IPHC is to conserve, manage, and rebuild the halibut stocks in the Convention Area to those levels that would achieve and maintain the maximum sustainable yield from the fishery. In addition to managing the Pacific halibut fishery, the Commission conducts research on Pacific halibut bycatch and discard mortality, as well as bycatch reduction devices. The two countries have agreed to take measures to reduce halibut bycatch in non-target fisheries. More information can be found on the IPHC website: <http://www.iphc.washington.edu/halcom/>.

Northwest Atlantic Fisheries Organization

The Northwest Atlantic Fisheries Organization (NAFO) is an intergovernmental fisheries science and management body formed to consult and cooperate to attain the optimum utilization, rational management, and conservation of the fishery resources of the northwest Atlantic (the domestic implementing statute is the Northwest Atlantic Fisheries Convention Act of 1995, 16 U.S.C. 5601 et seq.). Article 12 of the 2010 NAFO Conservation and Enforcement Measures limits bycatch to a certain proportion of haul weight or to an assigned quota. Article 17 prohibits shark finning, and Article 28 requires fisheries observers aboard all vessels participating in NAFO fisheries. Beginning in 2007, contracting parties now provide sea turtle bycatch data to NAFO. Additional information can be found on the NAFO website: <http://www.nafo.int/fisheries/frames/fishery.html>.

Western and Central Pacific Fishery Commission

In 2007, the United States became a member of the Western and Central Pacific Fisheries Commission (WCPFC). The Commission was established in 2004 by the Convention on the Conservation and Management of the Highly Migratory Fish Stocks in the Western and Central Pacific Ocean as a regional fishery management organization to conserve and manage tunas and other highly migratory fish stocks across a vast range of the Pacific Ocean (the domestic implementing legislation is the Western and Central Pacific Fisheries Convention Implementation Act, 16 U.S.C. 6901 et seq.). The goal of the WCPFC is to ensure the long-term conservation and sustainable use of highly migratory fish stocks in the west and central Pacific. While the Commission focuses mainly on tuna species, it also works to reduce bycatch of seabirds and sea turtles and sharks in commercial longline and purse seine fisheries. In 2007, the Commission finalized a binding conservation resolution to reduce seabird bycatch (7 Dec 2007, CMM 2007-04), and

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in 2008 a similar resolution was finalized to reduce bycatch and increase post-release survivorship in sea turtles (12 Dec 2008, CMM 2008-03). Another conservation resolution was finalized for sharks (12 Dec 2008, CMM 2008-06) to reduce discards and increase the proportion of live releases from incidental catches. More information can be found on the WCPFC website: <http://www.wcpfc.int>.

APPENDIX C Monitoring-Related Action Items from Regional Bycatch Implementation Plans: Updates for FY08–FY09

The NOAA Assistant Administrator for Fisheries each year asks NOAA Fisheries Regional Administrators, Science Center Directors, and Office Directors to submit updates to action items related to their Regional and Atlantic HMS Bycatch Implementation Plans. Action items fall under the following categories: monitoring, bycatch reduction engineering and other research, management (including international efforts), and education/outreach. A subset of the actions is listed below. Current Bycatch Implementation Plans and updated action items can be found at http://www.nmfs.noaa.gov/by_catch/bycatch_strategy.htm.

Northeast Region

- Improve Northeast Fisheries Science Center communication with constituents regarding observer programs, and obtain observer program feedback from observed vessel operators.
- Improve quantitative estimates of bycatch by gear and fishery.
- Optimally allocate observer coverage to address regional priorities.
- Develop electronic data entry at sea.
- Explore the use of video monitoring systems to view scallop dredge interactions with sea turtles.

Atlantic Highly Migratory Species (HMS)

- Maintain appropriate observer coverage levels in the pelagic longline, bottom longline, and shark gillnet fisheries.
- Evaluate mandatory observer coverage for headboats possessing HMS permits.
- Increase sample sizes for the Large Pelagic Survey in for-hire fisheries.

Southeast Region

- Enhance observer programs in the Gulf of Mexico and South Atlantic shrimp trawl fisheries.
- Enhance observer programs in the Gulf of Mexico bottom longline reef fish fishery.
- Improve bycatch estimates for red snapper, vermilion snapper, and other reef fishes in the commercial and for-hire reef fish fishery with respect to season, depth, and location.
- Monitor and assess bycatch in the South Atlantic reef fish fishery to minimize the impacts of incidental take on sea turtles and smalltooth sawfish.
- Reduce and monitor bycatch in Caribbean fisheries.

- Improve bycatch estimates of protected species for the shark bottom longline fishery with respect to season and location.
- Monitor right whale bycatch from gillnet or other commercial fisheries gear in the Southeast Restricted Area.
- Enhance observer coverage in the Mid-Atlantic coastal gillnet fishery via alternate platforms.
- Develop observer programs for the Gulf of Mexico recreational charter vessel fishery.

Southwest Region

- Determine whether the Coastal Pelagic Species Fishery Management Plan should be amended to explicitly establish a standardized reporting methodology.
- Ensure that a pilot at-sea observer program in California to supplement and confirm the bycatch assessments derived from dock-side sampling conducted by the State of California is a component of a standardized reporting methodology.
- Continue efforts, through support of the Inter-American Tropical Tuna Commission and international agreements, to ensure that bycatch by vessels flagged by the United States and other nations is accurately reported.
- Maintain drift gillnet observer coverage at 20%.
- Prepare reports that include estimates of the total bycatch of finfish in the drift gillnet fishery, as well as estimates of precision associated with measures of sea turtle and finfish bycatch.
- Characterize the size composition of fish bycatch species in drift gillnet fishery.
- Review the efficiency of drift gillnet observer coverage for estimating drift gillnet finfish and other non-turtle and marine mammal bycatch to determine whether enough samples [are] being collected, given variability.

Northwest Region

- Expand West Coast Groundfish Observer Program coverage to ancillary fleets making groundfish landings.
- Implement a mandatory catch monitoring program for the shore-based whiting fishery, possibly with camera or other technological observation systems.
- Expand the vessel monitoring system program to cover commercial open access and fleets that target groundfish.
- Update the Northwest Fisheries Science Center bycatch model with 2001–07 West Coast Groundfish Observer Program data to improve precision of bycatch rate estimates.
- Work with the states to improve the landings receipt system, possibly moving to electronic fish tickets.
- Assist in the creation of a comprehensive NOAA Fisheries U.S. National Bycatch Report.
- Conduct further observer data analysis to refine the West Coast Groundfish Observer Program's sampling design and fleet monitoring strategies.

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- Test electronic monitoring (EM) equipment on small fixed-gear vessels.
- Test equipment to record trawl tracks to better represent areas trawled.
- Continue to monitor the bycatch of Endangered Species Act-listed salmonids in the West Coast groundfish fishery for compliance with provisions of the current biological opinion.

Pacific Islands Region

- Continue to implement the High-Seas Protected Species Observer Reporting System, including the use of satellite phones by observers.
- Continue to develop estimation models for the take of non-targeted billfish in the tuna and swordfish longline fisheries.
- Refine and expand estimation of fishery takes of sea turtles, seabirds, and marine mammals for the Hawaii-based longline fishery based on observer data and logbooks.
- Refine and expand estimation of fishery bycatch of sharks and other fishes using longline logbook and observer data.

Alaska Region

- Ensure special fishery-dependent data collections outside of standard observer protocols to meet short-term user needs.
- Evaluate technologies suitable for monitoring groundfish fisheries.
- Develop approaches for expanding observer deployments to meet additional agency information needs for catch and bycatch estimation.
- Revise observer data-collection protocols to meet evolving needs and improve bycatch data quality.
- Investigate the impact of a real-time bycatch monitoring system on bycatch levels and fishing location choice in the Bering Sea and Aleutian Islands.
- Improve methodologies for estimating prohibited species bycatch.
- Prepare information and text for the first edition of the U.S. National Bycatch Report.
- Evaluate whether measures of effort other than total catch can be used to extrapolate from observed to total marine mammal bycatch.
- Evaluate the need for additional compliance resources to maintain the integrity of observer data.
- Promote the use of electronic logbooks to facilitate identification and correction of bias in estimating bycatch for unobserved vessels.
- Promote interagency efforts to develop electronic reporting of landings data by trip.
- Evaluate methods for improving bycatch estimates of marine mammals in state-managed Marine Mammal Protection Act Category II salmon fisheries.
- Improve accuracy and precision in estimates of seabird interactions and bycatch.
- Improve spatio-temporal characterization of seabird bycatch estimates.

APPENDIX D Precision, Accuracy, and Bias¹

The measure of precision used in the U.S. National Bycatch Report is the *coefficient of variation* (CV), which is the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the estimate itself. The CV of an estimate can be decreased by increasing the number of observations, which increases sampling cost (NMFS 2004a). However, as the number of observations is increased, the CV decreases at a decreasing rate. For large samples, the CV of an estimate is inversely proportional to the square root of the size of the sample. This means that at some point a further increase in the number of observations cannot be justified in terms of the reduction in the CV and the associated benefits of the more precise estimate, given the increase in sampling cost (Figure D.1).

Precision requirements for bycatch estimates depend upon the management procedures for which the estimates are being used. Additionally, there are a number of sampling issues that impede our ability to obtain precise bycatch estimates for individual stocks or species, including:

- management uses of bycatch estimates (e.g., setting of bycatch quotas, development of mitigation measures);
- assessment uses of bycatch estimates (i.e., evaluation of stock status, estimation of total allowable catches, estimation of PBR);
- monitoring relative to management standards (i.e., comparison of bycatch estimate with some management standard);
- developing mitigation plans (i.e., bycatch estimates used to design measures to reduce bycatch).

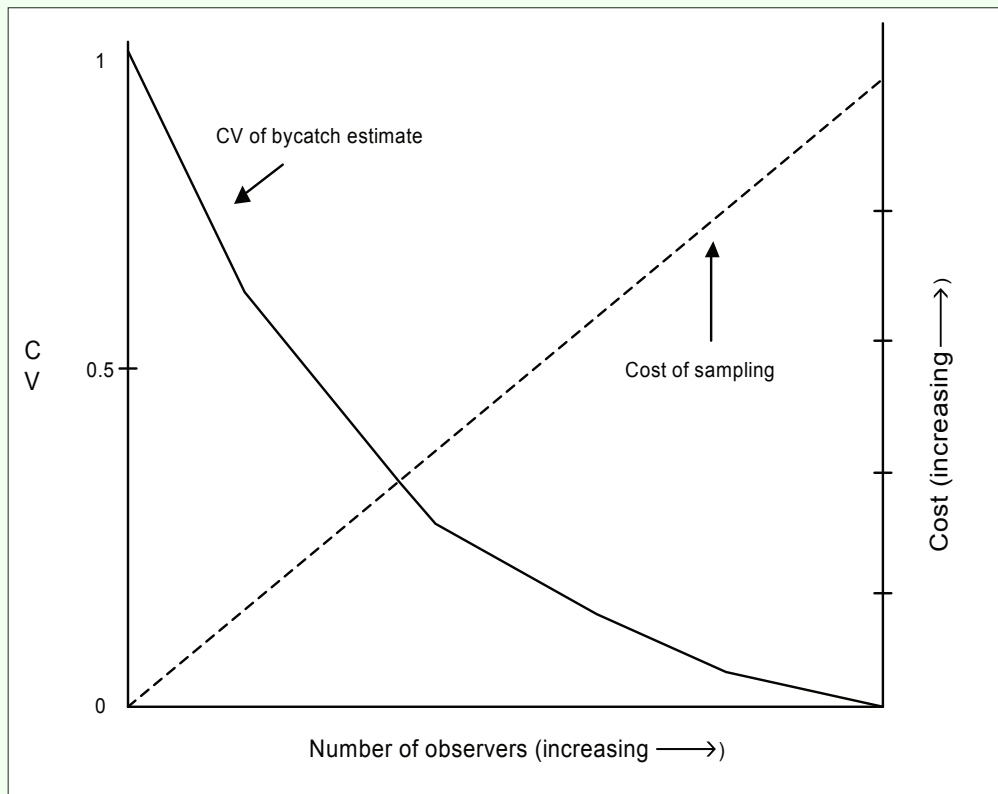


Figure D.1

Trade-offs between precision, number of samples, and cost (NMFS 2004a).

¹ Summary Information from NMFS (2004a) and Vølstad and Fogarty (2006).

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When estimating catch or bycatch from fisheries data, survey or observer programs usually are designed to address estimation of bycatch of multiple species, rather than being designed specifically for the estimate of bycatch of an individual species. Therefore, observer programs are often designed to obtain bycatch estimates of the aggregate of all fish species combined with a specified precision level. However, when a species comprises a small percentage of the aggregate the estimate of an individual species will be less precise.

Bias refers to systematic errors that cause the average survey value to deviate from the true population value for any sample selected under a specific survey design (Vølstad and Fogarty 2006). For observer monitoring programs, the total error in estimates of catch and bycatch is linked to vessel selection and observer deployment procedures, field data-collection procedures, and analytical methods for estimating catch and bycatch. Ideally, an overall design for observer programs is chosen to minimize the total error in the catch and bycatch estimates for the target fleet, within the resources available for the program and practical constraints.

A vessel selection procedure is considered biased if it results in catch and bycatch data that do not represent the fleet (and its fishing operations) on average (i.e., the procedure will tend to result in observer data that systematically deviate from data that would be representative of the fleet and its fishery). Random selection is a safeguard against systematic bias in the selection procedure (i.e., on average, the samples will represent the total population of vessels in the list). A random selection of vessels, however, does not in itself eliminate systematic bias. If observers cannot be deployed on the vessels selected by a representative method such as random sampling, or if some of the vessels selected change their fishing behavior, then the resulting sample is biased. Bias resulting from logistical problems and lack of compliance is particularly difficult to quantify and control and is not likely to be reduced by increasing sample sizes.

The sources of bias in observer programs can be classified into three broad categories: (1) incomplete sampling frame, (2) sampling bias caused by procedures for selecting vessels from the sampling frame or by factors preventing the deployment of observers on all selected vessels, and (3) observer bias (i.e., measurement errors caused by changes in fishing behavior in the presence of observers).

Bias related to errors in the sampling frame (i.e., the list from which vessels are selected for observation) can occur when the list fails to include all active vessels in the fishery for which inferences about catch and bycatch are to be made (NMFS 2004a). If the list omits an appreciable portion of vessels in the fleet for which estimates are required, then even a census (i.e., placing observers on all vessels and

trips on the list) could yield poor (biased) estimates of catch and bycatch. Errors in the sampling frame can result when using lists of vessels that are not up-to-date, or when vessels are included that are not actively fishing. If the fraction of vessels not observed accounts for an appreciable portion of the total catch for a fishery, then the resulting bias in overall estimates of catch and bycatch based on observer data could be significant.

Performing a census would eliminate the potential for bias (assuming that the sample frame is complete and there is 100% compliance), but this approach usually is prohibitively expensive. Typically, available resources allow for observing only a fraction of the vessels in a given fleet. Precise estimates of catch and bycatch, nevertheless, can be achieved by sampling only a small fraction of vessels in the fleet if the sampled vessels are representative and the sample size is sufficient. Ad-hoc vessel selection has the greatest potential for generating bias because this method does not guarantee that repeated selections result in samples that, on average, represent the fleet. Conducting a probability-based survey with 100% compliance (i.e., all selected vessels agree to take an observer) would also eliminate sample bias. All the methods that involve randomization (i.e., selection of vessels with known inclusion probabilities) fall in the category of probability-based sampling. Probability-based selection of vessels does not guarantee that observer data can be collected representatively because various constraints can limit NMFS' ability to place observers on all selected vessels. Concerns regarding safety of selected vessels or lack of accommodations may limit the pool of sampled vessels and reduce the ability to achieve a representative sample. Bias related to deployment can sometimes nullify the benefit of a well-planned survey. In effect, an inability to place observers on selected vessels is equivalent to implementing a program with an incomplete sampling frame because a portion of the fishery fleet is eliminated from observation. Deployment bias is equivalent to non-response error and is most often caused by logistical constraints, for example when the operators of vessels in the sample refuse to take observers, when some of the vessels selected for observer deployment are unsafe, or when selected vessels do not have space for observers. In principle, an ad-hoc selection with full compliance may cause no more systematic error than a random selection procedure with poor compliance (equivalent to a low response rate).

The implication of observer bias is that data recorded on selected vessels is not representative of the fishery as a whole. Observer bias can occur when vessel operators systematically change their fishing behavior, effort, and location when observers are aboard. In this case, the catch and bycatch rates for observed trips would deviate from the typical rates. This could occur if the fisher has an incentive to lower bycatch estimates (e.g., if the fisher believes that actual bycatch estimates could result in early closure of a

fishery due to in-season management or changes in regulations that could restrict his future fishing opportunities). This form of sampling bias is the most difficult to evaluate and correct. Systematic errors in data collection and recording also fall into the category of observer bias.

The vessel selection bias workshop conducted by NMFS in 2006 provided a full evaluation of 24 U.S. observer programs and recommendations to address biases in these programs (Vølstad and Fogarty 2006). These recommendations are currently being implemented by the regional observer programs and continued monitoring of potential bias is being conducted.

APPENDIX E

APPENDIX E Fisheries Identified by the U.S. National Bycatch Report, and Fisheries Included in the Report.

Appendix E lists all fisheries identified by the U.S. National Bycatch Report regional teams. Those fisheries that are shaded are the Federally managed commercial fisheries, or state fisheries with a Federal data-collection component, that were evaluated for bycatch data and estimation quality. Within each region, fisheries are listed alphabetically by management authority and then by name of fishery.

REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
NORTHEAST (fisheries included in the U.S. National Bycatch Report)	MID-ATLANTIC BOTTOM LONGLINE	Federal	Individual
	MID-ATLANTIC CLAM/QUAHOG DREDGE	Federal	Individual
	MID-ATLANTIC EXTRA-LARGE-MESH GILLNET	Federal	Part of Mid-Atlantic Gillnet Fisheries Group
	MID-ATLANTIC GENERAL CAT. CLOSED-AREA SCALLOP DREDGE	Federal	Part of Mid-Atlantic Scallop Dredge Fisheries Group
	MID-ATLANTIC GENERAL CAT. OPEN-AREA SCALLOP DREDGE	Federal	Part of Mid-Atlantic Scallop Dredge Fisheries Group
	MID-ATLANTIC GENERAL CAT. SCALLOP TRAWL	Federal	Part of Mid-Atlantic Scallop Trawl Fisheries Group
	MID-ATLANTIC LARGE-MESH GILLNET	Federal	Part of Mid-Atlantic Gillnet Fisheries Group
	MID-ATLANTIC LARGE-MESH OTTER TRAWL	Federal	Part of Mid-Atlantic Otter Trawl Fisheries Group
	MID-ATLANTIC LIMITED-ACCESS CLOSED-AREA SCALLOP DREDGE	Federal	Part of Mid-Atlantic Scallop Dredge Fisheries Group
	MID-ATLANTIC LIMITED-ACCESS OPEN-AREA SCALLOP DREDGE	Federal	Part of Mid-Atlantic Scallop Dredge Fisheries Group
	MID-ATLANTIC LIMITED-ACCESS SCALLOP TRAWL	Federal	Part of Mid-Atlantic Scallop Trawl Fisheries Group
	MID-ATLANTIC MID-WATER OTTER TRAWL	Federal	Part of Mid-Atlantic Otter Trawl Fisheries Group
	MID-ATLANTIC SMALL-MESH GILLNET	Federal	Part of Mid-Atlantic Gillnet Fisheries Group
	MID-ATLANTIC SMALL-MESH OTTER TRAWL	Federal	Part of Mid-Atlantic Otter Trawl Fisheries Group
	NEW ENGLAND BOTTOM LONGLINE	Federal	Part of New England Bottom Longline Fisheries Group
	NEW ENGLAND B REG DAS LARGE-MESH OTTER TRAWL	Federal	Part of New England Otter Trawl Fisheries Group
	NEW ENGLAND CLAM/QUAHOG DREDGE	Federal	Individual
	NEW ENGLAND CRAB POTS	Federal	Individual
	NEW ENGLAND EXTRA-LARGE-MESH GILLNET	Federal	Part of New England Gillnet Fisheries Group

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REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
NORTHEAST (fisheries included in the U.S. National Bycatch Report) (cont.)	NEW ENGLAND GENERAL CAT. CLOSED-AREA SCALLOP DREDGE	Federal	Part of New England Scallop Dredge Fisheries Group
	NEW ENGLAND GENERAL CAT. OPEN-AREA SCALLOP DREDGE	Federal	Part of New England Scallop Dredge Fisheries Group
	NEW ENGLAND HADDOCK SECTOR LONGLINE	Federal	Part of New England Bottom Longline Fisheries Group
	NEW ENGLAND LARGE-MESH GILLNET	Federal	Part of New England Gillnet Fisheries Group
	NEW ENGLAND LARGE-MESH OTTER TRAWL	Federal	Part of New England Otter Trawl Fisheries Group
	NEW ENGLAND LIMITED-ACCESS CLOSED-AREA SCALLOP DREDGE	Federal	Part of New England Scallop Dredge Fisheries Group
	NEW ENGLAND LIMITED-ACCESS OPEN-AREA SCALLOP DREDGE	Federal	Part of New England Scallop Dredge Fisheries Group
	NEW ENGLAND MID-WATER OTTER TRAWL	Federal	Individual
	NEW ENGLAND SCOTTISH SEINE	Federal	Individual
	NEW ENGLAND SMALL-MESH GILLNET	Federal	Part of New England Gillnet Fisheries Group
	NEW ENGLAND SMALL-MESH OTTER TRAWL	Federal	Part of New England Otter Trawl Fisheries Group
	NEW ENGLAND US/CAN AREA LARGE-MESH OTTER TRAWL	Federal	Individual
	NEW ENGLAND US/CAN AREA SMALL-MESH OTTER TRAWL	Federal	Individual
	GULF OF MAINE, MID-ATLANTIC TUNA, SHARK, SWORDFISH HARPOON	Federal, International	Individual
	GULF OF MAINE, MID-ATLANTIC TUNA, SHARK, SWORDFISH HOOK-AND-LINE	Federal, International	Individual
	MID-ATLANTIC HAND LINE	Federal, International	Individual
	MID-ATLANTIC PURSE SEINE	Federal, International	Individual
	NEW ENGLAND HAND LINE	Federal, International	Individual
	NEW ENGLAND PURSE SEINE	Federal, International	Individual
	MID-ATLANTIC FISH POTS AND TRAPS	Federal, State	Individual
	MID-ATLANTIC LOBSTER POTS	Federal, State	Individual
	MID-ATLANTIC SHRIMP TRAWL	Federal, State	Individual
	NEW ENGLAND FISH POTS AND TRAPS	Federal, State	Individual
	NEW ENGLAND LOBSTER POTS	Federal, State	Individual
	ATLANTIC BLUE CRAB TRAP/POT	State	Individual

APPENDIX E

REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
NORTHEAST (fisheries included in the U.S. National Bycatch Report) (cont.)	CHESAPEAKE BAY INSHORE GILLNET	State	Individual
	DELAWARE RIVER INSHORE GILLNET	State	Individual
	LONG ISLAND SOUND INSHORE GILLNET	State	Individual
	MID-ATLANTIC CRAB POTS	State	Individual
	MID-ATLANTIC HAUL/BEACH SEINE	State	Individual
	NEW ENGLAND SHRIMP TRAWL	State	Individual
	RI, S. MA (TO MONOMOY IS.) AND NY BIGHT (RARITAN AND LOWER NY BAYS) INSHORE GILLNET	State	Individual
	VIRGINIA POUND NET	State	Individual
NORTHEAST (fisheries not included in the U.S. National Bycatch Report)	GULF OF MAINE HERRING AND ATLANTIC MACKEREL STOP SEINE	State	Individual
	GULF OF MAINE HERRING AND ATLANTIC MACKEREL WEIR	State	Individual
	GULF OF MAINE MUSSEL	State	Individual
	GULF OF MAINE URCHIN DIVE, HAND/MECHANICAL COLLECTION	State	Individual
	MID-ATLANTIC CRAB STOP SEINE	State	Individual
	MID-ATLANTIC CRAB WEIR	State	Individual
	MID-ATLANTIC EEL TRAP/POT	State	Individual
	MID-ATLANTIC HAND SEINE	State	Individual
	MID-ATLANTIC OYSTER	State	Individual
	NORTHEAST ATLANTIC FINFISH AQUACULTURE	State	Individual
	NORTHEAST ATLANTIC SHELLFISH AQUACULTURE	State	Individual
SOUTHEAST (fisheries included in the U.S. National Bycatch Report)	CARIBBEAN GILLNET	Federal	Individual
	CARIBBEAN MIXED-SPECIES TRAP/POT	Federal	Individual
	CARIBBEAN SPINY LOBSTER TRAP/POT	Federal	Individual
	FLORIDA SPINY LOBSTER TRAP/POT	Federal	Individual
	GULF OF MEXICO COASTAL MIGRATORY PELAGIC GILLNET	Federal	Individual
	GULF OF MEXICO COASTAL MIGRATORY PELAGIC TROLL	Federal	Individual
	GULF OF MEXICO REEF FISH BOTTOM LONGLINE	Federal	Individual
	GULF OF MEXICO REEF FISH HANDLINE	Federal	Individual
	GULF OF MEXICO SHRIMP TRAWL	Federal	Individual
	LARGE COASTAL AND SMALL COASTAL SHARK AGGREGATES (DRIFT, STRIKE, AND BOTTOM GILLNET)	Federal	Individual
	SOUTH ATLANTIC COASTAL MIGRATORY PELAGIC TROLL	Federal	Individual
	SOUTH ATLANTIC SNAPPER-GROUPER BOTTOM LONGLINE	Federal	Individual
	SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE	Federal	Individual
	SOUTHEAST ATLANTIC BLACK SEA BASS POT	Federal	Individual
	SOUTHEASTERN ATLANTIC AND GULF OF MEXICO HMS PELAGIC LONGLINE	Federal	Individual
SOUTHEASTERN ATLANTIC AND GULF OF MEXICO SHARK BOTTOM LONGLINE	Federal	Individual	

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SOUTHEAST (fisheries included in the U.S. National Bycatch Report) (cont.)	SOUTHEASTERN ATLANTIC SHRIMP TRAWL	Federal	Individual
	SOUTHEASTERN ATLANTIC, GULF OF MEXICO GOLDEN CRAB TRAP/POT	Federal	Individual
	SPEARFISHING FOR TUNA	Federal	Individual
	WINTER FLUKE (FLOUNDER) TRAWLS	Federal	Individual
	NORTH CAROLINA COASTAL GILLNET	Federal, State	Individual
	SOUTHEASTERN ATLANTIC STONE CRAB TRAP/POT	Federal, State	Individual
SOUTHEAST (fisheries not included in the U.S. National Bycatch Report)	CARIBBEAN HAUL/BEACH SEINE	State	Individual
	FLORIDA WEST COAST SARDINE PURSE SEINE	State	Individual
	GULF OF MEXICO BLUE CRAB	State	Individual
	GULF OF MEXICO COASTAL GILLNET	State	Individual
	GULF OF MEXICO HAUL/BEACH SEINE	State	Individual
	GULF OF MEXICO MARINE SHRIMP BUTTERFLY NETS	State	Individual
	GULF OF MEXICO MARINE SHRIMP SKIMMER TRAWLS	State	Individual
	GULF OF MEXICO MENHADEN PURSE SEINE	State	Individual
	GULF OF MEXICO OYSTER	State	Individual
	GULF OF MEXICO SHRIMP CAST NET	State	Individual
	NORTH CAROLINA HAUL/BEACH SEINE, LONG HAUL	State	Individual
	NORTH CAROLINA INSHORE (BAYS AND RIVERS) GILLNET	State	Individual
	NORTH CAROLINA POUND-NET (CROAKER, WEAKFISH)	State	Individual
	NORTH CAROLINA SOUTHERN FLOUNDER POUND-NET	State	Individual
	NORTH CAROLINA STOP NETS	State	Individual
	SOUTH ATLANTIC BLUE CRAB	State	Individual
	SOUTH ATLANTIC COASTAL GILLNET	State	Individual
	SOUTHEAST CALICO SCALLOP TRAWL	State	Individual
	SOUTHEASTERN ATLANTIC, HAUL/BEACH SEINE	State	Individual
	SOUTHEASTERN ATLANTIC MARINE SHRIMP BUTTERFLY NETS	State	Individual
	SOUTHEASTERN ATLANTIC MARINE SHRIMP CAST NET	State	Individual
	SOUTHEASTERN ATLANTIC MENHADEN	State	Individual
SOUTHEASTERN ATLANTIC OCEAN, GULF OF MEXICO, CARIBBEAN SHELLFISH DIVE, HAND/MECHANICAL COLLECTION	State	Individual	
SOUTHEASTERN ATLANTIC SKIMMER TRAWLS	State	Individual	
SOUTHEAST FISH TRAWL	State	Individual	
SURFACE TRAWL JELLYFISH	State	Individual	
ALASKA (fisheries included in the U.S. National Bycatch Report)	ALEUTIAN ISLANDS, EASTERN BERING SEA ATKA MACKEREL TRAWL	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS FLATFISH GROUP (ARROWTOOTH FLOUNDER, FLATHEAD SOLE, OTHER FLATFISH) TRAWL	Federal	Part of BSAI Flatfish Trawl Fisheries Group

APPENDIX E

REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
ALASKA (fisheries included in the U.S. National Bycatch Report) (cont.)	BERING SEA ALEUTIAN ISLANDS GREENLAND TURBOT LONGLINE	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS PACIFIC COD JIG	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS PACIFIC COD LONGLINE	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS PACIFIC COD POT	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS PACIFIC COD TRAWL	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS PACIFIC OCEAN PERCH	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS POLLOCK TRAWL	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS ROCK SOLE TRAWL	Federal	Part of BSAI Flatfish Trawl Fisheries Group
	BERING SEA ALEUTIAN ISLANDS SABLEFISH LONGLINE	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS SABLEFISH POT	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS SABLEFISH TRAWL	Federal	Individual
	BERING SEA ALEUTIAN ISLANDS YELLOWFIN SOLE TRAWL	Federal	Part of BSAI Flatfish Trawl Fisheries Group
	GULF OF ALASKA ARROWTOOTH FLOUNDER TRAWL	Federal	Part of GOA Flatfish Trawl Fisheries Group
	GULF OF ALASKA FLATFISH (DEEP-WATER FLATFISH) TRAWL	Federal	Part of GOA Flatfish Trawl Fisheries Group
	GULF OF ALASKA FLATFISH (SHALLOW-WATER FLATFISH) TRAWL	Federal	Part of GOA Flatfish Trawl Fisheries Group
	GULF OF ALASKA FLATHEAD SOLE TRAWL	Federal	Part of GOA Flatfish Trawl Fisheries Group
	GULF OF ALASKA PACIFIC COD JIG	Federal	Individual
	GULF OF ALASKA PACIFIC COD LONGLINE	Federal	Individual
	GULF OF ALASKA PACIFIC COD POT	Federal	Individual
	GULF OF ALASKA PACIFIC COD TRAWL	Federal	Individual
	GULF OF ALASKA POLLOCK TRAWL	Federal	Individual
	GULF OF ALASKA REX SOLE TRAWL	Federal	Part of GOA Flatfish Trawl Fisheries Group
	GULF OF ALASKA ROCKFISH (NORTHERN ROCKFISH, PELAGIC SHELF ROCKFISH, PACIFIC OCEAN PERCH) TRAWL	Federal	Individual
	GULF OF ALASKA SABLEFISH LONGLINE	Federal	Individual
	GULF OF ALASKA SABLEFISH TRAWL	Federal	Individual
	AK HALIBUT LONGLINE	International	Individual
	AK COOK INLET DRIFT GILLNET	State	Individual
	AK COOK INLET SALMON SET GILLNET	State	Individual
	AK PENINSULA/ ALEUTIANS SALMON DRIFT GILLNET	State	Individual
	AK PRINCE WILLIAM SOUND SALMON DRIFT GILLNET	State	Individual
	AK PRINCE WILLIAM SOUND SALMON SET GILLNET	State	Individual
	AK SOUTHEAST SALMON DRIFT GILLNET	State	Individual
GULF OF ALASKA CRAB POT	State	Individual	

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ALASKA (fisheries not included in the U.S. National Bycatch Report)	AK ABALONE	State	Individual
	AK BRISTOL BAY SALMON DRIFT GILLNET	State	Individual
	AK BRISTOL BAY SALMON SET GILLNET	State	Individual
	AK CLAM	State	Individual
	AK DUNGENESS CRAB	State	Individual
	AK FOOD/BAIT HERRING TRAWL	State	Individual
	AK GROUND FISH LONGLINE/SETLINE (INCLUDING SABLEFISH, ROCKFISH, AND MISC. FINFISH)	State	Individual
	AK HERRING SPAWN ON KELP POUND-NET	State	Individual
	AK KODIAK SALMON SET GILLNET	State	Individual
	AK KUSKOKWIM, YUKON, NORTON SOUND, KOTZEBUE SALMON GILLNET	State	Individual
	AK METLAKATLA/ANNETTE ISLAND SALMON DRIFT GILLNET	State	Individual
	AK METLAKATLA SALMON PURSE SEINE	State	Individual
	AK MISC. FINFISH BEACH SEINE	State	Individual
	AK MISC. FINFISH HANDLINE AND MECHANICAL JIG	State	Individual
	AK MISC. FINFISH OTTER OR BEAM TRAWL	State	Individual
	AK MISC. FINFISH PAIR TRAWL	State	Individual
	AK MISC. FINFISH PURSE SEINE	State	Individual
	AK MISC. FINFISH SET GILLNET	State	Individual
	AK NORTH PACIFIC HALIBUT HANDLINE AND MECHANICAL JIG	State	Individual
	AK OCTOPUS/SQUID HANDLINE	State	Individual
	AK OCTOPUS/SQUID LONGLINE	State	Individual
	AK OCTOPUS/SQUID POT	State	Individual
	AK PENINSULA/ ALEUTIANS SALMON SET GILLNET	State	Individual
	AK ROE HERRING AND FOOD/BAIT HERRING BEACH SEINE	State	Individual
	AK ROE HERRING AND FOOD/BAIT HERRING GILLNET	State	Individual
	AK ROE HERRING AND FOOD/BAIT HERRING PURSE SEINE	State	Individual
	AK SALMON BEACH SEINE	State	Individual
	AK SALMON PURSE SEINE (EXCEPT SOUTHEAST ALASKA, WHICH IS IN CATEGORY II)	State	Individual
	AK SALMON TROLL	State	Individual
	AK SHRIMP OTTER TRAWL AND BEAM TRAWL (STATEWIDE AND COOK INLET)	State	Individual
	AK SNAIL POT	State	Individual
	AK SOUTHEAST HERRING ROE/FOOD/BAIT POUND NET	State	Individual
	AK SOUTHEAST SALMON PURSE SEINE	State	Individual
AK URCHIN AND OTHER FISH/SHELLFISH	State	Individual	
AK YAKUTAT SALMON SET GILLNET	State	Individual	
ALEUTIAN ISLANDS STATE WATERS PACIFIC COD	State	Individual	
BERING SEA, ALEUTIAN ISLANDS CRAB POT	State	Individual	

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REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
ALASKA (fisheries not included in the U.S. National Bycatch Report) (cont.)	COASTWIDE SCALLOP DREDGE	State	Individual
	GULF OF ALASKA PACIFIC COD STATE FISHERY JIG	State	Individual
	GULF OF ALASKA PACIFIC COD STATE FISHERY POT	State	Individual
	SOUTHEAST ALASKA CRAB POT	State	Individual
	SOUTHEAST ALASKA SHRIMP POT	State	Individual
NORTHWEST (fisheries included in the U.S. National Bycatch Report)	WEST COAST GROUND FISH NON-TRAWL GEAR: LIMITED-ENTRY SABLEFISH-ENDORSED FIXED GEAR	Federal	Individual
	WEST COAST GROUND FISH NON-TRAWL GEAR: NON-ENDORSED FIXED GEAR	Federal	Individual
	WEST COAST LIMITED-ENTRY BOTTOM TRAWL; GROUND FISH BOTTOM TRAWL	Federal	Individual
	WEST COAST SALMON TROLL, NON-TRIBAL OCEAN	Federal	Individual
	CALIFORNIA HALIBUT TRAWL	Federal, State	Individual
	CA/OR NEARSHORE ROCKFISH	Federal, State	Individual
	WEST COAST PACIFIC HALIBUT LONGLINE, NON-TRIBAL	Federal, State, International, Tribal	Individual
	WEST COAST MID-WATER TRAWL FOR WHITING, SHORESIDE PROCESSING	Federal, State, Tribal	Individual
	WEST COAST MID-WATER TRAWL FOR WHITING, AT-SEA PROCESSING	Federal, Tribal	Individual
	WEST COAST SALMON TROLL, TRIBAL OCEAN	Federal, Tribal	Individual
NORTHWEST (fisheries not included in the U.S. National Bycatch Report)	OREGON AND CALIFORNIA PINK SHRIMP	State	Individual
	OREGON AND CALIFORNIA SPOT PRAWN	State	Individual
	WA BEACH SEINE OR DRAG SEINE	State	Individual
	WA GRAYS HARBOUR SALMON DRIFT GILLNET (EXCLUDING TREATY TRIBAL FISHING)	State	Individual
	WA GRAYS HARBOUR SALMON SET AND DRIFT GILLNET	State	Individual
	WA HERRING BRUSH WEIR	State	Individual
	WA PUGET SOUND REGION SALMON DRIFT GILLNET	State	Individual
	WA SALMON PURSE SEINE	State	Individual
	WA SALMON REEF NET	State	Individual
	WA WILLAPA BAY DRIFT GILLNET	State	Individual
	WA/OR GILLNET	State	Individual
	WA/OR HERRING, SMELT, SQUID PURSE SEINE	State	Individual
	WA/OR LOWER COLUMBIA RIVER DRIFT GILLNET	State	Individual
	WA/OR SHRIMP POT AND TRAP	State	Individual
	WA/OR SMELT, HERRING DIP NET	State	Individual
	WA/OR/CA DUNGENESS CRAB POT	State	Individual
	WA/OR LOWER COL. RIVER SALMON DRIFT	State	Individual
	WA/OR MISC. INVERTEBRATE	State	Individual
	WILLAPA BAY SALMON DRIFT	State	Individual
MAKAH SALMON SET GILLNET AREAS 4,4A, 4B	Tribal	Individual	

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REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
SOUTHWEST (fisheries included in the U.S. National Bycatch Report)	CA COASTAL PURSE SEINE FOR TUNA	Federal	Individual
	CA/OR DRIFT GILLNET (MESH SIZE >14 INCHES) FOR SWORDFISH AND THRESHER SHARK	Federal	Individual
	CA PELAGIC LONGLINE	Federal	Individual
	NORTH PACIFIC ALBACORE BAITBOAT, POLE AND LINE	Federal	Individual
	NORTH PACIFIC ALBACORE TROLL	Federal	Individual
	SOUTH PACIFIC ALBACORE TROLL	Federal	Individual
	CA COASTAL PURSE SEINE FOR ANCHOVY, MACKEREL, SARDINE	Federal, State	Individual
	CA SWORDFISH HARPOON	Federal, State	Individual
	CA COASTAL PURSE SEINE FOR SQUID	State	Individual
	CA SET GILLNET (MESH SIZE UP TO 14 INCHES)	State	Individual
	CA SMALL-MESH DRIFT GILLNET (MESH SIZE >3.5 IN AND <14 IN)	State	Individual
SOUTHWEST (fisheries not included in the U.S. National Bycatch Report)	CENTRAL WESTERN PACIFIC TUNA PURSE SEINE	International	Individual
	EPO TUNA PURSE SEINE	International	Individual
	ETP BAITBOAT	International	Individual
	CA ABALONE	State	Individual
	CA HERRING GILLNET	State	Individual
	CA LIVE FISH HOOK-AND-LINE	State	Individual
	CA SALMON ENHANCEMENT REARING PEN	State	Individual
	CA SEA URCHIN	State	Individual
	CA SET AND DRIFT GILLNET (STRETCHED MESH SIZE OF 3.5 OR LESS)	State	Individual
	CA SQUID DIP NET	State	Individual
	CA TRAP/POT	State	Individual
	CA WHITE SEABASS ENHANCEMENT NET PENS	State	Individual
	OR/CA HAGFISH POT OR TRAP	State	Individual
	WA/OR/CA BAIT PENS	State	Individual

APPENDIX E

REGION	FISHERY	MANAGEMENT AUTHORITY	INDIVIDUAL OR GROUPED FISHERY
PACIFIC ISLANDS (fisheries included in the U.S. National Bycatch Report)	AMERICAN SAMOA BOTTOMFISH	Federal	Individual
	AMERICAN SAMOA LOBSTER	Federal	Individual
	AMERICAN SAMOA PELAGIC LONGLINE FISHERY	Federal	Individual
	AMERICAN SAMOA TROLL	Federal	Individual
	COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS BOTTOMFISH	Federal	Individual
	COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS LOBSTER	Federal	Individual
	COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS TUNA TROLL	Federal	Individual
	GUAM BOTTOMFISH HANDLINE	Federal	Individual
	GUAM LONGLINE	Federal	Individual
	GUAM TROLL	Federal	Individual
	HAWAII-BASED DEEP-SET PELAGIC LONGLINE FISHERY (TUNA)	Federal	Individual
	HAWAII-BASED SHALLOW-SET PELAGIC LONGLINE FISHERY (SWORDFISH)	Federal	Individual
	HAWAII SHRIMP TRAP	Federal	Individual
	NON-LONGLINE COMMERCIAL PELAGIC FISHERY	Federal	Individual
	NORTHWESTERN HAWAIIAN ISLANDS BOTTOMFISH	Federal	Individual
	PRECIOUS CORAL (FEDERAL WATERS)	Federal	Individual
	WESTERN PACIFIC SQUID JIG	Federal	Individual
HAWAII BOTTOMFISH	Federal, State	Individual	
PACIFIC ISLANDS (fisheries not included in the U.S. National Bycatch Report)	HAWAII CRAB TRAP	State	Individual
	HAWAII FISH POND	State	Individual
	HAWAII FISH TRAP	State	Individual
	HAWAII INSHORE HANDLINE	State	Individual
	HAWAII LAY NET	State	Individual
	HAWAII LOBSTER DIVING	State	Individual
	HAWAII LOBSTER TRAP	State	Individual
	HAWAII OCTOPUS, SPEAR	State	Individual
	HAWAII OPELU/AKULE NET	State	Individual
	HAWAII PELAGIC HANDLINE	State	Individual
	HAWAII THROW NET, CAST NET	State	Individual
	HAWAII TROLLING, ROD AND REEL	State	Individual
PRECIOUS CORAL (STATE WATERS)	State	Individual	

APPENDIX F

APPENDIX F Membership of the National Bycatch Report Regional Teams

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APPENDIX G

APPENDIX G Membership of the National Bycatch Report National Steering Committee

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APPENDIX H Details of Scoring and Tier Classification System

A1. Bycatch Data Adequacy: Observer Data (maximum of 33 points)

An evaluation of the adequacy of at-sea observer bycatch data was conducted for each fishery that is currently observed, or has been observed in the past. All fisheries with at-sea observer programs designed to either estimate bycatch or total catch were evaluated. Fisheries that have never had observer coverage were scored as zero. The criteria included in evaluating observer bycatch data were:

Longevity of Observer Program (maximum of 5 points): This criterion evaluated the longevity of the observer program and whether the program is multiyear in nature.

- 0 = No observer program has ever been implemented
- 1 = Observer program was conducted prior to 1995
- 2 = Observer program was conducted on one or more occasions during 1995–2000, but not annually
- 3 = Observer program was conducted annually during 1995–2000 and not subsequently
- 4 = Observer program was conducted on one or more occasions from 2001 to present (i.e. 2006), but not annually
- 5 = Observer program has been conducted annually from 2001 to present (i.e. 2006)

Sampling Frame (maximum of 3 points): This criterion evaluated the sampling frame for placing observers on commercial fishing vessels. An evaluation of the sampling frame considered whether the frame is partially or completely developed, and assessed how well the sampling frame reflects the target population and program goals.

- 0 = No sampling frame
- 2 = Partial sampling frame
- 3 = Complete sampling frame

Sampling Design (maximum of 12 points): This criterion evaluated the overall sampling design of the observer program, relative to the goal of bycatch or total catch estimation. If a formal observer program sampling design had been developed, the scores indicated the type of sampling conducted at the vessel/permit/license, trip, and haul levels.

Sampling of Vessels/Permits/Licenses

- 0 = No observer program, or sampling design does not support bycatch or total catch estimation
- 1 = Opportunistic or haphazard sampling, including voluntary observer programs, to support bycatch or total catch estimation
- 2 = Random sampling scheme or probability-based sampling with moderate observer coverage levels to support bycatch or total catch estimation
- 3 = Random sampling scheme or probability sampling with adequate observer coverage levels to support bycatch or total catch estimation
- 4 = Near-census of vessels with estimation required, or census of vessels with no estimation required

Sampling of Trips

- 0 = No observer program, or sampling design does not support bycatch or total catch estimation
- 1 = Opportunistic or haphazard sampling, including voluntary observer programs, to support bycatch or total catch estimation
- 2 = Random sampling scheme or probability-based sampling with pilot/baseline observer coverage levels to support bycatch or total catch estimation
- 3 = Random sampling scheme or probability sampling with adequate observer coverage levels to support bycatch or total catch estimation
- 4 = Near-census of trips with estimation required, or census of trips with no estimation required

Sampling of Hauls

- 0 = No observer program, or sampling design does not support bycatch or total catch estimation
- 1 = Opportunistic or haphazard sampling, including voluntary observer programs, to support bycatch or total catch estimation
- 2 = Random sampling scheme or probability-based sampling to support bycatch or total catch estimation
- 3 = Near-census of hauls with estimation required
- 4 = Census of hauls with no estimation required

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Design Implementation (maximum of 8 points): This criterion evaluated the overall implementation of the observer program sampling design. Factors considered include the spatial and temporal coverage of the program, vessel selection bias, and observer bias.

Sub-criteria	Point Scores		
Spatial Coverage	Add 0 points if no observer program has ever been implemented.	Add 1 point if spatial coverage is limited.	Add 2 points if spatial coverage is synoptic.
Temporal Coverage	Add 0 points if no observer program has ever been implemented.	Add 1 point if temporal coverage is limited.	Add 2 points if temporal coverage is synoptic.
Vessel Selection Bias	Add 0 points if vessel selection bias is high or unknown.		Add 2 points if vessel selection bias is negligible or no bias exists.
Observer Bias	Add 0 points if observer bias is high or unknown.		Add 2 points if observer bias is negligible or no bias exists.

Data Quality Control (maximum of 5 points): This criterion evaluated the overall data quality control of the observer program. Data quality control for observer programs involves a variety of activities, including observer training, observer debriefing, data editors, electronic range and other data checks, and observer/contractor incentive programs to improve data quality. The scoring system attempted to quantify the level of data quality control.

- 0 = No observer program, or no data quality control
- 1 = Limited or incomplete observer training, no debriefing or other quality control
- 2 = One-time observer training, no debriefing or other quality control measures
- 3 = Periodic observer training, minimal quality control measures
- 4 = One-time observer training, comprehensive quality control measures
- 5 = Periodic observer training, comprehensive quality control measures

**A2. Bycatch Data Adequacy:
Industry Bycatch Data (maximum of 2 points)**

This criterion evaluated the availability and use of self-reported industry bycatch data (e.g. logbooks, trip tickets). This criterion was evaluated for all fisheries. However, if the observer bycatch data are used as the basis of the bycatch estimation the maximum score of 2 points was applied.

- 0 = No industry bycatch data available, or industry bycatch data are not used as a basis for bycatch estimates
- 1 = Industry bycatch data available prior to 2000 are used as a basis for bycatch estimates
- 2 = Industry bycatch data available from 2000 to present are used as a basis for bycatch estimates

APPENDIX H

B. Bycatch Data: Supplemental Data (maximum of 10 points)

These criteria evaluated the quantity and quality of supplemental data (e.g. logbooks, state data, and environmental data). Specific criteria evaluated the use of supplemental data to estimate or verify the sampling frame, expand observer data for unobserved components of the fishery, verify logbook data, stratify data and impute estimates, and identify model covariates.

Sub-criteria	Point Scores		
Data available for use as expansion factors for unobserved components of the fishery	Add 0 points if supplemental data are not available as expansion factors.	Add 1 point if limited supplemental data are available as expansion factors.	Add 2 points if extensive supplemental data are available or data are not necessary as expansion factors.
Data available for stratification	Add 0 points if supplemental data are not available for stratification.	Add 1 point if limited supplemental data are available for stratification.	Add 2 points if extensive supplemental data are available or data are not necessary for stratification.
Data available for imputation	Add 0 points if supplemental data are not available for imputation.	Add 1 point if limited supplemental data are available for imputation.	Add 2 points if extensive supplemental data are available or data are not necessary for imputation.
Data available for model covariates	Add 0 points if supplemental data are not available for model covariates.	Add 1 point if limited supplemental data are available for model covariates.	Add 2 points if extensive supplemental data are available or data are not necessary for model covariates.
Industry data verified	Add 0 points if industry data are not verified or no industry data are available.	Add 1 point if some relevant industry data are verified.	Add 2 points if all relevant industry data are verified.

C. Database / IT Considerations (maximum of 3 points)

This criterion evaluated the integration and linkages between observer data and supplemental data in order to improve the ability to produce timely bycatch estimates. If no observer data and/or supplemental data are available this criterion was scored as zero.

- 0 = No observer data and/or supplemental data available
- 1 = Analytical approach is constrained because of database/IT considerations
- 3 = Analytical approach is not constrained because of database/IT considerations

D. Analytical Approach (maximum of 25 points)

All fisheries were evaluated for analytical approach; how-

ever, if no analytical approach had been developed for estimation of total catch or bycatch in a fishery, the overall score for this criterion is zero.

Assumptions Identified, Tested, and Appropriate (maximum of 10 points): This criterion evaluated the assumptions of the analytical approach. The evaluation involved a determination of how well the assumptions of the approach have been identified and resolved. The scoring system attempted to provide a measure of gradient in these attributes.

- 0 = No bycatch estimation methodologies
- 1 = Assumptions not identified or tested
- 3 = Assumptions identified and tested, but no assumptions have been resolved
- 5 = Minor assumptions identified, tested, and determined to be appropriate or resolved
- 8 = Critical assumptions identified, tested, and determined to be appropriate or resolved
- 10 = All assumptions identified, tested, and determined to be appropriate or resolved

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Peer Reviewed / Published (maximum of 8 points): This criterion evaluated whether the observer program sampling design and the analytical approach for estimating bycatch or total catch have been peer reviewed.

Sub-criteria	Point Scores		
Observer Program Sampling Design	Add 0 points if the observer program sampling design has not been peer reviewed, or if the sampling design is found to be seriously flawed during peer review.	Add 2 points if the observer program sampling design has been internally peer reviewed, or if problems were found during a peer review but they have not been fully addressed.	Add 4 points if the observer program sampling design has been externally peer reviewed.
Analytical Approach	Add 0 points if the analytical approach has not been peer reviewed, or if the analytical approach is found to be seriously flawed during peer review.	Add 2 points if the analytical approach has been internally peer reviewed, or if problems were found during a peer review but they have not been fully addressed.	Add 4 points if the analytical approach has been externally peer reviewed.

Statistical Bias of Estimators (maximum of 4 points): This criterion evaluated the statistical bias of the bycatch estimators, in particular whether there is any statistical bias associated with the estimator. Factors that were considered included measures of association, cross validation, and overfitting.

- 0 = No bycatch estimation methods, or statistical bias is unknown
- 2 = Estimators have high statistical bias
- 4 = Estimators have negligible statistical bias or are not statistically biased, or census sampling was used

Measures of Uncertainty (maximum of 3 points): This criterion evaluated whether measures of uncertainty (coefficients of variation) are calculated at various levels of sampling (vessel/permit/license, trip, and haul).

- 0 = No bycatch estimation methods
- 1 = Measures of uncertainty are not calculated
- 2 = Measures of uncertainty are calculated, but not at all levels (vessel/permit/license, trip, and haul)
- 3 = Measures of uncertainty are calculated at all levels (vessel/permit/license, trip, and haul)

APPENDIX I

APPENDIX I Living Marine Resources with U.S. National Bycatch Report Bycatch Estimates

Due to differences in naming conventions between NMFS regions, some listings may appear redundant (e.g. “unidentified skates” and “other skates”). All taxa used in the report are included in this appendix. Marine resource types are those categories used within the report (e.g., fish, marine mammal, sea turtle, seabird).

RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Acanthocybium solandri</i>	Wahoo	Fish
Actinaria	Sea anemone, unidentified	Fish
<i>Aetobatus narinari</i>	Spotted eagle ray	Fish
<i>Albatrossia pectoralis</i>	Giant grenadier	Fish
<i>Alepisaurus brevirostris</i>	Shortnose lancetfish	Fish
<i>Alepisaurus ferrox</i>	Longnose lancetfish	Fish
Alopiidae	Thresher sharks (unidentified)	Fish
<i>Alopias</i> spp.	Thresher sharks	Fish
<i>Alopias pelagicus</i>	Pelagic thresher	Fish
<i>Alopias superciliosus</i>	Bigeye thresher	Fish
<i>Alopias vulpinus</i>	Thresher shark	Fish
<i>Ammodytes hexapterus</i>	Pacific sand lance	Fish
Anguilliformes	True eels	Fish
<i>Anisotremus virginicus</i>	Porkfish	Fish
<i>Anoplopoma fimbria</i>	Sablefish	Fish
<i>Apsilus dentatus</i>	Black snapper	Fish
<i>Arctica islandica</i>	Ocean quahog	Fish
Ariidae	Sea catfishes	Fish
<i>Assurger anzac</i>	Razorback scabbardfish	Fish
Asteroidea	Sea star	Fish
<i>Atheresthes stomias</i>	Arrowtooth flounder	Fish
<i>Bagre marinus</i>	Gafftopsail catfish	Fish
<i>Balaenoptera edeni</i>	Brydes whale	Marine mammal
<i>Balistes capriscus</i>	Gray triggerfish	Fish
Balistidae	Triggerfish (unidentified)	Fish
Balistidae	Triggerfishes	Fish
Batrachoididae	Toad fishes	Fish
Bivalvia	Bivalves	Fish
<i>Brevoortia smithi</i>	Yellowfin menhaden	Fish
<i>Brevoortia tyrannus</i>	Atlantic menhaden	Fish
<i>Calamus bajonado</i>	Jolthead porgy	Fish
<i>Calamus leucosteus</i>	Whitebone porgy	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Calamus nodosus</i>	Knobbed porgy	Fish
<i>Callorhinus ursinus</i>	Northern fur seal	Marine mammal
<i>Cancer magister</i>	Dungeness crab	Fish
<i>Canthidermis maculata</i>	Rough triggerfish	Fish
Carangidae	Jacks and pompanos	Fish
<i>Caranx bartholomaei</i>	Yellow jack	Fish
<i>Caranx crysos</i>	Blue runner	Fish
<i>Caranx hippos</i>	Crevalle jack	Fish
<i>Caranx ruber</i>	Bar jack	Fish
<i>Carcharhinus acronotus</i>	Blacknose shark	Fish
<i>Carcharhinus altimus</i>	Bignose shark	Fish
<i>Carcharhinus amblyrhynchos</i>	Grey reef shark	Fish
<i>Carcharhinus brevipinna</i>	Spinner shark	Fish
<i>Carcharhinus falciformis</i>	Silky shark	Fish
<i>Carcharhinus galapagensis</i>	Galapagos shark	Fish
<i>Carcharhinus leucas</i>	Bull shark	Fish
<i>Carcharhinus limbatus</i>	Blacktip shark	Fish
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	Fish
<i>Carcharhinus obscurus</i>	Dusky shark	Fish
<i>Carcharhinus perezii</i>	Reef shark	Fish
<i>Carcharhinus plumbeus</i>	Sandbar shark	Fish
<i>Carcharias taurus</i>	Sand tiger	Fish
<i>Carcharodon carcharias</i>	White shark	Fish
<i>Caretta caretta</i>	Loggerhead sea turtle	Sea turtle
<i>Caulolatilus microps</i>	Blueline tilefish	Fish
<i>Centropristis ocyurus</i>	Bank sea bass	Fish
<i>Centropristis philadelphica</i>	Rock sea bass	Fish
<i>Centropristis striata</i>	Black sea bass	Fish
Cetacea	Cetacean (unidentified)	Marine mammal
<i>Chaceon quinquegens</i>	Red deepsea crab	Fish
<i>Chaetodipterus faber</i>	Atlantic spadefish	Fish
Chaetodontidae	Butterflyfishes	Fish
<i>Chelonia mydas</i>	Green sea turtle	Sea turtle
<i>Chionoecetes bairdi</i>	Southern Tanner crab	Fish
<i>Chionoecetes opilio</i>	Snow crab	Fish
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	Fish
Chondrichthyes	Cartilaginous fishes	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
Chondrichthyes	Shark (unidentified)	Fish
<i>Clupea harengus</i>	Atlantic herring	Fish
<i>Clupea pallasii</i>	Herring	Fish
<i>Conger oceanicus</i>	Conger eel	Fish
<i>Coryphaena</i> spp.	Dolphinfishes	Fish
<i>Coryphaena equiselis</i>	Pompano dolphinfish	Fish
<i>Coryphaena hippurus</i>	Dolphinfish	Fish
Cottidae	Large sculpins	Fish
Cottidae	Other sculpins	Fish
Crustaceamorphia	Miscellaneous crustaceans	Fish
<i>Cubiceps</i> spp.	Driftfishes	Fish
<i>Cynoscion</i> spp.	Seatrouts and weakfishes	Fish
<i>Cynoscion arenarius</i>	Sand seatrout	Fish
<i>Cynoscion nebulosus</i>	Spotted seatrout	Fish
<i>Cynoscion nothus</i>	Silver seatrout	Fish
<i>Dasyatis</i> spp.	Whiptail stingray—South Atlantic/Gulf of Mexico	Fish
<i>Dasyatis violacea</i>	Pelagic stingray	Fish
Decapoda	Miscellaneous crabs	Fish
Decapoda	Squid	Fish
<i>Delphinus capensis</i>	Common dolphin, long-beaked	Marine mammal
<i>Delphinus delphis</i>	Common dolphin	Marine mammal
<i>Dermochelys coriacea</i>	Leatherback sea turtle	Sea turtle
<i>Diplodus holbrookii</i>	Spottail pinfish	Fish
<i>Elagatis bipinnulata</i>	Rainbow runner	Fish
Elasmobranchii	Sharks	Fish
<i>Elops saurus</i>	Ladyfish	Fish
<i>Eopsetta jordani</i>	Petrable sole	Fish
Ephippidae	Spadefishes	Fish
<i>Epinephelus adscensionis</i>	Rock hind	Fish
<i>Epinephelus cruentatus</i>	Graysby	Fish
<i>Epinephelus drummondhayi</i>	Speckled hind	Fish
<i>Epinephelus flavolimbatus</i>	Yellowedge grouper	Fish
<i>Epinephelus guttatus</i>	Red hind	Fish
<i>Epinephelus itajara</i>	Goliath grouper	Fish
<i>Epinephelus morio</i>	Red grouper	Fish
<i>Epinephelus nigritus</i>	Warsaw grouper	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Epinephelus niveatus</i>	Snowy grouper	Fish
<i>Epinephelus striatus</i>	Nassau grouper	Fish
<i>Erignathus barbatus</i>	Bearded seal	Marine mammal
<i>Erythrocles monodi</i>	Crimson rover	Fish
<i>Eschrichtius robustus</i>	Gray whale	Marine mammal
<i>Eumegistus illustris</i>	Lustrous pomfret	Fish
<i>Eumetopias jubatus</i>	Steller sea lion	Marine mammal
<i>Euthynnus affinis</i>	Kawakawa	Fish
<i>Euthynnus alletteratus</i>	Little tunny	Fish
<i>Euthynnus pelamis</i>	Skipjack tuna	Fish
<i>Fulmarus glacialis</i>	Northern fulmar	Seabird
<i>Gadus macrocephalus</i>	Pacific cod	Fish
<i>Gadus morhua</i>	Atlantic cod	Fish
<i>Galeocerdo cuvier</i>	Tiger shark	Fish
<i>Galeocerdo cuvieri</i>	Tiger shark	Fish
Gastropoda	Snails	Fish
<i>Gempylus serpens</i>	Snake mackerel	Fish
<i>Ginglymostoma cirratum</i>	Nurse shark	Fish
<i>Globicephala</i> spp.	Pilot whales	Marine mammal
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	Marine mammal
<i>Glyptocephalus cynoglossus</i>	Witch flounder	Fish
<i>Glyptocephalus zachirus</i>	Rex sole	Fish
<i>Grampus griseus</i>	Risso's dolphin	Marine mammal
Haemulidae	Grunts	Fish
<i>Haemulon album</i>	Margate	Fish
<i>Haemulon aurolineatum</i>	Tomtate	Fish
<i>Haemulon flavolineatum</i>	French grunt	Fish
<i>Haemulon plumieri</i>	White grunt	Fish
<i>Hemiramphus brasiliensis</i>	Ballyhoo	Fish
Hexagrammidae	Greenlings	Fish
<i>Hexagrammos decagrammus</i>	Kelp greenling	Fish
<i>Hexanchus griseus</i>	Bluntnose sixgill shark	Fish
<i>Hippoglossoides elassodon</i>	Flathead sole	Fish
<i>Hippoglossoides platessoides</i>	American plaice	Fish
<i>Hippoglossus hippoglossus</i>	Atlantic halibut	Fish
<i>Hippoglossus stenolepis</i>	Pacific halibut	Fish
Holocentridae	Squirrelfishes	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Hyperoglyphe perciformis</i>	Barrelfish	Fish
<i>Hypomesus pretiosus</i>	Surf smelt	Fish
<i>Illex illecebrosus</i>	Northern shortfin squid	Fish
<i>Isistius brasiliensis</i>	Cookiecutter shark	Fish
<i>Istiophorus albicans</i>	Atlantic sailfish	Fish
<i>Istiophorus platypterus</i>	Sailfish	Fish
<i>Isurus</i> spp.	Mako sharks	Fish
<i>Isurus oxyrinchus</i>	Shortfin mako	Fish
<i>Isurus paucus</i>	Longfin mako	Fish
<i>Katsuwonus pelamis</i>	Skipjack tuna	Fish
Kyphosidae	Sea chubs	Fish
<i>Lachnolaimus maximus</i>	Hogfish	Fish
<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	Marine mammal
<i>Lagenorhynchus obliquidens</i>	Pacific white-sided dolphin	Marine mammal
<i>Lagocephalus lagocephalus</i>	Pelagic puffer	Fish
<i>Lagodon rhomboides</i>	Pinfish	Fish
<i>Lamna ditropis</i>	Salmon shark	Fish
<i>Lampris guttatus</i>	Opah	Fish
<i>Larimus fasciatus</i>	Banded drum	Fish
<i>Leiostomus xanthurus</i>	Spot	Fish
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle	Sea turtle
<i>Lepidochelys olivacea</i>	Olive ridley sea turtle	Sea turtle
<i>Lepidocybium flavobrunneum</i>	Escolar	Fish
<i>Limanda aspera</i>	Yellowfin sole	Fish
<i>Limanda ferruginea</i>	Yellowtail flounder	Fish
<i>Lissodelphis borealis</i>	Northern right whale dolphin	Marine mammal
<i>Lithodes aequispina</i>	Golden king crab	Fish
<i>Lobotes surinamensis</i>	Tripletail	Fish
<i>Loligo pealeii</i>	Longfin inshore squid	Fish
<i>Lophius americanus</i>	Goosefish	Fish
<i>Lopholatilus chamaeleonticeps</i>	Tilefish	Fish
<i>Lophotus lacepede</i>	Crestfish	Fish
Lutjanidae	Snappers	Fish
<i>Lutjanus analis</i>	Mutton snapper	Fish
<i>Lutjanus buccanella</i>	Blackfin snapper	Fish
<i>Lutjanus campechanus</i>	Red snapper	Fish
<i>Lutjanus griseus</i>	Gray snapper	Fish

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SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Lutjanus purpureus</i>	Caribbean red snapper	Fish
<i>Lutjanus synagris</i>	Lane snapper	Fish
<i>Lutjanus vivanus</i>	Silk snapper	Fish
<i>Luvarus imperialis</i>	Louvar	Fish
<i>Makaira indica</i>	Black marlin	Fish
<i>Makaira mazara</i>	Indo-Pacific blue marlin	Fish
<i>Makaira nigricans</i>	Blue marlin	Fish
Malacanthidae	Tilefishes	Fish
<i>Malacanthus plumieri</i>	Sand tilefish	Fish
<i>Mallotus villosus</i>	Capelin	Fish
<i>Manta birostris</i>	Atlantic manta	Fish
<i>Masturus lanceolatus</i>	Sharptail mola	Fish
<i>Megalops atlanticus</i>	Tarpon	Fish
<i>Megaptera novaeangliae</i>	Humpback whale	Marine mammal
<i>Melanogrammus aeglefinus</i>	Haddock	Fish
<i>Merluccius albidus</i>	Offshore hake	Fish
<i>Merluccius bilinearis</i>	Silver hake	Fish
<i>Merluccius productus</i>	Pacific hake	Fish
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	Marine mammal
<i>Micropogonias undulatus</i>	Atlantic croaker	Fish
<i>Microstomus pacificus</i>	Dover sole	Fish
<i>Mirounga angustirostris</i>	Northern elephant seal	Marine mammal
<i>Mobula</i> spp.	Mobulas (unidentified)	Fish
Mobulidae	Mantas (unidentified)	Fish
<i>Mola mola</i>	Ocean sunfish	Fish
<i>Morus bassanus</i>	Northern gannet	Seabird
Muraenidae	Moray eels	Fish
<i>Mustelus canis</i>	Smooth dogfish	Fish
<i>Mycteroperca bonaci</i>	Black grouper	Fish
<i>Mycteroperca interstitialis</i>	Yellowmouth grouper	Fish
<i>Mycteroperca microlepis</i>	Gag	Fish
<i>Mycteroperca phenax</i>	Scamp	Fish
<i>Mycteroperca venenosa</i>	Yellowfin grouper	Fish
Myctophidae	Lanternfishes	Fish
<i>Naucrates ductor</i>	Pilotfish	Fish
<i>Negaprion brevirostris</i>	Lemon shark	Fish
<i>Notorynchus cepedianus</i>	Bluntnose sevengill shark	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Oceanites oceanicus</i>	Wilson's storm-petrel	Seabird
Octocorallia	Blue coral, soft corals, sea pens, and gorgonians	Fish
Octopoda	Octopus	Fish
<i>Ocyurus chrysurus</i>	Yellowtail snapper	Fish
<i>Odobenus rosmarus divergens</i>	Pacific walrus	Marine mammal
<i>Odontaspis taurus</i>	Sand tiger shark	Fish
<i>Omosudis lowei</i>	Hammerjaw	Fish
<i>Oncorhynchus kisutch</i>	Coho salmon	Fish
<i>Oncorhynchus tshawytscha</i>	Chinook salmon	Fish
Ophichthidae	Snake eels	Fish
<i>Ophiodon elongatus</i>	Lingcod	Fish
Ophiuroidea	Brittle star (unidentified)	Fish
<i>Orcinus orca</i>	Killer whale	Marine mammal
<i>Pagrus pagrus</i>	Red porgy	Fish
Paguroidea	Hermit crab (unidentified)	Fish
<i>Paralichthys dentatus</i>	Summer flounder	Fish
<i>Paralichthys lethostigma</i>	Southern flounder	Fish
<i>Paralithodes camtschaticus</i>	Red king crab	Fish
<i>Paralithodes platypus</i>	Blue king crab	Fish
<i>Paraplagusia bilineata</i>	Doublelined tonguesole	Fish
<i>Parophrys vetulus</i>	English sole	Fish
<i>Pelecanus occidentalis</i>	Brown pelican	Seabird
<i>Pandalus</i> spp.	Pandalid shrimp	Fish
<i>Peprilus triacanthus</i>	Butterfish	Fish
<i>Phoca fasciata</i>	Ribbon seal	Marine mammal
<i>Phoca hispida</i>	Ringed seal	Marine mammal
<i>Phoca largha</i>	Spotted seal	Marine mammal
<i>Phoca vitulina</i>	Harbor seal	Marine mammal
<i>Phoca vitulina richardsi</i>	Harbor seal	Marine mammal
<i>Phocoena phocoena</i>	Harbor porpoise	Marine mammal
<i>Phocoenoides dalli</i>	Dall's porpoise	Marine mammal
<i>Phoebastria albatrus</i>	Short-tailed albatross	Seabird
<i>Phoebastria immutabilis</i>	Laysan albatross	Seabird
<i>Phoebastria nigripes</i>	Black-footed albatross	Seabird
Pholidae	Gunnels	Fish
<i>Physeter macrocephalus</i>	Sperm whale	Marine mammal
<i>Placopecten magellanicus</i>	Sea scallop	Fish

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SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Platyrrhinoidis triseriata</i>	Thornback	Fish
<i>Pleurogrammus monopterygius</i>	Atka mackerel	Fish
<i>Pleuronectes quadrituberculatus</i>	Alaska plaice	Fish
Pleuronectiformes	Flatfishes	Fish
<i>Pogonias cromis</i>	Black drum	Fish
<i>Pollachius virens</i>	Pollock	Fish
Polychaeta	Polychaete (unidentified)	Fish
<i>Polyprion americanus</i>	Wreckfish	Fish
<i>Pomatomus saltatrix</i>	Bluefish	Fish
Porifera	Sponge (unidentified)	Fish
<i>Prionace glauca</i>	Blue shark	Fish
<i>Pristis pectinata</i>	Smalltooth sawfish	Fish
<i>Promethichthys prometheus</i>	Roudi escolar	Fish
<i>Pseudocarcharias kamoharai</i>	Crocodile shark	Fish
<i>Pseudopleuronectes americanus</i>	Winter flounder	Fish
<i>Pseudorca crassidens</i>	False killer whale	Marine mammal
<i>Puffinus gravis</i>	Greater shearwater	Seabird
<i>Rachycentron canadum</i>	Cobia	Fish
<i>Raja binoculata</i>	Big skate	Fish
<i>Raja rhina</i>	Longnose skate	Fish
Rajidae	Skate	Fish
Rajiformes	Other rays	Fish
Rajiformes	Ray (unidentified)	Fish
Rajiformes	Rays, sawfish, and skates	Fish
Rajiformes	Rays, sawfish, and skates— South Atlantic/Gulf of Mexico	Fish
<i>Ranzania laevis</i>	Slender mola	Fish
<i>Regalecus glesne</i>	Oarfish	Fish
<i>Reinhardtius hippoglossoides</i>	Greenland halibut	Fish
<i>Remora remora</i>	Remora	Fish
<i>Rhinoptera bonasus</i>	Cownose ray	Fish
<i>Rhizoprionodon porosus</i>	Caribbean sharpnose shark	Fish
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	Fish
<i>Rhomboplites aurorubens</i>	Vermilion snapper	Fish
<i>Rissa brevirostris</i>	Red-legged kittiwake	Seabird
<i>Ruvettus pretiosus</i>	Oilfish	Fish
<i>Salmo salar</i>	Atlantic salmon	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Sarda chiliensis</i>	Pacific bonito	Fish
<i>Sarda sarda</i>	Atlantic bonito	Fish
Scaridae	Parrotfishes	Fish
<i>Sciaenops ocellatus</i>	Red drum	Fish
<i>Scomber japonicus</i>	Pacific chub mackerel	Fish
<i>Scomber scombrus</i>	Atlantic mackerel	Fish
<i>Scomberomorus</i> spp.	Mackerels	Fish
<i>Scomberomorus cavalla</i>	King mackerel	Fish
<i>Scomberomorus maculatus</i>	Spanish mackerel	Fish
<i>Scombrolabrax heterolepis</i>	Black mackerel	Fish
<i>Scophthalmus aquosus</i>	Windowpane	Fish
<i>Scorpaenichthys marmoratus</i>	Cabezon	Fish
Scorpaenidae	Scorpionfishes	Fish
<i>Scymnodon squamulosus</i>	Velvet dogfish	Fish
Scyphozoa	Scypho jellies	Fish
<i>Sebastes aleutianus</i>	Rougheye rockfish	Fish
<i>Sebastes alutus</i>	Pacific ocean perch	Fish
<i>Sebastes borealis</i>	Shortraker rockfish	Fish
<i>Sebastes crameri</i>	Darkblotched rockfish	Fish
<i>Sebastes diploproa</i>	Splitnose rockfish	Fish
<i>Sebastes entomelas</i>	Widow rockfish	Fish
<i>Sebastes fasciatus</i>	Acadian redfish	Fish
<i>Sebastes flavidus</i>	Yellowtail rockfish	Fish
<i>Sebastes goodei</i>	Chilipepper	Fish
<i>Sebastes jordani</i>	Shortbelly rockfish	Fish
<i>Sebastes levis</i>	Cowcod	Fish
<i>Sebastes melanops</i>	Black rockfish	Fish
<i>Sebastes melanostomus</i>	Blackgill rockfish	Fish
<i>Sebastes mystinus</i>	Blue rockfish	Fish
<i>Sebastes paucispinis</i>	Bocaccio	Fish
<i>Sebastes pinniger</i>	Canary rockfish	Fish
<i>Sebastes polyspinis</i>	Northern rockfish	Fish
<i>Sebastes ruberrimus</i>	Yelloweye rockfish	Fish
<i>Sebastolobus alascanus</i>	Shortspine thornyhead	Fish
<i>Sebastolobus altivelis</i>	Longspine thornyhead	Fish
<i>Selene setapinnis</i>	Atlantic moonfish	Fish
<i>Semicossyphus pulcher</i>	California sheephead	Fish

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SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Seriola</i> spp.	Amberfishes, banded rudderfish, amberjacks, and yellowtails	Fish
<i>Seriola dumerili</i>	Greater amberjack	Fish
<i>Seriola fasciata</i>	Lesser amberjack	Fish
<i>Seriola lalandi</i>	Yellowtail jack	Fish
<i>Seriola rivoliana</i>	Almaco jack	Fish
<i>Seriola zonata</i>	Banded rudderfish	Fish
Serranidae	Groupers and sea basses	Fish
Sparidae	Breams and porgies	Fish
<i>Sphyrna barracuda</i>	Great barracuda	Fish
Sphyrnidae	Barracudas	Fish
<i>Sphyrna</i> spp.	Hammerhead sharks	Fish
<i>Sphyrna lewini</i>	Scalloped hammerhead	Fish
<i>Sphyrna mokarran</i>	Great hammerhead	Fish
<i>Sphyrna tiburo</i>	Bonnethead	Fish
<i>Sphyrna zygaena</i>	Smooth hammerhead	Fish
Sphyrnidae	Hammerhead sharks	Fish
<i>Spisula solidissima</i>	Atlantic surfclam	Fish
Squalidae	Dogfish sharks	Fish
<i>Squalus acanthias</i>	Spiny dogfish	Fish
<i>Squatina dumeril</i>	Atlantic angelshark	Fish
<i>Stenella attenuata</i>	Pantropical spotted dolphin	Marine mammal
<i>Stenella coeruleoalba</i>	Striped dolphin	Marine mammal
<i>Stenella frontalis</i>	Atlantic spotted dolphin	Marine mammal
<i>Stenella longirostris</i>	Spinner dolphin	Marine mammal
<i>Stenotomus caprinus</i>	Longspine porgy	Fish
<i>Stenotomus chrysops</i>	Scup	Fish
<i>Strongylura marina</i>	Atlantic needlefish	Fish
<i>Sula leucogaster</i>	Brown booby	Seabird
<i>Taractes asper</i>	Rough pomfret	Fish
<i>Taractes rubescens</i>	Knifetail pomfret	Fish
<i>Taractichthys steindachneri</i>	Sickle pomfret	Fish
Teleostomi	Miscellaneous deep fish	Fish
Teleostomi	Miscellaneous fish	Fish
Tetraodontidae	Blowfishes	Fish
<i>Tetrapturus</i> spp.	Marlins and spearfishes	Fish
<i>Tetrapturus albidus</i>	White marlin	Fish
<i>Tetrapturus angustirostris</i>	Shortbill spearfish	Fish

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RESOURCES BY SPECIES NAME AND TYPE		
SCIENTIFIC NAME	COMMON NAME	MARINE RESOURCE TYPE
<i>Tetrapturus audax</i>	Striped marlin	Fish
<i>Thaleichthys pacificus</i>	Eulachon	Fish
<i>Theragra chalcogramma</i>	Walleye pollock	Fish
<i>Thunnus alalunga</i>	Albacore	Fish
<i>Thunnus albacares</i>	Yellowfin tuna	Fish
<i>Thunnus atlanticus</i>	Blackfin tuna	Fish
<i>Thunnus obesus</i>	Bigeye tuna	Fish
<i>Thunnus orientalis</i>	Pacific bluefin tuna	Fish
<i>Thunnus thynnus</i>	Bluefin tuna	Fish
<i>Trachinotus falcatus</i>	Permit	Fish
<i>Trachipterus altivelis</i>	King-of-salmon	Fish
<i>Trachipterus fukuzakii</i>	Tapertail ribbonfish	Fish
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	Fish
<i>Tursiops truncatus</i>	Bottlenose dolphin	Marine mammal
<i>Uraspis</i> spp.	Jacks (unidentified)	Fish
Urochordata	Benthic urochordata	Fish
<i>Urophycis</i> spp.	Hakes	Fish
<i>Urophycis chuss</i>	Red hake	Fish
<i>Urophycis tenuis</i>	White hake	Fish
<i>Xiphias gladius</i>	Swordfish	Fish
<i>Zalophus californianus</i>	California sea lion	Marine mammal
<i>Zoarces americanus</i>	Ocean pout	Fish
Zoarcidae	Eelpouts	Fish
<i>Zu cristatus</i>	Scalloped ribbonfish	Fish

RESOURCES BY GROUP NAME AND TYPE		
GROUP	SPECIES GROUP TYPE	GROUP DESCRIPTION (MAJOR SPECIES)
Alcid	Seabird	Auks, auklets, murre, murrelets, puffins, and guillemots
All seabirds	Seabird	All seabirds
Beaked whale (unidentified)	Marine mammal	Family Ziphiidae
Billfishes	Fish	Sailfishes, spearfishes, marlins
Bony fishes	Fish	Class Osteichthyes
Bony fishes (other)	Fish	Class Osteichthyes
Bony fishes (unidentified)	Fish	Class Osteichthyes
Brama pomfrets (unidentified)	Fish	Unidentified brama pomfret

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RESOURCES BY GROUP NAME AND TYPE		
GROUP	SPECIES GROUP TYPE	GROUP DESCRIPTION (MAJOR SPECIES)
Cartilaginous fishes	Fish	Class Chondrichthyes
Coastal shark group 1, South Atlantic	Fish	Night, silky, scalloped hammerhead, tiger, dusky, hammerhead, sandbar, bignose, and spinner sharks
Coastal shark group 2, South Atlantic	Fish	Shortfin mako, longfin mako, thresher, porbeagle, oceanic whitetip, common thresher, mako, and bigeye thresher sharks
Bryozoans/hydroids	Fish	Unidentified bryozoans, hydroids, and corals
Deep sea smelts (Bathylagidae)	Fish	Unclassified deep sea smelt
Deep water flatfish	Fish	Unclassified deep water flatfish
Deeper nearshore species	Fish	Black-and-yellow rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, treefish, unspecified nearshore rockfish
Demersal shelf rockfish	Fish	Unclassified demersal shelf rockfish
False killer or short-finned pilot whale (unidentified)	Marine mammal	Unidentified whale: either short-finned pilot whale or false killer whale
Finfishes, unclassified, general	Fish	Unclassified finfish
Flatfish	Fish	Unclassified flatfish
Gannet	Seabird	Unclassified gannet
Grenadier	Fish	Unclassified grenadier
Grouped finfish other than listed, Gulf of Mexico	Fish	Other grouped finfishes
Grouped sharks, Gulf of Mexico	Fish	Grouped sharks other than listed
Gull	Seabird	Unclassified gull
Invertebrate, unidentified	Fish	Unidentified invertebrate
Mako sharks	Fish	Unclassified mako shark
Non-Chinook salmon	Fish	Unclassified non-Chinook salmon
Non-crustacean invertebrates, Gulf of Mexico	Fish	Unidentified non-crustacean invertebrate
Non-penaeid shrimp crustacean, Gulf of Mexico	Fish	Unidentified shrimp, non-penaeid
Other flatfish1	Fish	Alaska plaice, butter sole, Curlfin sole, flathead sole, greenland turbot, Kamchatka flounder, rex sole, rock sole, sand sole, yellowfin sole, other flatfish, unspecified turbot, unspecified flatfish
Other flatfish 2	Fish	Flathead sole, Pacific sandab, rex sole
Other flatfish 3	Fish	Rock sole, sand sole, unspecified turbot, unspecified flatfish
Other groundfish 1	Fish	Atka mackerel, big skate, cabezon, California skate, capelin, kelp greenling, leopard shark, longnose skate, Pacific skate, soupfin shark, spotted ratfish, walleye pollock, unspecified rockfish, unspecified roundfish, unspecified groundfish, unspecified skates, unspecified sharks, unspecified flatfish, unspecified grenadiers

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RESOURCES BY GROUP NAME AND TYPE		
GROUP	SPECIES GROUP TYPE	GROUP DESCRIPTION (MAJOR SPECIES)
Other groundfish 2	Fish	Kelp greenling, soupfin shark, spotted ratfish
Other groundfish 3	Fish	Lepoard shark, Pacific whiting, soupfin shark, spotted ratfish, unspecified grenadiers
Other <i>Lutjanus</i> spp., Gulf of Mexico	Fish	Other snapper species
Other minor nearshore rockfish, North	Fish	Black-and-yellow rockfish, brown rockfish, calico rockfish, China rockfish, copper rockfish, gopher rockfish, grass rockfish, kelp rockfish, olive rockfish, quillback rockfish, treefish, unspecified nearshore rockfish
Other nearshore rockfish	Fish	Black-and-yellow rockfish, blue rockfish, brown rockfish, calico rockfish, california scorpionfish, China rockfish, copper rockfish, gopher rockfish, grass rockfish, kelp rockfish, olive rockfish, quillback rockfish, treefish, unspecified nearshore rockfish
Other osmerids	Fish	Other smelts
Other seabird	Seabird	Other seabird
Other shelf rockfish 1	Fish	Bocaccio, bronzespotted rockfish, chameleon rockfish, dwarf-red rockfish, flag rockfish, freckled rockfish, greenblotched rockfish, greenspotted rockfish, greenstriped rockfish, halfbanded rockfish, honeycomb rockfish, Mexican rockfish, pink rockfish, pinkrose rockfish, Puget Sound rockfish, pygmy rockfish, redbanded rockfish, redstripe rockfish, rosethorn rockfish, rosy rockfish, silvergrey rockfish, speckled rockfish, squarespot rockfish, starry rockfish, stripetail rockfish, swordspine rockfish, tiger rockfish, vermillion rockfish, unspecified shelf rockfish
Other shelf rockfish 2	Fish	Greenstriped rockfish, redstripe rockfish, rosethorn rockfish, silvergray rockfish, stripetail rockfish
Other shelf rockfish 3	Fish	Bocaccio, bronzespotted rockfish, chameleon rockfish, chilipepper rockfish, dwarf-red rockfish, flag rockfish, freckled rockfish, greenblotched rockfish, greenspotted rockfish, greenstriped rockfish, halfbanded rockfish, harlequin rockfish, honeycomb rockfish, Mexican rockfish, pink rockfish, pinkrose rockfish, Puget Sound rockfish, pygmy rockfish, redbanded rockfish, redstripe rockfish, rosethorn rockfish, rosy rockfish, silvergrey rockfish, speckled rockfish, squarespot rockfish, starry rockfish, stripetail rockfish, swordspine rockfish, tiger rockfish, vermillion rockfish, yellowtail rockfish, unspecified shelf rockfish

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GROUP	SPECIES GROUP TYPE	GROUP DESCRIPTION (MAJOR SPECIES)
Other slope rockfish 1	Fish	Aurora rockfish, bank rockfish, blackgill rockfish, darkblotched rockfish, roughey rockfish, sharpchin rockfish, shortraker rockfish, splitnose rockfish, yellowmouth rockfish, unspecified slope rockfish
Other slope rockfish 2	Fish	Aurora rockfish, bank rockfish, redbanded rockfish, roughey rockfish, sharpchin rockfish, shortraker rockfish
Other slope rockfish 3	Fish	Aurora rockfish, bank rockfish, blackgill rockfish, roughey rockfish, sharpchin rockfish, shortraker rockfish, splitnose rockfish, yellowmouth rockfish, unspecified slope rockfish
Other species	Fish	Other species
Pelagic shelf rockfish	Fish	Dusky rockfish, dark rockfish, yellowtail rockfish, widow rockfish.
Pricklebacks (Stichaeidae)	Fish	Unclassified pricklebacks
Rockfish	Fish	Unclassified rockfish
Shallow nearshore species	Fish	California scorpionfish, China rockfish, gopher rockfish, grass rockfish, kelp rockfish, quillback rockfish
Shallow water flatfish	Fish	Northern rock sole, southern rock sole, butter sole, yellowfin sole, starry flounder
Shark (other)	Fish	Other sharks
Shearwater	Seabird	Unclassified shearwater
Short-beaked common dolphin (unidentified)	Marine mammal	Unidentified short-beaked common dolphin
Skate complex (NE)	Fish	Winter skate, barndoor skate, thorny skate, smooth skate, little skate, clearnose skate, and rosette skate
Tanner crab	Fish	Opilio Tanner crab, unspecified Tanner crab
Thresher sharks	Fish	Unidentified thresher shark
Tunas	Fish	Unclassified tuna species
Unidentified albatross	Bird	Unidentified albatross species
Unidentified gull	Bird	Unidentified gull species
Unidentified procellarids	Bird	Unidentified shearwater or petrel
Unidentified seabirds	Bird	Unidentified seabird
Unidentified sea turtle	Sea turtle	Unidentified sea turtle
Unspecified seabirds	Seabird	Unspecified seabird
Unspecified skate 1 (NW)	Fish	Unspecified skate species
Unspecified skate 2 (NW)	Fish	Big skate, longnose skate, unspecified skate
Urchins, dollars, cucumbers	Fish	Unspecified urchin, sand dollar, sea cucumber