Final

United States
National Plan of Action
for
Reducing
the
Incidental Catch of Seabirds in Longline Fisheries

Silver Spring, MD 20910
February 2001

Photograph of Short-tailed Albatross by Dr. Hiroshi Hasegawa

DEPARTMENT OF COMMERCE
National Oceanic and
Atmospheric Administration
National Marine Fisheries Service

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U. S. DEPARTMENT OF COMMERCE
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U.S. FINAL NATIONAL PLAN OF ACTION FOR REDUCING THE INCIDENTAL CATCH OF SEABIRDS IN LONGLINE FISHERIES

Executive Summary

Increased concerns have arisen about the incidental capture of non-target species in various fisheries throughout the world. Incidental capture can be economically wasteful, it impacts living marine resources, and the accidental killing of non-harvested animals may be aesthetically aversive. Incidental catch of non-target marine species such as marine mammals, sea turtles, and seabirds has generated growing concern over the long-term ecological effects of such bycatch in longline and other fisheries conducted in many areas of the world's oceans.

The United States has voluntarily developed the U.S. *National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* (NPOA-S) to fulfill a national responsibility to address seabird bycatch in longline fisheries, as requested in the *International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* (IPOA-S). The IPOA-S applies to "States" (hereafter Countries) in whose waters longline fishing is being conducted by their own or foreign vessels, and to Countries that conduct longline fishing on the high seas and in the exclusive economic zones (EEZs) of other Countries. The IPOA-S is a voluntary measure that calls on Countries to: (1) assess the degree of seabird bycatch in their longline fisheries; (2) develop individual national plans of action to reduce seabird bycatch in longline fisheries that have a seabird bycatch problem; and (3) develop a course of future research and action to reduce seabird bycatch. The NPOA-S is to be implemented consistent with the FAO *Code of Conduct for Responsible Fisheries* and all applicable rules of international law, and in conjunction with relevant international organizations.

Development of the NPOA-S was a collaborative effort between the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (FWS) and the Department of State (DOS), carried out in large part by the Interagency Seabird Working Group (ISWG) consisting of representatives from those three agencies. This partnership approach recognizes the individual agency management authorities covering seabird interactions with longline fisheries. NMFS manages U.S. fisheries under the authority of the Magnuson-Stevens Fishery Conservation and Management Act and the High Seas Fishing Compliance Act. FWS manages birds predominately under the authority of the Endangered Species Act and the Migratory Bird Treaty Act. In addition, DOS has the lead role in international negotiations on fisheries conservation and management issues that should help promote IPOA implementation by encouraging other nations to develop NPOAs. Given each agency's responsibilities, the NPOA-S was developed collaboratively by NMFS and FWS. This collaborative effort has increased communication between seabird specialists and fishery managers in FWS and NMFS. Maintaining this cooperation is a high priority for both agencies.

The NPOA-S contains the following themes:

1. Action Items: NMFS, with the assistance of the Regional Fishery Management Councils (Councils), the NMFS Regional Science Centers, and FWS, as appropriate, should conduct the following activities:

- Detailed assessments of its longline fisheries for seabird bycatch within 2 years of the adoption of the NPOA-S;
- If a problem is found to exist within a longline fishery, measures to reduce this seabird bycatch should be implemented within 2 years. These measures should include data collection, prescription of mitigation measures, research and development of mitigation measures and methods, and outreach, education, and training about seabird bycatch; and
- NMFS, in collaboration with the appropriate Councils and in consultation with FWS, will prepare an annual report on the status of seabird mortality for each longline fishery, including assessment information, mitigation measures, and research efforts. FWS will also provide regionally-based seabird population status information that will be included in the annual reports.

2.) Interagency Cooperation: The continuation, wherever possible, of the ongoing cooperative efforts between NMFS and FWS on seabird bycatch issues and research.

3.) International Cooperation: The United States' commitment, through the DOS, NMFS and FWS, to advocate the development of National Plans of Action within relevant international fora.

The development of the NPOA-S has emphasized that all U.S. longline fisheries have unique characteristics, and that the solution to seabird bycatch issues will likely require a multi-faceted approach requiring different fishing techniques, the use of mitigating equipment, and education within the affected fisheries. Therefore, the NPOA-S does not prescribe specific mitigation measures for each longline fishery. Rather, this NPOA-S provides a framework of actions that NMFS, FWS, and the Councils, as appropriate, should undertake for each longline fishery. By working cooperatively, fishermen, managers, scientists, and the public may use this national framework to achieve a balanced solution to the seabird bycatch problem and thereby promote sustainable use of our nation's marine resources.

Introduction

There has been growing concern over the long-term ecological effects of seabird bycatch in longline fisheries conducted in many areas of the world's oceans. The United States has voluntarily developed the U.S. *National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* (NPOA-S) to fulfill a national responsibility to address seabird bycatch in longline fisheries, as requested in the *International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* (IPOA-S). Specifically, "the NPOA-S is a plan that a State designs, implements, and monitors to reduce the incidental catch of seabirds in longline fisheries." In 1997, the Food and Agriculture Organization of the United Nations (FAO) Committee on Fisheries (COFI) considered a joint proposal from the United States and Japan for a Consultation on *Guidelines for a Plan of Action* for reducing incidental (i.e., unintentional) seabird catch in longline fisheries. The proposal culminated in the development of

the IPOA-S, which was endorsed by COFI in February 1999, commended by the March 1999 FAO Fisheries Ministerial, and adopted by the June 1999 FAO Council and November 1999 FAO Conference.

The IPOA-S applies to "States" (hereafter Countries) in whose waters longline fishing is being conducted by their own or foreign vessels, and to Countries that conduct longline fishing on the high seas and in the exclusive economic zones (EEZs) of other Countries. The IPOA-S is a voluntary measure that calls on Countries to: (1) assess the degree of seabird bycatch in their longline fisheries; (2) develop individual national plans of action to reduce seabird bycatch in longline fisheries that have a seabird bycatch problem; and (3) develop a course of future research and action to reduce seabird bycatch. The NPOA-S is to be implemented consistent with the FAO *Code of Conduct for Responsible Fisheries* and all applicable rules of international law, and in conjunction with relevant international organizations.

Development of the NPOA-S was a collaborative effort between the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (FWS) and the Department of State (DOS), carried out in large part by the Interagency Seabird Working Group (ISWG) consisting of representatives from those three agencies. This partnership approach recognizes the individual agency management authorities covering seabird interactions with longline fisheries. NMFS manages U.S. fisheries under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the High Seas Fishing Compliance Act (HSFCA). FWS manages birds predominately under the authority of the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA). In addition, DOS has the lead role in international negotiations on fisheries conservation and management issues that should help promote IPOA implementation by encouraging other nations to develop NPOAs. The ability of NMFS to implement effective seabird bycatch mitigation measures in all U.S. longline fisheries will be strengthened by working through the ISWG to accomplish this goal.

Although incidental catch of seabirds in longline fisheries is often termed "bycatch," the Magnuson-Stevens Act specifically excludes seabirds from the definition of "fish" and, therefore, bycatch[1]. For the purpose of this NPOA, however, the term "bycatch" refers to incidental, or unintentional, seabird catch or mortality, and the term "seabird" refers to those bird species that habitually obtain their food from the sea below the low water mark.

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[1]Unless certain requirements under the ESA are involved, the Magnuson-Stevens Act does not *require* the implementation of measures to reduce incidental catch of seabirds. However, the Magnuson-Stevens Act authorizes implementation of fishery management measures designed to protect the marine environment from the effects of fishing activities. In order to strengthen NMFS' ability to effectively implement seabird conservation measures in all U.S. fisheries, NMFS and FWS are supporting an amendment to the Magnuson-Stevens Act that would change the definition of bycatch to include seabirds and would require fishery management plans to specifically address seabird bycatch.

Purpose

The purpose of the NPOA-S is to provide an action plan that reduces seabird bycatch in U.S. longline fisheries, to provide national-level policy guidance on reducing seabird bycatch in U.S. longline fisheries, and to require that NMFS, in cooperation with FWS, conduct an assessment of all U.S. longline fisheries to determine whether a seabird bycatch problem exists. This NPOA-S further requires NMFS, in cooperation with FWS, to work through the regional fishery management council (Council) process in partnership with longline fishery representatives to develop and implement seabird bycatch mitigation measures in those fisheries that have a seabird bycatch problem. Such measures should attempt to reduce seabird bycatch to the maximum extent practicable.

In addition to guidance on conducting seabird bycatch assessments and reducing seabird bycatch, this NPOA-S provides guidance to the Councils, NMFS, and FWS for the following seven Action Elements:

I. Collecting seabird bycatch data
II. Developing proposed time frames for implementing seabird bycatch mitigation measures
III. Developing and evaluating mitigation measures
IV. Conducting research on mitigation measures
V. Conducting outreach, education, and training programs to help fishermen avoid and minimize seabird bycatch, and reduce mortality of seabird bycatch that cannot be avoided
VI. Developing national and international reporting requirements, and
VII Continued collaboration between NMFS and FWS.

Although this NPOA-S does not include quantitative criteria for determining what constitutes a seabird bycatch problem, NMFS, in consultation with FWS, should make a determination that is consistent with applicable federal laws, Executive Order 13186, the FAO *Code of Conduct for Responsible Fisheries*, and the NMFS Bycatch Plan (NMFS 1998c). Specifically, a "problem" may include an unacceptable level of seabird take that has a measurable negative effect on a seabird population, or unacceptable take of a bird species, as determined by FWS and NMFS. Seabird bycatch assessments should be completed as soon as practicable, which should be within 1 year and will be no later than 2 years after publication of this NPOA-S. Within 1 year after a seabird bycatch problem is found to exist, the appropriate NMFS Region should develop a seabird bycatch reduction program that details fishery-specific seabird bycatch reduction measures. The programs will address the seven action elements of the NPOA-S (I through VII listed above), and will clearly describe the criteria used to determine that a seabird bycatch problem exists.

Fishery-specific measures to reduce seabird bycatch should then be developed through the Council process, integrated into Fishery Management Plans (FMPs), or included in FMP amendments or regulatory amendments, and submitted to the Secretary of Commerce for approval. Management measures mitigating seabird bycatch will be developed within 2 years after a seabird bycatch problem is found to exist. Every effort will be taken to expedite this time

line and, where feasible, documented area- and fishery-specific mitigation measures will be implemented as expeditiously as practicable. Public participation is provided during the Council process for developing these mitigation measures, and additional opportunity for public comment is provided during the NMFS implementation process on proposed seabird bycatch regulations.

Background

National and international initiatives highlight the need to address fisheries bycatch issues, including seabird bycatch. The FAO *Code of Conduct for Responsible Fisheries* was adopted in 1995 by the FAO Conference and calls for Countries to "take appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species … and promote, to the extent practicable, the development and use of selective, environmentally safe and cost effective gear and techniques." (FAO *Code of Conduct for Responsible Fisheries*, Article 7.6.9).

In the United States, a longline is defined as "a line that is deployed horizontally and to which gangions and hooks or pots are attached. Longlines can be stationary, anchored, or buoyed lines that may be hauled manually, electrically, or hydraulically" (50 CFR 600.10). This definition includes demersal, or bottom set, longlines for groundfish and sharks, as well as pelagic (set at or near the surface or within the water column) longlines for sharks, tunas, swordfish and other species. There are other regional terms for longline gear, including hook-and-line gear and tub trawl. For the purposes of this NPOA-S, the term "longline" refers only to hook-and-line gear and does not include gear with pots attached.

Although the IPOA-S does not define the term "longline," the international fishing community has a common understanding of the equipment and techniques used in longline fisheries. Longline gear is hook-and-line gear that is generally deployed from the vessel's stern, with the main line and attached hooks following the vessel in a downward sloping diagonal line until it enters the water. The baited hooks on this main line remain in the air or near the water surface and are accessible to seabirds for varying times and distances depending on the size of the vessel, sea conditions, gear deployment equipment and methods, and the specific longline gear configuration.

Longline fishing vessels also discharge offal in the form of discarded fish, fish scraps from cleaned fish, and used or discarded bait. The availability of "free" food in the form of offal and bait attracts seabirds to longline fishing operations. Most seabirds that are killed during longline operations are attracted to the baited hooks when the gear is being set. The birds are sometimes accidentally hooked or entangled while feeding on baits near the surface and are dragged underwater and killed by drowning or by strangulation. Birds are also hooked or entangled during the haul back process but these birds are usually released alive.

The factors potentially affecting seabird hooking and entanglement on longline gear are complex and include geographic location of fishing activity, time of day, season, type of fishing operation

and gear used, bait type, condition of the bait (frozen, thawed, dyed), length of time baited hooks remain at or near the surface of the water, water and weather conditions, availability of food (including bait and offal), bird size, bird behavior (feeding and foraging strategies), and physical condition of the bird. Most seabird species probably interact with longline fishing gear; however, only the larger species have the physical capabilities and feeding strategies to face frequent interactions and potential hookings. The highest density of large seabirds in the United States occurs in the Pacific Ocean. NMFS regulations designed to reduce seabird bycatch in the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) groundfish longline fisheries were approved and implemented in 1997, in the Pacific halibut longline fishery in 1998, and in the Hawaii pelagic longline fishery in 2001. In addition, NMFS plans to promulgate new seabird bycatch mitigation regulations in Alaska longline fisheries to provide additional seabird protection. Such measures will be based on the results of scientific research and on ESA requirements. Several research projects on seabird-longline interactions have been completed in the Pacific by U.S. researchers, and additional seabird bycatch research is currently underway.

NMFS published a bycatch reduction policy document entitled *Managing the Nation's Bycatch: Programs, Activities, and Recommendations for the National Marine Fisheries Service* (NMFS Bycatch Plan; NMFS 1998c). The NMFS Bycatch Plan addresses harvested fish species as well as non-harvested and protected species such as seabirds. It also presents national objectives, priorities, and strategies for avoiding and reducing bycatch, and for minimizing mortality of bycatch that cannot be avoided. The document reviews bycatch reduction efforts already completed or underway, provides recommendations for evaluating existing bycatch management and research programs, and suggests future efforts to reduce bycatch and bycatch mortality.

NMFS and FWS believe that implementation of the NPOA-S, the FAO *Code of Conduct for Responsible Fisheries*, the Council-developed FMPs and FMP amendments promulgated under the Magnuson-Stevens Act, Executive Order 13186, and the NMFS Bycatch Plan will significantly reduce seabird bycatch in longline fisheries conducted within U.S. waters. Managing seabird bycatch in U.S. fisheries is a partnership effort that will require cooperation among the Councils, NMFS, FWS, the longline fishing industry, individual longline vessel owners and operators, fishing gear manufacturers, conservation organizations, and other interested groups and individuals.

Statutory Authority and Agency Responsibility

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary U.S. law dealing with marine fisheries resources and fishing activities in U.S. Federal waters (those waters extending seaward from coastal state waters to the 200-mile limit). The predecessor of the Magnuson-Stevens Act was the Fishery Conservation and Management Act, passed into law in 1976, which established the conservation and management of U.S. marine fishery resources and helped develop U.S. domestic fisheries within the U.S. 200-mile fisheries conservation zone. This area became known as the U.S. exclusive economic zone (EEZ) following President Ronald Reagan's 1983 proclamation.

In 1996, Congress ushered in a new era in marine fisheries management, making significant revisions to the Magnuson-Stevens Act through the Sustainable Fisheries Act (SFA). The SFA amendments address a number of fishery conservation and management issues, and include measures to help ensure that FMPs prevent overfishing, rebuild overfished fisheries, identify and protect essential fish habitat, minimize bycatch and the mortality of bycatch that cannot be avoided, and consider the effects of management actions on fishing communities and on the safety of fishermen at sea.

The Magnuson-Stevens Act creates eight regional fishery management councils (Councils) and requires the Councils to prepare FMPs for fisheries under their jurisdictions that "require conservation and management." The FMPs and FMP amendments must be consistent with the Magnuson-Stevens Act's 10 national standards (§ 301(a)), the rest of the Magnuson-Stevens Act, and other applicable laws, such as ESA. After developing an FMP or amendment, the Council submits it along with implementing regulations to NMFS, and NMFS may approve, disapprove, or partially disapprove the submission on behalf of the Secretary. NMFS makes the Councils' recommendations available for additional public review and comment (in part, by publication of proposed regulations) and must consider this additional public input before taking final action to approve, disapprove, or partially approve a Council's recommendations. Disapproval must be based on the fact that the submission is inconsistent with applicable law (e.g., the Magnuson-Stevens Act, ESA, National Environmental Policy Act).

If conservation and management measures are necessary for a fishery, and the appropriate Council fails to act within a reasonable time, NMFS may prepare an amendment to an existing FMP, or a new FMP if appropriate, on behalf of the Secretary (Secretarial FMP). In addition, if NMFS finds that an emergency exists, the agency may promulgate emergency regulations to address the emergency without regard to whether an FMP is in place. Emergency regulations are valid for 180 days, and may be extended once under certain conditions for an additional 180 days.

The Council system has provided local, state and regional fishery participants and other interested parties a substantial role in managing U.S. fisheries and fishery resources. Council membership consists of representatives from Federal agencies, the commercial and recreational fisheries sectors, coastal state governments, and members of the public knowledgeable in regional fishery issues. These representatives serve for three-year terms. The appropriate NMFS Regional Administrator sits on each Council as the single voting representative from the Federal government. Councils are bound by various provisions in the Magnuson-Stevens Act (e.g., all meetings of the Councils and their committees are open to the public, with a few exceptions).

In addition to managing fisheries resources for conservation purposes, the Councils are responsible for recommending, through their FMPs and FMP amendments, allocations of fishery resources among various, and often competing, users (e.g., between commercial and recreational fishermen). In developing their FMPs and FMP amendments, the Councils hold public hearings and meetings to obtain the views of various fishery participants and other interested parties.

They must consider these views before taking final action on a given Council recommendation.

Management measures for highly migratory species in the Atlantic Ocean including tunas, swordfish, sharks, and billfish are developed directly by NMFS under the authority of the Secretary of Commerce, rather than by a regional fishery management council. For the purpose of the NPOA-S, however, any reference to a regional fishery management council will also include the management process for species included in the Atlantic Tunas, Swordfish, and Sharks FMP and the Atlantic Billfish FMP.

In carrying out its mandate under the Magnuson-Stevens Act, NMFS ensures that fishery management actions comply with other applicable U.S. laws and policies that protect seabirds, such as the ESA, MBTA, and Executive Orders, such as E.O. 13186. Federal fishery management actions that may affect seabird species that are listed as threatened or endangered under the ESA require NMFS to consult with FWS under section 7 of ESA. Thus, if a listed seabird may be captured or harmed in a fishery conducted under the Magnuson-Stevens Act, NMFS (as the action agency that regulates the fishery) is required to consult with the FWS (as the consulting agency) to determine the most effective means of protecting seabirds during fishery operations. ESA requires NMFS to mitigate impacts of fisheries on endangered and threatened species such as the Short-tailed Albatross.

In addition, the recent Presidential Executive Order ("Responsibilities of Federal Agencies to Protect Migratory Birds," EO 13186, 10 January 2001, *Federal Register* 66(11):3853-3856) directs Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to work with FWS to develop an agreement to conserve those bird populations.

The United States has recognized the importance of the migratory bird resource by ratifying international treaties with Canada, Mexico, Japan, and Russia for the conservation of that shared resource. These treaties impose substantive obligations on the United States for the conservation of migratory birds and their habitats. The United States meets these treaty obligations through implementation of the Migratory Bird Treaty Act, as amended (Act). The FWS administers the Act, which protects some 836 bird species, including approximately 150 seabird species.

In addition to the Magnuson-Stevens Act requirements, the NMFS Bycatch Plan provides policy guidance to NMFS, the Councils, and other partners such as states, interstate fishery commissions, the fishing industry, and the conservation community. Implementing the NPOA-S will also help meet U.S. goals for seabird bycatch reduction pursuant to international agreements, including the IPOA-S and the FAO *Code of Conduct for Responsible Fisheries*.

Effective implementation of the NPOA-S will require the longline fishing industry to be closely involved with NMFS, FWS, and conservation organizations in developing fishery-specific seabird bycatch mitigation measures. Industry involvement is important because longline fishermen who have experience in individual longline fisheries have gained first-hand knowledge

of how seabirds interact with those fisheries. Their knowledge and expertise is required to help develop and refine seabird bycatch mitigation measures and to evaluate their effectiveness. They recognize that these measures increase fishing efficiency and reduce seabird mortality, so they are invaluable for developing effective, long-term solutions to seabird bycatch.

NMFS acknowledges that assessing seabird bycatch and assessing the effectiveness of mitigation measures is costly and that the final NPOA includes ambitious objectives and goals. Additional funding needs for implementing the final NPOA need to be addressed by the individual management entities. NMFS has historically not received sufficient appropriated funds to monitor seabird bycatch in all U.S. longline fisheries. The cost of previous seabird bycatch mitigation research studies ranged between $150,000 and $227,000. NMFS further acknowledges that cooperation with the fishing industry led to the use of commercial longline vessels in seabird mitigation research studies, which resulted in significant cost savings. NMFS will use the final NPOA-S as guidance in its strategic planning and budget processes.

International Fishery Management Measures to Conserve Seabirds

Several international fishery management organizations and foreign nations have adopted conservation and management measures to reduce seabird bycatch by regulating regional longline fishing fleets. For example:

- The Convention for the Conservation of Antarctic Living Marine Resources adopted voluntary measures in 1992 to minimize interactions with seabirds by longline vessels in the Convention area. These measures include use of a bird-scaring device while setting longlines, night setting, avoidance of offal dumping, weighted ground lines when possible, and the use of thawed bait.

- The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) adopted a recommendation that includes collection of fishery data, use of seabird bycatch mitigation measures, and education of fishermen about species, including seabirds, that are ecologically related to the fishery. All member nations of CCSBT are required to use bird-scaring lines during longline setting and hauling operations.

- The International Pacific Halibut Commission requests voluntary information on seabird bycatch from participants in their fishery. Operators of vessels fishing for Pacific halibut off Alaska are required by NMFS to comply with the same seabird avoidance regulations that are in place for the groundfish longline fisheries off Alaska. These measures require that longline fishermen: (1) Use hooks that when baited, sink as soon as they are put in the water; (2) discharge offal in a manner that distracts seabirds away from baited hooks, either aft of the hauling station or on the opposite side of the vessel from the hauling station; (3) make every reasonable effort to ensure that birds brought aboard alive are released alive and that wherever possible, hooks are removed without jeopardizing the life of the bird; (4) on vessels longer than or equal to 26 ft (7.9m) length overall the

operator of the vessel must employ one or more of the following seabird avoidance measures: (a) Tow a streamer line or lines during deployment of gear, (b) tow a buoy, board, stick or other device during deployment of gear at a distance appropriate to prevent birds from taking hooks, (c) deploy hooks underwater through a lining tube at a depth sufficient to prevent birds from settling on hooks during deployment of gear, or (d) deploy gear only during hours of darkness, using only the minimum vessel's lights necessary for safety.

- The Australian NPOA will be based on its domestic *Threat Abatement Plan for the Incidental Catch of Seabirds During Oceanic Longline Fishing Operations* (TAP). The objective of the TAP is to reduce seabird bycatch in all fishing areas, seasons, or fisheries to below 0.05 seabirds per thousand hooks, based on year 2000 fishing levels. The TAP aims to significantly reduce seabird bycatch during oceanic longline operations in the Australian Fishing Zone within 5 years by: prescribing the appropriate modifications to fishing practices or equipment (mitigation measures), providing for development of new mitigation measures, educating fishers and the public, and collecting information necessary to improve knowledge of seabird-longline fishery interactions.

- Since 1993, New Zealand (N.Z.) has required all tuna longline vessels to use seabird scaring devices (tori lines) while operating in the N.Z. EEZ, and also requires that all N.Z. vessels fishing outside the N.Z. EEZ to use tori lines. The intent of the N.Z. NPOA is to significantly reduce fishing-related seabird capture in all fisheries within the next 5 years. The N.Z. NPOA-S will move towards establishing limits on seabird mortalities in each of the fisheries where fishing-related incidental seabird capture has been reported. In order to provide adequate information on which to base such limits, the N.Z. NPOA-S identifies targets for observer coverage, management actions, and mitigation research for each of its fisheries. The NPOA-S calls for achieving adequate levels of observer coverage to detect and reliably estimate levels of incidental seabird capture, and calls for management actions that may include required mitigation regulations or voluntary codes of practice in all fisheries that have interactions with seabirds.

U.S. Fishery Management Measures to Conserve Seabirds

The decline of foreign fishing operations after 1976 within the U.S. EEZ and government financial support programs for domestic fishermen led to the growth and development of the U.S. offshore fishing fleet. With this expansion came increased interactions by U.S. vessels with seabirds, marine mammals, and sea turtles that were incidentally captured during fishing operations. NMFS regulations designed to reduce seabird bycatch in the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) groundfish longline fisheries were approved and implemented in 1997, in the Pacific halibut longline fishery in 1998, and are under development for the Hawaii pelagic longline fishery. Research is underway in Alaska and Hawaii longline fisheries to determine the effectiveness of existing seabird bycatch measures and to improve those measures.

While seabird bycatch data are collected in most NMFS observer programs, U.S. fisheries bycatch research and data collection has focused historically on targeted and non-targeted fish species, marine mammals, and sea turtles, not seabirds. Collecting seabird data through logbooks and scientific observations has not been given the same priority as for other protected species, especially in those regions that do not have ESA-listed seabird species that interact with longline gear. Additionally, the experimental designs for some bycatch research were developed for non-bird species, which may be sufficiently different from seabirds in terms of migratory behavior and geographic range to prevent simple extrapolation of the limited seabird data to larger geographic areas. Future efforts should collect data for statistically valid seabird bycatch assessments. Additional funding should be sought to expand observer coverage in general, to collect data for statistically valid seabird bycatch assessments, including seabird species catch per unit effort, and to evaluate mitigation measures.

The U.S. National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries NPOA-S

Development of the NPOA-S

FWS has expertise and primary legal responsibility for seabird conservation and management, while NMFS has expertise and responsibility for managing longline fisheries. In recognition of this expertise and responsibility, the Assistant Administrator of NMFS and the FWS Director agreed to collaborate on the development of the NPOA-S and to conduct this effort through the work of the Interagency Seabird Working Group (ISWG). The resulting NPOA-S is a collaborative interagency effort that has increased communication between seabird specialists and fishery managers in FWS and NMFS. Maintaining this cooperation is a high priority for both agencies.

There is considerable variation between different longline fisheries in the United States, including differences in target species, geographic location, baits, gear types and configuration, methods employed, depth fished, time of day, season, weather, vessel characteristics, and seabird species present and vulnerable. Consequently, the individual characteristics of each longline fishery may interact in complex ways to affect seabird bycatch rates. The biological and life history characteristics of individual seabird species also affect the risk of incidental capture and the population-level impact of longline fishery mortality. These differences will likely require that unique seabird bycatch solutions be developed for each individual longline fishery where assessments show a seabird bycatch problem exists. These characteristics will need to be taken into consideration as the Councils and NMFS, in collaboration with the FWS, develop individual seabird bycatch reduction programs.

Implementation of the NPOA-S

The initial process for NPOA-S implementation will occur over the course of the next 4 years. Assessments of all U.S. longline fisheries will be completed within 2 years. In those fisheries where a seabird bycatch problem is found to exist a mitigation program will be developed within 3 years and implemented within 4 years. In all longline fisheries where an initial determination is made that no seabird bycatch problem exists, a re-assessment will be conducted within 4 years of such a determination.

Implementation of the NPOA-S may vary among Council jurisdictional areas and longline fisheries. Some Councils need to start or complete seabird bycatch assessments for the longline fisheries within their jurisdictional area, and each fishery may require individually tailored seabird management measures. This NPOA-S provides the Councils with flexibility to develop effective seabird mitigation measures for individual longline fisheries. In U.S. longline fisheries where seabird bycatch problems are already known to exist, including Alaska demersal groundfish and Hawaii pelagic longline fisheries, regulations are already in place or under development to mitigate seabird bycatch. The North Pacific and Western Pacific Fishery Management Councils are well positioned to develop seabird bycatch reduction programs needed to implement the NPOA-S, because they have already conducted seabird bycatch assessments and developed regulations to implement seabird bycatch reduction measures.

Role of the ISWG

The ISWG is composed of agency staff from NMFS, FWS, and DOS. The ISWG should continue to address seabird bycatch issues and help coordinate the implementation of the NPOA-S and IPOA-S. Future activities of the ISWG may include, but are not necessarily limited to, the following:

- Assist in development and review of regional seabird bycatch programs and individual Council Plans of Action
- Assist in assessing the adequacy and effectiveness of these programs
- Assist in drafting of the NPOA-S Implementation Report that is to be included in the biennial report to FAO on Code of Conduct for Responsible Fisheries
- Promote and coordinate implementation of the NPOA-S and the IPOA-S in all relevant U.S., international, and regional fisheries organizations
- Advise on training for Regional and Council staff on how to conduct seabird assessments and develop regional seabird bycatch reduction programs, and
- Brief the public and interested parties on the status of the NPOA-S, additional efforts to reduce seabird bycatch in other fisheries, and on related efforts.

Action Elements of the NPOA-S

For those areas where longline fisheries occur, this NPOA-S strongly encourages that the following actions to be taken:

I. *Assessment*: NMFS, in cooperation with FWS, will conduct regional assessments of seabird interactions with longline fishing gear within no longer than 2 years of the adoption of the NPOA-S where none have been completed. NMFS and FWS will work in partnership with the Councils to conduct the assessments and determine the extent and nature of seabird interactions within each longline fishery conducted under a Council's area of authority. The assessment will address the following:

- Criteria used to evaluate the need for seabird bycatch mitigation and management measures
- Longline fishing fleet data (numbers and characteristics of vessels)
- Fishing techniques data (demersal, pelagic, and other pertinent technical information)
- Fishing areas (by season and geographic location)
- Fishing effort data (seasons, species, catch, number of sets, and number of hooks/year/fishery)
- Status of seabird populations in the fishing areas, if known
- Estimated total annual seabird species-specific catch and catch-per-unit-effort (number/1,000 hooks set/species/fishery)
- Existing area and species-specific seabird bycatch mitigation measures and their effectiveness in reducing seabird bycatch
- Efforts to monitor seabird bycatch (e.g., observer program and logbooks), and
- Statement of conclusions and decision to develop and implement mitigation measures as needed.

If NMFS or a Council assesses seabird bycatch in a longline fishery and determines that a seabird bycatch problem does exist, then a mitigation plan will be developed within 1 year to implement the following action items within 2 years. Additionally, NMFS and the Councils will review such a determination on a regular basis (at least every 4 years), and take into account changes such as expansion or reduction of existing longline fisheries or the development of new fisheries. If, based on an initial or a subsequent assessment, it is determined that a seabird bycatch problem (*e.g.,* impact on a population or unacceptable take of a species) does not exist, then no additional action is necessary until the next periodic assessment (within 4 years).

II. *Data Collection*: Seabird bycatch data collection programs should collect statistically reliable data to determine seabird bycatch rates in longline fisheries and to evaluate the effectiveness of mitigation measures. Such programs will be incorporated into existing fishery observer programs wherever possible. Ongoing data collection efforts, including the NMFS Observer Program, will be expanded to include detailed data on seabird interactions. Some progress towards this goal has been made regionally, but efforts will be expanded across all U.S. longline fisheries in order to determine which fisheries have seabird bycatch problems. This effort will be facilitated and coordinated by the recently created NMFS National Observer Program.

III. *Prescription of Mitigation Measures*: Where appropriate, longline fishery-specific seabird mitigation methods should be prescribed by the Councils for longline fisheries with seabird bycatch problems. These measures should be of known efficiency and be cost-effective for the fishing industry. Councils should implement several different mitigation measures based on the particular circumstances of individual longline fisheries if bycatch reduction can be improved by combining different mitigation measures or devices. See the technical note in Appendix 1 for suggested measures.

NMFS and the Councils, in collaboration with FWS, will examine each individual longline fishery, even prior to the completion of the formal assessments, to determine whether the precautionary imposition of seabird bycatch mitigation is appropriate and practicable. These management measures should be incorporated into FMP or regulatory amendments and submitted to NMFS for approval and implementation.

IV. *Research and Development of Mitigation Measures and Methods*: NMFS, in consultation with FWS, will work in partnership with the Councils and longline fishermen to conduct research on seabird bycatch, develop the most practical and effective seabird deterrent measures, evaluate the effectiveness of those measures, and evaluate and improve other technologies and practices that reduce seabird bycatch. This may include incentive programs and recognition of individual fishermen that achieve low seabird bycatch rates.

Seabird bycatch reduction will be supported through continuing research into new gear designs and fishing techniques. The IPOA-S includes descriptions of gear modifications and fishing techniques currently being used and tested in the various longline fisheries around the world. It is important to reiterate that seabird bycatch reduction measures developed for one fishery may not be equally successful in other fisheries.

V. *Outreach, Education, and Training About Seabird Bycatch*: NMFS and FWS will:

- Develop mechanisms to raise awareness among fishermen, fishing industry associations, gear manufacturers, and other groups concerning the need to reduce seabird bycatch in longline fisheries. This should include designing and implementing seabird bycatch outreach programs for fishermen, fisheries managers, gear technologists, maritime architects, shipbuilders, conservationists, and other partners. These programs should improve understanding of seabird bycatch problems and the importance of using mitigation measures. Outreach programs should include educational curricula and guidelines that will be disseminated through workshops, videos, handbooks, brochures, and posters. The program should focus on both the conservation aspects of managing seabird bycatch and the economic benefits of increased fishing efficiency that result from eliminating bait loss to seabirds.
- Make available the NPOA-S, IPOA-S, and other information on seabird bycatch in longline fisheries.
- Promote the implementation of the NPOA-S within U.S. fisheries.
- Provide information about seabird bycatch technical and financial assistance, and

- Provide education to Council, NMFS, and FWS personnel on seabird bycatch assessments and reduction measures.

VI. *Reporting*: NMFS, in collaboration with the appropriate Councils and in consultation with FWS, will prepare an annual report on the status of seabird mortality for each longline fishery, including assessment information, mitigation measures, and research efforts. FWS will also provide regionally-based seabird population status information that will be included in the annual reports. The reports will be submitted annually as part of the Stock Assessment and Fishery Evaluation (SAFE) Report that is already provided on an annual basis by NMFS and made widely available. Such annual reports will be compiled and incorporated into NMFS' biennial status report to FAO on its implementation of the *Code of Conduct for Responsible Fisheries*. The ISWG may participate in the compilation, drafting, and review of the NPOA-S section of the biennial report to FAO.

VII. *Collaboration between NMFS and the FWS on Seabird Issues*: NMFS and FWS will continue to promote and implement the NPOA-S. This should be accomplished at the regional level through the Council process and by the FWS through research needed to assess and monitor seabird populations and to improve population assessment methodologies. The ISWG should continue to collaborate on seabird bycatch issues at both the national and international levels.

NMFS and FWS will:

- Participate in the Council process to help develop, implement, review, and recommend changes to regional seabird bycatch programs, recognizing that FWS currently has no vote on the Councils
- Assess all U.S. longline fisheries to determine whether a seabird bycatch problem exists
- Conduct collaborative research to determine the effectiveness of seabird bycatch mitigation measures, further refine those measures, and develop new measures
- Continue to develop and review fishery observer programs that collect seabird bycatch data
- Seek additional funding to expand observer programs and increase collection of seabird data
- Conduct outreach, education, and public awareness programs on seabird bycatch issues
- Provide recognition to fishermen and organizations that promote seabird bycatch reduction
- Develop incentive programs to encourage further seabird bycatch reductions
- Participate in national and international seabird bycatch meetings and workshops
- Assess, at least every 4 years, the implementation of the NPOA-S and individual fishery seabird bycatch mitigation plans to determine their effectiveness
- Continue ESA Section 7 Consultations as required
- Continue working through the ISWG to promote and coordinate implementation of the NPOA-S and the IPOA-S in all relevant international and regional fisheries organizations, and
- Develop consolidated biennial national status reports on seabird bycatch reduction to

provide to FAO.

TABLE OF PROPOSED TIMELINE FOR NPOA-S IMPLEMENTATION

ACTIVITY	DATE DUE
Seabird Bycatch Assessment	within 2 years of adoption of NPOA-S
Develop Regional Seabird Bycatch Reduction Programs	within 1 year of identifying a seabird bycatch problem
Prescription of Seabird Measures and other NPOA-S Action Elements	within 2 years of determining that a seabird bycatch problem exists
Seabird Bycatch Data Collection incorporated in New and Existing Observer Programs	as soon as practicable
Regional NPOA-S Implementation Report	submitted in the SAFE Report that is provided annually by NMFS and widely distributed
NPOA-S Implementation Report within the U.S. Report to FAO on Implementation of the Code of Conduct for Responsible Fisheries	biennial report that compiles regional U.S. seabird bycatch reduction activities and other measures the United States has taken to implement the NPOA-S and IPOA-S

TABLE OF ORGANIZATIONAL ROLES FOR SEABIRD BYCATCH REDUCTION

Action Items	NMFS	FWS	Council
1. Participate in the FMC process to review and recommend improvements to regional seabird bycatch programs	X	X	X
2. Conduct research on the effectiveness of seabird bycatch mitigation measures	X	X	
3. Develop or improve seabird bycatch data collection in fishery observer programs	X	X	X
4. Develop and conduct seabird bycatch education and outreach programs for fishermen and other interested individuals and organizations	X	X	X
5. Train the NMFS fishery observers in seabird identification and data collection	X	X	
6. Recognize achievements of fishermen and fishing organizations that promote seabird bycatch reduction	X	X	X
7. Participate in national and international meetings and workshops to promote seabird bycatch reduction	X	X	X
8. Provide information on seabird populations (distribution, abundance, population trends and demographic parameters)		X	
9. Participate in the NPOA Interagency Seabird Working Group to coordinate implementation of the NPOA-S and IPOA-S	X	X	
10. Develop annual regional and biennial national reports on seabird bycatch	X	X	
11. Summarize information on fishing methods, fishing effort, and fishery observer programs	X		
12. Summarize seabird bycatch data from NMFS longline fishery observer programs	X		

APPENDICES

to the

Final United States National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries

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NOTE: While the NPOA-Seabirds is not expected to change in the foreseeable future, these appendices will be updated as necessary. Each appendix will indicate the date it was last updated at the beginning of the appendix.

Appendix I. International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (as endorsed by the FAO Conference in November 1999)

FAO Fisheries Department
The International Plan of Action for Reducing Incidental
Catch of Seabirds in Longline Fisheries

Introduction

1. Seabirds are being incidentally caught in various commercial longline fisheries in the world, and concerns are arising about the impacts of this incidental catch. Incidental catch of seabirds may also have an adverse impact on fishing productivity and profitability. Governments, non-governmental organizations, and commercial fishery associations are petitioning for measures to reduce the mortality of seabirds in longline fisheries in which seabirds are incidentally taken.

2. Key longline fisheries in which incidental catch of seabirds are known to occur are: tuna, swordfish and billfish in some particular parts of oceans; Patagonian toothfish in the Southern Ocean, and halibut, black cod, Pacific cod, Greenland halibut, cod, haddock, tusk and ling in the northern oceans (Pacific and Atlantic). The species of seabirds most frequently taken are albatrosses and petrels in the Southern Ocean, northern fulmars in the North Atlantic and albatrosses, gulls and fulmars in the North Pacific fisheries.

3. Responding to the need to reduce the incidental catch of seabirds in commercial fisheries in the Southern Ocean, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) adopted mitigation measures in 1992 for its 23 member countries to reduce incidental catch of seabirds.

4. Under the auspices of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), Australia, Japan and New Zealand have studied and taken seabird mitigation measures in their southern bluefin tuna longline fishery since 1994, and in 1995 CCSBT adopted a recommendation relating to ecologically related species, including the incidental mortality of seabirds by longline fishing. The recommendation stipulates a policy on data and information collection, mitigation measures, as well as education and information dissemination. All member nations of CCSBT have made the use of bird scaring lines (tori poles) mandatory in their fisheries.

5. The United States of America also adopted, by regulation, measures for reducing incidental catch of seabirds for its groundfish longline fisheries in the Bering Sea/Aleutian Islands and Gulf of Alaska in 1997, and for its halibut fishery in 1998. The United States is currently developing measures to mitigate the incidental catch of seabirds in the Hawaiian

pelagic longline fisheries. Several other countries with longline fisheries have likewise adopted similar mitigation measures.

Origin

6. Noting an increased awareness about the incidental catch of seabirds in longline fisheries and its potential negative impacts on seabird populations, a proposal was made at the Twenty-second Session of the Committee on Fisheries (COFI) in March 1997 that FAO organize an expert consultation, using extra-budgetary funds, to develop Guidelines leading to a Plan of Action to be submitted at the next Session of COFI aiming at a reduction in such incidental catch.

7. The International Plan of Action for reducing incidental catch of seabirds in longline fisheries (IPOA-SEABIRDS) has been developed through the meeting of a Technical Working Group in Tokyo 25-27 March 1998[1] and the Consultation on the Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries held 26-30 October 1998 and its preparatory meeting held in Rome 22-24 July 1998[2].

Nature and Scope

8. IPOA-Seabirds is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). The provisions of Article 3 of the Code of Conduct apply to the interpretation and application of this document and its relationship with other international instruments. All concerned States[3] are encouraged to implement it.

9. The IPOA-SEABIRDS applies to States in the waters of which longline fisheries are being conducted by their own or foreign vessels and to States that conduct longline fisheries on the high seas and in the exclusive economic zones (EEZ) of other States.

Objective

10. Taking into account in particular the objectives of articles 7.6.9 and 8.5 of the Code of Conduct, the objective of the IPOA-SEABIRDS is to reduce the incidental catch of seabirds in longline fisheries where this occurs.

Implementation

11. In implementing the IPOA-SEABIRDS States should carry out a set of activities. This should be done as appropriate in conjunction with relevant international organizations. The exact configuration of this set of activities will be based on an assessment of the incidental catch of seabirds in longline fisheries.

12. States with longline fisheries should conduct an assessment of these fisheries to determine if a problem exists with respect to incidental catch of seabirds. If a problem exists, States should adopt a National Plan of Action for reducing the incidental catch of seabirds in longline fisheries (NPOA-SEABIRDS). (See the attached "Technical note on developing a National Plan of Action for reducing the incidental catch of seabirds in longline fisheries".) When developing the NPOA-SEABIRDS experience acquired in regional management organizations should be taken into account as appropriate. FAO should provide a list of experts and a mechanism of technical assistance to countries for use in connection with development of NPOA-SEABIRDS.

13. States that determine that an NPOA-SEABIRDS is not necessary should review that decision on a regular basis, particularly taking into account changes in their fisheries, such as the expansion of existing fisheries and/or the development of new longline fisheries. If, based on a subsequent assessment, States determine that a problem exists, they should follow the procedures outlined in paragraph 12, and implement an NPOA-SEABIRDS within two years.

14. The assessment should be included as a part of each relevant State's NPOA-SEABIRDS.

15. Each State is responsible for the design, implementation and monitoring of its NPOA-SEABIRDS.

16. States recognize that each longline fishery is unique and the identification of appropriate mitigation measures can only be achieved through on-the-spot assessment of the concerned fisheries. Technical and operational mitigation measures are presently in use or under development in some longline fisheries where incidental catch of seabirds occurs. Measures developed by different States are listed in a Technical Note attached to this document. This list does not prejudice the right of States to decide to use any of these or other suitable measures that may be developed. A more comprehensive description and discussion of the mitigation measures currently used or under development can be found in FAO Fisheries Circular No. 937.

17. States should start the implementation of the NPOA-SEABIRDS no later than the COFI Session in 2001.

18. In implementing their NPOA-SEABIRDS States should regularly, at least every four years, assess their implementation for the purpose of identifying cost-effective strategies for increasing the effectiveness of the NPOA-SEABIRDS.

19. States, within the framework of their respective competencies and consistent with international law, should strive to cooperate through regional and subregional fisheries organizations or arrangements, and other forms of cooperation, to reduce the incidental catch of seabirds in longline fisheries.

20. In implementing the IPOA-SEABIRDS States recognize that cooperation among States which have important longline fisheries is essential to reduce the incidental catch of seabirds given the global nature of the issue. States should strive to collaborate through FAO and through bilateral and multilateral arrangements in research, training and the production of information and promotional material.

21. States should report on the progress of the assessment, development and implementation of their NPOA-SEABIRDS as part of their biennial reporting to FAO on the Code of Conduct for Responsible Fisheries.

Role of FAO

22. FAO will, as and to the extent directed by its Conference, and as part of its Regular Programme activities support States in the implementation of the IPOA-SEABIRDS.

23. FAO will, as and to the extent directed by its Conference, support development and implementation of NPOA-SEABIRDS through specific, in-country technical assistance projects with Regular Programme funds and by use of extra-budgetary funds made available to the Organization for this purpose.

24. FAO will, through COFI, report biennially on the state of progress in the implementation of the IPOA-SEABIRDS.

TECHNICAL NOTE ON DEVELOPING A NATIONAL PLAN OF ACTION FOR REDUCING THE INCIDENTAL CATCH OF SEABIRDS IN LONGLINE FISHERIES (NPOA-SEABIRDS)

This is not an exclusive or necessarily all-encompassing list but provides guidance for preparation of the NPOA-SEABIRDS.

The NPOA-SEABIRDS is a plan that a State designs, implements and monitors to reduce the incidental catch of seabirds in longline fisheries.

I. Assessment

1. The purpose of the assessment is to determine the extent and nature of a State's incidental catch of seabirds in longline fisheries where it occurs.

2. The assessment may include, but is not limited to, the collection and analysis of the Criteria used to evaluate the need for an NPOA-SEABIRDS.

- Fishing fleet data (numbers of vessels by size).
- Fishing techniques data (demersal, pelagic, methods).
- Fishing areas.

- Fishing effort by longline fishery (seasons, species, catch, number of hooks/year/fishery).
- Status of seabird populations in the fishing areas, if known.
- Total annual catch of seabirds (numbers per 1000 hooks set/species/longline fishery).
- Existing mitigation measures in use and their effectiveness in reducing incidental catch of seabirds.
- Incidental catch of seabirds monitoring (observer program, etc.).
- Statement of conclusions and decision to develop and implement an NPOA-SEABIRDS.

II. NPOA-SEABIRDS

The NPOA-SEABIRDS may contain the following elements:

1. Prescription of mitigation measures

The NPOA-SEABIRDS should prescribe appropriate mitigation methods. These should have a proven efficiency, and be cost-effective for the fishing industry. If effectiveness of mitigation measures can be improved by combining different mitigation measures or devices, it is likely that each State will find it advantageous to implement a number of different measures that reflect the need and particular circumstances of their specific longline fishery.

2. Research and development

The NPOA-SEABIRDS should contain plans for research and development, including those aiming: (i) to develop the most practical and effective seabird deterrent device; (ii) to improve other technologies and practices which reduce the incidental capture of seabirds; and (iii) undertake specific research to evaluate the effectiveness of mitigation measures used in the longline fisheries, where this problem occurs.

3. Education, training and publicity

The NPOA-SEABIRDS should prescribe means to raise awareness among fishers, fishing associations and other relevant groups about the need to reduce the incidental catch of seabirds in longline fisheries where this occurs; National and International Plans of Action and other information on the incidental catch of seabirds in longline fisheries; and to promote the implementation of the NPOA-SEABIRDS among national industry, research and its own administration.

Provide information about technical or financial assistance for reducing the incidental catch of seabirds.

Preferably design and implementation of outreach programmes for fishers, fisheries managers, gear technologists, maritime architects, shipbuilders, and conservationists and other interested members of the public should be described in the plan. These programmes should aim at improving the understanding of the problem resulting from incidental catch of seabirds and the use of mitigation measures. The outreach programme may include educational curricula, and guidelines disseminated through videos, handbooks, brochures and posters. The programme should focus on both the conservation aspects of this issue and on the economic benefits of expected increased fishing efficiency inter alia by eliminating bait loss to seabirds.

4. Data Collection

Data collection programmes should collect reliable data to determine the incidental catch of seabirds in longline fisheries and the effectiveness of mitigation measures. Such programmes may make use of onboard observers.

TECHNICAL NOTE ON SOME OPTIONAL TECHNICAL AND OPERATIONAL MEASURES FOR REDUCING THE INCIDENTAL CATCH OF SEABIRDS

I. INTRODUCTION

To reduce the incidental catch of seabirds, it is essential to reduce the number of encounters between seabirds and baited hooks. It should be noted that, if used in combination, the options could improve mitigation effectiveness.

For each of the measures, the effectiveness and the cost involved for fishers are briefly presented. In this presentation, "effectiveness" is defined as to what extent the measures reduce incidental catch of seabirds; "cost" is defined as the initial cost or investment and any ongoing operational costs.

Other technical options are currently under development and fishers and researchers in the field may develop new mitigation measures, so the list of measures is likely to increase over time.

If effectiveness of mitigation measures can be improved by combining different mitigation measures or devices, each State may find it advantageous to implement different measures that are more suitable for their conditions and reflect the needs of their specific longline fisheries.

The list below should not be considered mandatory or exhaustive and FAO shall maintain a data base of measures that are in use or under development.

II. TECHNICAL MEASURES

1. Increase the sink rate of baits

a) Weighting the longline gear

Concept: Increase the sinking speed of baited hooks and reduce their exposure time to seabirds.

Effectiveness: Studies have shown that appropriate line-weighting can be highly effective in avoiding bait loss to birds.

Cost: The cost is the initial purchase of the weighting material (either heavier gear or weights) and any ongoing replacement of weights lost during fishing.

b) Thawing bait

Concept: Overcome buoyancy problems in bait by thawing and/or puncturing swim bladders.

Effectiveness: Rate of incidental catch of seabirds is reduced when thawed baits are used. It has also been shown that bait fish with deflated swim bladders sink more quickly than those with inflated swim bladders did.

Cost: Possible costs include bait thawing rack, or extra weight to compensate flotation resulting from the air bladder.

c) Line-setting machine

Concept: Increase line sinking rate by removing line tension during gear deployment.

Effectiveness: Although no quantitative assessments have been done, this practice would resultin the line sinking more rapidly thereby reducing availability of baited hooks to seabirds.

Cost: For some fisheries, initial costs may include purchase of a line-setting device.

2. Below-the-water setting chute, capsule, or funnel

Concept: Prevent access by seabirds to baited hooks by setting line under water.

Effectiveness: Underwater setting devices are still under development but could have higheffectiveness.

Cost: Initial cost would include purchase of the underwater setting device.

3. Bird-scaring line positioned over or in the area where baited hooks enter the water

Concept: Prevent seabirds access to baited hooks where they enter the water. The bird scaring line is designed to discourage birds from taking baited hooks by preventing their access to baited hooks. Design specifications may vary by vessel, fishing operation, and location and are critical to its effectiveness. Streamer lines and towing buoys are examples of these techniques.

Effectiveness: A number of studies and anecdotal observations have demonstrated significant effectiveness of these devices when properly designed and used.

Cost: Low initial cost for the purchase and installation of bird scaring line.

4. Bait casting machine

Concept: Places bait in area protected by a bird scaring line and outside the turbulence caused by the propeller and the ships wake.

Effectiveness: Deployment of bait under the protection zone of the bird-scaring line reduces the availability of baited hooks to seabirds. The extent to which bait loss is reduced by the use of bait casting machines, used either without a bird-scaring line or in such a manner that baits are not protected by a bird-scaring line, is yet to be determined.

Cost: High, initial costs may include purchase of a bait-casting device.

5. Bird scaring curtain

Concept: To deter seabirds from taking baited hooks during the haul by using a bird scaring curtain.

Effectiveness: Anecdotal evidence indicates that the bird-scaring curtain can effectively discourage birds from seizing baits in the hauling area.

Cost: Low, cost for materials.

6. Artificial baits or lures

Concept: Reduce palatability or availability of baits.

Effectiveness: New baits are still under development and effectiveness has yet to be resolved.

Cost: Currently unknown

7. Hook modification

Concept: Utilize hook types that reduce the probability of birds getting caught when they attack a baited hook.

Effectiveness: Hook size might effect the species composition of incidentally caught seabirds. The effect of modification of hooks is, however, poorly understood.

Cost: Unknown.

8. Acoustic deterrent

Concept: Deterring birds from the longline using acoustic signals, such as high frequency, high volume, distress call, etc.

Effectiveness: Low probability of being effective as background noises are loud and habituation to noises is common among seabirds.

Cost: Unknown

9. Water cannon

Concept: Concealing baited hooks by using high pressure water.

Effectiveness: There is no definite conclusion about the effectiveness of this method.

Cost: Unknown.

10. Magnetic deterrent

Concept: Perturbing the magnetic receptors of the birds by creating magnetic fields.

Effectiveness: No indication of effect in practical experiments.

Cost: Unknown.

III. OPERATIONAL MEASURES

1. Reduce visibility of bait (Night setting)

Concept: Set during hours of darkness and reduce illumination of baited hooks in the water.

Effectiveness: This method is generally recognized as being highly effective. However, effectiveness can vary between fishing grounds and also seasonally according to the seabird species. Effectiveness of this measure may be reduced around the full moon.

Cost: A restriction of line setting to the hours of darkness may affect fishing capacity, especially for smaller longliners. Small costs may be incurred to make vessel lighting appropriate. Such restriction can also entail investing in costly technology for maximizing fishing efficiency in ashorter period of time.

2. Reduce the attractiveness of the vessels to seabirds

Concept: Reducing the attractiveness of vessels to seabirds will reduce the potential for seabirds being incidentally caught. Materials (e.g. fish discards, garbage) discharged from vessels should be at a time or in a way that makes them least available to birds or least likely to cause them harm. This includes avoidance of the dumping of discarded fish, offal, fish heads, etc. with embedded hooks. If dumping offal is unavoidable, it should be done on the opposite side of the vessel to where lines are being set or in such a manner that birds are not attracted to the vessel (e.g. at night).

Effectiveness: The issue of offal discharge is a complex one, and there have been conflicting results regarding effects of various procedures in the studies done to date.

Cost: Low; in some situations costs may be associated with providing for offal containment or reconfiguration of offal discharge systems on the vessel.

3. Area and seasonal closures

Concept: Reduce incidental catch of seabirds when concentrations of breeding or foraging seabirds can be avoided.

Effectiveness: Area and seasonal closures could be effective (such as in high density foraging areas or during the period of chick care when parental duties limit the distances adults can fly from breeding sites) although displacement of fishing fleet to other seabird areas needs to be considered.

Cost: Unknown, but a restriction on fishing by area or season may effect fishing capacity.

4. Give preferential licensing to vessels that use mitigation measures that do not require compliance monitoring

Concept: Incentive provided for effective use of mitigation measures that do not require compliance monitoring.

Effectiveness: May be highly effective in stimulating the use of mitigation measures and development of fishing systems that reduce incidental catch of seabirds.

Cost: Unknown.

5. Release live birds

Concept: If despite the precautions, seabirds are incidentally caught, every reasonable effort should be made to ensure that birds brought onboard alive are released alive and that when possible hooks should be removed without jeopardizing the life of the birds.

Effectiveness: Depends on the number of birds brought onboard alive and this is considered small by comparison to the numbers killed in line setting.

Cost: Unknown.

[1] See: "Report of the Technical Working Group on Reduction of Incidental Catch of Seabirds in Longline Fisheries. Tokyo, Japan, 25-27 March 1998. FAO Fisheries Report No. 585.

[2] See report: "Preparatory Meeting for the Consultation on the Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries". Rome, 22-24 July, 1998. FAO Fisheries Report No. 584.

[3] In this document the term "State" includes Members and non-members of FAO and applies *mutatis mutandis* also to "fishing entities" other than States.

August 1, 2001

Appendix II. Longline Fisheries of the United States: Seabird Bycatch Assessments, Descriptions, Regulations, Current Mitigation Efforts, Current Research Efforts, and Monitoring of Seabird Bycatch by Fishery Management Councils and International Agreements

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Western Pacific Fishery Management Council (WPFMC)

National Marine Fisheries Service, Southwest Region, Pacific Islands Area Office Seabird Bycatch Assessment

The Hawaii-based pelagic longline fisheries exhibit a seabird bycatch problem and in accordance with the FAO's *International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries*, it is the intent of the NMFS Southwest Region and its Pacific Islands Area Office, in collaboration with the WPFMC and the U.S. Fish and Wildlife Service (USFWS), to implement, the action items described in the U.S.'s *National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries.*

Introduction

The National Marine Fisheries Service (NMFS), an agency of the National Oceanic and Atmospheric Administration (NOAA), has five regions located throughout the United States. The NMFS Southwest Region consists of both management and research entities. Fisheries management, protected resources, and habitat conservation issues are addressed by the Southwest Regional Office located in Long Beach, California, and its field offices in Santa Rosa, Arcata, and Eureka, California; Honolulu, Hawaii; and Pago Pago, American Samoa. Scientific and technical support is provided to the Southwest Regional Office by the Southwest Fisheries Center located in La Jolla, California, and its laboratories in Santa Cruz/Tiburon and Pacific Grove, California, and in Honolulu, Hawaii.

The Pacific Islands Area Office (PIAO), one of the field offices for the Southwest Region, is located in Honolulu, Hawaii. The PIAO assesses, manages, and promotes the conservation of living marine resources in U.S. waters encompassing more than 1.7 million square miles of the Pacific Ocean. The PIAO responsibility for managing protected species extend from the Hawaiian Archipelago to Guam and the Northern Mariana Islands, the islands of the former U.S. Pacific Trust Territory (the Federated States of Micronesia, the Marshall Islands and Palau), and America Samoa. Also included in PIAO's responsibilities are the U.S. Pacific Islands possessions of Johnston Atoll, Wake Island, Kingman Reef Palmyra Atoll, Howland Island, Jarvis Island and Baker Island. The culturally-distinct western Pacific island communities vary widely in terms of language, traditional practices, and local economies, however, they are dependent on and utilization of the ocean resources. The PIAO plays a major role in strengthening the NOAA/NMFS partnerships with Pacific island communities in the management and conservation of fisheries and protected resources and habitats in the Western Pacific Region. In addition to ensuring that federally managed fisheries do not adversely affect protected species, the PIAO also works to recover endangered and threatened species.

The PIAO and NMFS Honolulu Laboratory work cooperatively with the WPFMC on seabird bycatch issues. The WPFMC was established by the Magnuson Fishery Conservation and Management Act of 1976 (Public Law 94-265; 16 U.C.S. 1801 et. seq.) to develop fishery

management plans (FMPs) for fisheries operating in the U.S. Exclusive Economic Zone (EEZ) around American Samoa, Guam, Hawaii, the Northern Mariana Islands and the remote U.S. Pacific Island possessions.[1] The NMFS Honolulu Laboratory has been in operation since 1949, and is organized into five research areas: 1) fish biology and ecology; 2) ecosystems and environment; 3) stock assessment; 4) fishery management and perfomance; and, 5) protected species.

Seabirds Affected

Hawaii-based longline vessels targeting broadbill swordfish (*Xiphias gladius*) and tuna (*Thunnus* spp.) inadvertently hook and kill black-footed albatrosses (*Phoebastria nigripes*) and Laysan albatrosses (*P. immutabilis*) that nest in the Northwestern Hawaiian Islands (NWHI).

The NWHI are the primary breeding colonies for the black-footed and Laysan albatross populations and these species range throughout the North Pacific primarily between 20° N. and 58° N. latitude. Black-footed albatrosses are less abundant than Laysan albatrosses at the NWHI, with about 59,622 nesting pairs, versus 558,378 nesting pairs of Laysan albatrosses (WPFMC 2000). Ninety-six percent of black-footed albatross nesting sites and more than 99% of Laysan albatross nesting sites are in the NWHI. As the number of juvenile (i.e., non-breeding) albatrosses may be five to six times the number of adult (i.e., breeding albatrosses) (Pradel, 1996), the total world populations for black-footed and Laysan albatrosses are estimated to be 300,000 and 2.4 million, respectively (WPFMC 2000). A USFWS census data show that during the last decade the number of breeding pairs of black-footed albatrosses in nesting colonies in the NWHI have marginally decreased by only about 1.3 percent while the number of breeding pairs of Laysan albatrosses have declined by more than ten percent.

The average annual incidental catches of black-footed and Laysan albatrosses in the Hawaii longline fishery represent about 0.6% and 0.06% of the total estimated populations of these species, respectively (Table 6). This source of seabird mortality cannot account for all of the declines in the number of NWHI Laysan albatross breeding pairs. Although it is known that foreign longline vessels are operating in the foraging areas of the albatrosses close to the northern boundary of the U.S. EEZ around the NWHI, the number of seabirds killed by these vessels is unknown (WPFMC 2000).

Neither albatross species is listed as endangered, but both are protected under the U.S. Migratory Bird Treaty Act (16 U.S.C. 703 et. seq.). Under the World Conservation Union (IUCN) criteria for identification of threatened species, the conservation status for the black-footed albatross is currently listed as Vulnerable (Croxall and Gales, 1998). Laysan albatrosses are the most numerous of the North Pacific albatrosses, consequently, the IUCN assigned a "lower risk – least concern" criteria to the species (Croxall and Gales, 1998).

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[1] Howland Island, Baker Island, Jarvis Island, Johnston Atoll, Midway Island, Kingman Reef, Palmyra Atoll, and Wake Island.

The endangered short-tailed albatross (*P. albatrus*) also visit the NWHI. In 1997, a short-tailed albatross was seen flying over a vessel engaged in swordfish longlining research operations northeast of the main Hawaiian Islands (MHI). This was the first at-sea observation of this species off the Hawaiian Islands. In January 2000, a NMFS observer saw a juvenile short-tailed albatross flying near a Hawaii-based longline fishing vessel at 33° 09′ N., 147° 49′ W. Although no short-tailed albatross has been reported taken in Hawaii's longline fishery, it is possible that longline fishing vessels have encountered this albatross, albeit infrequently given its very low abundance and known range in the North Pacific region. A biological consultation under Section 7 of the Endangered Species Act was initiated by NMFS in 1999 to determine the effects of the Hawaii-based longline fleet on the short-tailed albatross. A biological assessment completed by the PIAO concluded that, at present, the chance of an interaction between a Hawaii-based longline vessel and a short-tailed albatross is extremely low, but would be reduced further if mitigation measures were employed by longline vessels (NMFS, 1999). The Section 7 consultation resulted in the issuance of a Biological Opinion (BO) by the consulting agency, USFWS, on November 28, 2000. The BO concluded that the fishery may adversely affect short-tailed albatrosses, and contained several terms and conditions which must be implemented by April 15, 2001.

Currently, the short-tailed albatross is listed as an endangered species throughout its range under the Endangered Species Act of 1973 (ESA). Under the IUCN criteria for identification of threatened species the short-tailed albatross is listed as vulnerable (Croxall and Gales, 1998). The short-tailed albatross is also listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; July 1, 1975) which protects the endangered species by prohibiting its commercial import or export or the trade of its parts across international borders.

Prior to the late 1980s, there were millions of short-tailed albatrosses, and the species was once considered to be the most numerous albatross in the North Pacific. In the late 1980s, however, commercial harvesting of the short-tailed albatross for feathers, oil, and fertilizer at the breeding colonies resulted in the decline of the species to near extinction. The short-tailed albatross is known to breed only in the western North Pacific Ocean, south of the main islands of Japan. Although at one time there may have been more than ten breeding locations (Hasegawa, 1979), today there are only two known active breeding colonies, Minami Tori Shima Island ("Torishima") (30° 29′ N., 140° 19′ E.) and Minami-Kojima Island (25° 56′ N., 123° 42′ E.). On December 14, 2000, one short-tailed albatross was discovered incubating an egg on Yomejima Island of the Ogasawara Islands (southernmost island among the Mukojima Islands). Currently, the breeding population is estimated at approximately 243 breeding pairs: 213 pairs on Torishima and 30 pairs on Minami-Kojima (Hasegawa, pers. comm.). It is projected that there will be 380 breeding pairs on Torishima by the year 2010[2]. The current world-wide population of Short-tailed albatrosses is estimated at about 1,100 individuals (Hasegawa, pers. comm.).

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[2] Based on preliminary population analyses by Dr. Hiroshi Hasegawa, Biology Department, Toho University, Miyama, Funabashi, Chiba, Japan (1997). Short-tailed Albatross: annual survival rate = 96%; % current breeders of the breeding population = 75%; breeding success = 53%; clutch-size = 1; fledgling rate = 0.24; sex ratio = 0.5.

In the NWHI, the majority of the short-tailed albatross sightings on land are coincident with the breeding season, occurring in the fall and winter months, of October to March. A biological assessment completed by the PIAO estimated that at least 15 short-tailed albatrosses have visited the NWHI over the past 60 years with only one or two birds present each year (NMFS, 1999). Short-tailed albatrosses have also attempted to breed on Midway Atoll. A lone short-tailed albatross female has visited Midway Atoll each breeding season since 1989, and has laid an infertile egg in three breeding seasons between 1994 and 1997. Other sightings of short-tailed albatrosses visiting the Hawaiian Islands (but not displaying breeding behavior) have been reported on Laysan Island (25° 42′ N., 171° 44′ W.), Green Island, Kure Atoll (28° 25′ N., 178° 10′ W.) and Tern Island, French Frigate Shoals (23° 45′ N., 166° 15′ W.).

Three species of boobies and shearwaters also breed in the NWHI and forage in the North Pacific: the masked booby *(Sula dactylatra)*, the brown booby *(Sula leucogaster)* and the red-footed booby *(Sula sula*); the wedge-tailed shearwater (*Puffinus pacificus*), the Christmas shearwater (*P. nativitatis*) and the Newell's shearwater (*P. auricularis newelli*). A fourth shearwater, the short-tailed shearwater (*P. tenuirostris*), breeds in Australia but migrate across Hawaiian waters to forage at Kotzebue Sound which is north of the Arctic Circle in Alaska (Harrison, 1996). Currently, the World Conservation Union classifies boobies as "not globally threatened" and the wedge-tailed shearwater is one of the most abundant seabirds in the Hawaiian Islands with an estimated 1,330,000 birds (Harrison, 1990). Worldwide there is an estimated 5.2 million wedge-tailed shearwaters (Whittow, 1997). The Newell's shearwater, however, is listed as "threatened" on the U.S. Endangered Species List and is considered to be in great jeopardy by the IUCN. The conservation status of the Christmas shearwater is unknown. To date, there have been no reports of lethal interactions between boobies and the Hawaii-based longline fishery. NMFS observer records show that in 1995, a wedge-tailed shearwater was incidentally caught by Hawaii longline vessels targeting tuna. Boobies are reported to sit on vessel decks and watch the baited hooks as they are being set or hauled back while shearwaters rarely show interest in fishing operations. NMFS observers report boobies hovering over baited hooks and some birds may actually attempt a dive, however, no boobies have been reported hooked.

Generally, boobies tend to fish closer inshore than the albatrosses, with brown boobies fishing closer inshore than the other two species (about 16 to 24 km from shore; Anderson 1954). Masked boobies rarely follow ships, whereas red-footed boobies range far from shore (up to 150 km; Nelson, 1978), freely approach vessels and readily perch in rigging. Boobies fish almost entirely by day, with the exception of the red-footed booby which is more nocturnal than the other two booby species, and have evolved to plunge dive (up to 5 m; Nelson, 1978) for their prey, using feet as flippers. Some booby species remain underwater for 25 to 40 seconds suggesting a pursuit by swimming (Gibson-Hill, 1947). Boobies also specialize in the aerial pursuit of flying fish (*Cypselurus* spp.), catching their prey above or just at the surface of the water.

Shearwaters are most active in the day and skim the ocean surface while foraging. During the breeding season, shearwaters tend to forage within 50 - 62 miles (80 -100 km) from their nesting burrows (Harrison, 1990). Shearwaters also tend to be gregarious at sea and only the Newell's and short-tailed shearwaters are known to occasionally follow ships (Harrison, 1996). Shearwaters feed by surface-seizing and pursuit-plunging (Warham, 1990). Often shearwaters will dip their heads under the water to site their prey before submerging (Warham, 1990). Shearwaters are efficient swimmers as their pelvises are narrow and their legs are placed far back on their body (Harrison, 1990). Shearwaters generally prefer fish, such as goatfish (Ammodytidae), carangids and juvenile yellowfin tuna (*Thunnus albacares*) (Harrison *et al.*, 1983), and consequently, high densities of these birds are seen in the southeastern portion of where the Hawaii longline fishery operates (Spear *et al.*, 1999).

Albatrosses, on the other hand, are strictly surface feeders making shallow dives for prey items like crustaceans, squid and fish (Harrison *et al.*, 1983), as well as baited hooks. Black-footed and Laysan albatrosses have been observed diving after sinking bait using an underwater video camera (C. Boggs, pers. comm.). The deepest dives observed were about two body lengths, which is equal to about 1.6 m. Behaviorally, albatrosses also tend to follow vessels more so than boobies and eagerly scavenge offal or galley refuse. The albatrosses have a well-developed olfactory system which assists them in locating food sources from great distances. Albatrosses also have excellent eye sight and use both scent and visual stimuli to locate and retrieve food sources.

Further, albatrosses, even breeding albatrosses with a chick in the nest, tend to roam greater distances in any one foraging trip in comparison to that of the boobies. Although the short-tailed albatross has been described as shy and was thought to rarely follow ships (King, 1967), recent observations in Alaskan waters contradict this. This albatross has been reported to follow fishing vessels in Alaskan waters and has been observed attempting to forage ship refuse and baited hooks. Given these differences in foraging behaviors between boobies, shearwaters and albatrosses and the lack of fishery interaction records for boobies, it appears that the albatrosses are the seabirds most at risk of being incidentally caught on Hawaii longline fishing operations.

It is the albatrosses that follow the longline vessels and dive on the baited longline hooks as the vessels deploy their fishing lines that tend to be killed. Incidental catches of seabirds may also occur as the longline is hauled. However, albatrosses are more often killed during longline setting because as they become hooked or entangled, they sink with the fishing gear and are drowned, whereas if birds are hooked during the haul back operation they can be often be released alive. Besides the direct mortality to juvenile or adult albatrosses, fishing-related deaths may also have a negative influence on chick survival if one or both parent birds are killed. Further, when a mate of a breeding pair is killed on longline gear, the remaining mate may lose up to three or more years in search of a new mate (WPFMC 2000). If mitigation measures were adopted by the Hawaii-based longline fishery, this would reduce the incidental mortality of albatrosses caught on longlines. In theory, there should be an immediate increase in fecundity due to a reduction in the number of widowed albatrosses searching for new mates. With both

parents supplying food to their chicks, there should be an increase in chick and fledgling survival. And, in theory after three to five years of mitigative effort by the Hawaii longline fishermen, there should be a noted increase in juvenile recruitment into the breeding populations, especially for the black-footed albatross.

Description of Fisheries

The current hook-and-line fisheries in Hawaii are dominated by the pelagic longline fisheries. Tunas (*Thunnus spp.*), broadbill swordfish (*Xiphias gladius*) and sharks are the dominant components of the Hawaii-based longline catch, but a variety of other pelagic species (Table 1) and some protected species are also caught. The Hawaii-based longline fishery is the largest commercial fishery in Hawaii and accounted for 85% of all commercial pelagic landings (28.6 million pounds) in 1998.

Longline fishing in Hawaii had been conducted for many decades prior to the expansion of the fishery in the late 1980s. Hawaii longline vessels evolved from wooden pole-and-line tuna sampans, employing longlines made from rope and fishing mainly within 2 - 20 nautical miles of the coast. By the 1930s, the longline fishery was second only to the pole-and-line skipjack tuna fishery in landed volume of fish, and accounted for most of the yellowfin tuna (*T. albacares*), bigeye tuna (*T. obesus*) and albacore (*T. alalunga*) landed in Hawaii. The longline fishery peaked in the mid-1950s with landings exceeding 2000 t and then declined steadily through lack of investment in boats and gear until the late 1980s.

The revitalization of the longline fishery was due to the development of local markets and export markets for fresh tuna in Japan and on the U.S. mainland due to the popularity of sushi bars during the late 1980s. Participation in the longline fishery increased from 37 vessels in 1987 to 80 in 1989, and then increased again to 144 vessels in 1991. Following the rapid expansion of the fishery between 1987 and 1991, entry to the longline fishery was halted through a moratorium on permit issuance in 1991, under an amendment to the WPFMC's Pelagic Fisheries Management Plan (FMP). In 1994, a limited entry program was implemented for the Hawaii longline fishery through another amendment to the FMP. This amendment established a cap of 164 permits for the Hawaii longline fishery, and limited fishing capacity by restricting maximum vessel size to 101 feet (30.8 m).

Landings in the Hawaii longline fishery increased rapidly from 1987 onwards, and by 1991 had reached 19.6 million lbs (8,9000 mt), of which about 10 million lbs (4,500 mt) was broadbill swordfish. The new entrants in the longline fishery were mostly steel hulled vessels between 70 and 80 ft (21 - 24 m) in length and their operators were former participants in the U.S. east coast tuna and swordfish fisheries. These newer vessels in the fishery were also characterized by a greater reliance on sophisticated electronic gear for navigation, marking deployed longline gear and finding fish. The revitalized fleet also adopted more modern longline gear, using continuous nylon monofilament main lines stored on spools, with snap-on monofilament branch lines. Over the same period, the range of the longline fishery expanded, with some vessels fishing up to

1,000 nautical miles from Hawaii and over half of the longline sets made at distances greater than 50 nautical miles away from the main Hawaiian Islands (MHI).

In early 1991, longline fishing was prohibited within 50 nautical miles of the Northwestern Hawaiian Islands (NWHI) to prevent interactions between the fishery and endangered populations of Hawaiian monk seals (*Monachus schauinslandi*). A further longline exclusion zone of 50-75 nautical miles was established in mid-1991 around the Main Hawaiian Islands (MHI) through Amendment 5 of the FMP. The closure around the MHI was in response to alleviate potential gear conflicts between small boat handline fishermen, charter boat operators, recreational fishermen and longline fishermen. Enforcement of the two longline exclusion zones around the MHI and the NWHI is possible with a Vessel Monitoring System (VMS). Hawaii-permitted longline vessels must be equipped with a satellite transponder that provides "real-time" position updates and tracks of vessel movements.

Description of vessels

There are 164 Federal limited entry permits issued for the Hawaii-based longline fishery. Vessels registered for use with Hawaii longline limited access permits are limited to 101 ft (30.8 m) in length, and vessels are categorized in three size classes: small (<56 ft), medium (56-74 ft), and large (>74 ft) vessels. The majority of vessels operating in the longline fishery are medium- and large-sized vessels. The number of active medium-sized vessels in 1991 was 61, 49 in 1996, and 55 in 1998. The number of active large-sized vessels was 49 in 1991, 35 in 1997, and 42 in 1998. The number of active small vessels decreased from 31 in 1991 to 17 vessels in 1998.

Overall, 114 longline vessels were active in 1998 (Table 2). In 1998, this fishery included 16 vessels that did not fish in 1997, but either began (n = 7) or resumed (n = 9) fishing in 1998 (Table 2). Among the vessels that resumed activity in this fishery, six of these vessels had fished for swordfish in Hawaii during the early 1990s before migrating to the U.S. mainland in 1994. Since their return to Hawaii in 1998, these six vessels have targeted tunas. Five vessels also left Hawaii in 1998, while two remained in Hawaii, but were inactive in 1998 (Table 2). One noticeable development in the longline fishery in 1998, was the relocation of 18 longline vessels to California (Ito and Machado, 1999). The number of active vessels in the fleet as a whole and by trip types between 1991 and 2000, are presented in Table 3.

Description of the Gear Used

The Hawaii pelagic longline fleet uses a monofilament longline gear system to target primarily broadbill swordfish and bigeye tuna (Figure 1). Both daytime and nighttime fishing are practiced and vessels generally set a single monofilament longline (i.e., mainline) up to 60 miles (96 km) in length. The mainline holds between 600-3,000 branch lines, each about (49 -65 feet) 15-20 meterslong holding a single hook. The branch lines are usually weighted with 40-80 grams of lead, but the proximity of the weight to the hook varies by vessel and target species. There are two gear configurations to target either swordfish or tuna. Some longline sets target both

swordfish and bigeye tuna and are called "mixed" sets. These sets are typically made with a modified swordfish gear configuration and without the use of a line-shooter.

Swordfish Gear

During swordfish fishing the longline is set at a shallow depth (5-60 m), and the longline gear is configured to sink comparatively slowly. The mainline is set without the use of a line-setting machine. Vessels targeting swordfish use open gap "J" hooks and large imported squid (*Illex* spp.) as bait. These vessels set between 800-1,500 hooks and deploy between 3-5 hooks per float. Swordfish vessels use branch lines with weights (60-80 grams) 5-7 meters from the hook and buoyant luminescent light sticks that attract swordfish and bigeye tuna, or their prey approximately 2-3 meters from the hook. Vessels targeting swordfish set according to the lunar cycle. As a consequence, these vessels set in the late afternoon or in the twilight hours and then haul back the line the next day.

Tuna Gear

Longline vessels targeting bigeye tuna use a line-setting machine (i.e., line-shooter) to deploy sufficient line to achieve a deep curve or sag in the longline. In targeting deep swimming bigeye tuna, 18-28 hooks are deployed between floats with lots of sag to reach as deep as 400 meters. Vessels targeting tuna set between 1,200-2,500 tuna ring hooks (i.e., a type of circle hook) and use samna (*Cololabis saira*) as bait. These vessels also use branch lines with 40-80 grams of weight less than one meter from the hook.

Fishing Effort

The number of fishing vessels operating in the Hawaii longline fishery rose from 50 in 1987, to a peak of 141 in 1991, followed by a period of decline and stabilization between 100 and 110 vessels during the mid- to late 1990s. In 2000, the number of active vessels increased to 125 (Table 3). Records of fishing activity extend only from 1991, after daily logbooks with catch and effort records were required of the longline vessels through an FMP amendment. Although the number of vessels active in the fishery has decreased since 1991, the overall fishing effort in number of hooks deployed has risen from 12.3 million in 1991, to 20.3 million hooks in 2000 (Figure 2, Tables 3 and 4).

The distribution of fishing effort with respect to targeting has also changed since 1991 (Figure 3 and Table 3). In general, the number of trips targeting principally tuna has risen steadily since 1991 (556), to 814 in 2000. Swordfish targeted trips reached a high of 310 in 1994, but declined to 37 trips in 2000, likely a result of the court-ordered longline area closures (Center for Marine Conservation v. NMFS Civ. No. 99-00152) that were established by emergency rule to protect sea turtles. Mixed target trips also has declined substantially. In 1991, there were 823 mixed trips; in 2000, only 252 trips were of a mixed type. Longline fishing effort is not uniform throughout the year, with a seasonal decline in the number trips and hooks set in the third quarter. The percentage of hooks set in the third quarter represents approximately 18 % of the annual total

number set, and the numbers set in the first, second and fourth quarters are about equal and each represent about 28% of the total set each year.

The distribution of fishing effort is not homogenous, with effort distributed between the U.S. EEZ around the Hawaiian Islands, the other U.S. EEZ waters in the western and central Pacific and the adjacent high seas. On average, 57% of longline fishing occurs within the EEZ surrounding the Hawaiian Islands, with a further 40% on the high seas and 3% in the EEZs of uninhabited U.S. Pacific island possessions such as Palmyra Island and Kingman Reef, Jarvis and Howland and Baker Islands. The distribution of fishing effort in 1998, was notable for the high volume of fishing within the EEZs of these remote Pacific island areas (11.4%), particularly around Palmyra and Kingman Reef. This was in response to the high abundance of bigeye tuna in these waters which occurs periodically in the lower latitudes to the south of Hawaii.

During 2000, 28% (5.74 million hooks) and 10% (2.05 million hooks) of the total Hawaii-based longline fishing effort (20.3 million hooks set) occurred within the EEZ around the main Hawaiian Islands and NWHI, respectively. Fishing effort in the EEZ around the remote U.S. Pacific island areas accounted for 15% (3.02 million hooks set) of the total fishing effort and the remaining 47% (9.47 million hooks set) occurred in the adjacent high seas areas (NMFS Honolulu Laboratory longline logbook data, 2000).

Catch Composition

The average catch composition of the Hawaii-based pelagic longline fishery between 1991 and 1998, is shown in Figure 4. Logbook catches are reported in numbers of fish. The two most economically important components of the catch, swordfish and bigeye tuna, make about equal contributions to the catch in numbers (15% and 17%, respectively), although the largest single component of the catch is sharks (29%), most of which are blue shark (*Prionace glauca)*. Other important components of the Hawaii long line catch include mahimahi (*Coryphaena hippurus*) and albacore, both forming 11% of the catch, and yellowfin and striped marlin (*Tetrapturus audax*), both forming 5% of the catch. The remainder of the catch comprises other pelagic species such as ono (*Acanthocybium solandri*), blue marlin (*Makaira mazara*), other billfish and moonfish (*Lampris guttatus*).

The catch composition of the Hawaii longline fishery during 2000 changed slightly from the average catch composition for 1991 to 1998, in all likelihood a result of the court-ordered longline area closures that impacted the swordfish fishery. In 2000, the amount of swordfish caught decreased to 10% (37,023), whereas bigeye tuna catch increased to 21% (74,493),based on a total catch of 363,054 pelagic species landed by Hawaii longliners (NMFS Honolulu Laboratory preliminary longline logbook data, 2000). The catch composition of sharks decreased to 22%, whereas yellowfin tuna and mahimahi catches increased to 11% and 16%, respectively. The amount of the remaining economically important longline-caught pelagic species: blue

marlin, striped marlin, other billfish, albacore, ono, and moonfish that collectively had an average catch composition of 23% between 1991 and 1998, remained about the same in 2000 at 21%.

Monitoring of Seabird Bycatch

The two major sources of information on albatross interactions with Hawaii-based longline vessels are the mandatory logbook and observer data collection programs administered by NMFS. The longline logbook program requires operators of longline vessels to complete and submit to NMFS a data form containing detailed catch and effort data on each set (50 CFR 660.14). Although the information is extensive, it does not compare to the completeness of the data collected by NMFS observers. Furthermore, preliminary comparisons between logbook and observer data indicate under-reporting of protected species interactions by vessel operators in the logbooks (NMFS, 1996).

The Observer Program administered by NMFS was implemented in February 1994, to collect data on protected species interactions (marine turtles have highest priority) which include: all sea turtles, especially green, leatherback, and loggerhead turtles; Hawaiian monk seals; selected whale and dolphin species; and seabirds, including the albatross species and the brown booby (*Sula leucogaster*). The Observer Program has achieved 4.7%, 5.5%, 4.9%, 3.5% coverage of all trips in the first four years since it was implemented. The selection of trips to observe is based on a sampling design by DiNardo (1993) to monitor sea turtle interactions.

Although data collection on protected species is the primary purpose of the Observer Program, the observers also collect catch data on the fishery and in total record five different sets of data: 1) incidental sea turtle take events; 2) fishing effort; 3) interactions with other protected species; 4) fishes kept and discarded, by species; and 5) life history information, including biological specimens in some instances. The data from this program cover observed trips from February 25, 1994 (tail end of first quarter 1994), to the end of the fourth quarter of 1998, and are the primary source of statistical information for this assessment.

The NMFS Honolulu Laboratory used data from observer reports and the federal Western Pacific Daily Longline Fishing Log to estimate the annual incidental catch of seabirds in the Hawaii longline fishery between 1994 - 1999, and describe the spatial distribution of the catch. Fleet-wide incidental catch estimates prior to 1998, were computed using a regression tree technique and bootstrap procedure (Skillman and Kleiber 1998). The regression tree technique revealed structure in observer data sets and was applied to an array of independent variables (e.g., month, latitude, longitude, target species, gear type, sea surface temperature and distance to seabird nesting colonies). The model was "pruned" by cross validation, meaning that only the statistically significant predictors of seabird catches were kept in the analysis. Interestingly, this analysis showed that catches of black-footed albatrosses were found to be significantly related only to proximity to nesting colonies and longitude, while catches of Laysan albatrosses were significantly related only to proximity to nesting colonies and year (WPFMC 2000). In 1999, Dr.

M. McCracken developed a new prediction model to estimate the number of black-footed and Laysan albatrosses taken by the Hawaii longline fishery during 1999, and then re-estimated takes for earlier years, 1994-1998 (Table 5).

For each albatross species, a prediction model was developed that related the number of takes documented by an observer to ancillary variables recorded in the vessel's logbook or derived from such variables. The model was then used to predict the number of albatrosses taken on each unobserved trip on the basis of the predictor variables recorded in the logbooks for those trips. The total annual take for the fleet was estimated by adding the sum of predicted takes for the unobserved trips to the sum of recorded takes for the observed trips. After exploring several alternative statistical models for take estimation, a negative binomial generalized linear model was adopted. Variables well represented in the logbooks and transformations of them were considered as candidate predictors. A bootstrapping procedure that takes into account the uncertainty of the prediction model parameter estimates, and also the random variation of actual unobserved takes about the expected predicted values was used to construct approximate "prediction intervals" for take. The bootstrap analysis also produced estimates of the estimation bias; the latter was used to adjust the point estimates. Point estimates adjusted for estimation bias and approximate prediction intervals for take are given in Table 5. Estimates of takes for the years 1994-1998 differ from values computed and reported by P. Kleiber in 1999. The revised estimates are based on a larger accumulation of observer statistics and different prediction models.

It is estimated that between 1994 and 1999, an average of 1,175 Laysan albatrosses and 1,388 black-footed albatrosses were killed in the Hawaii longline fishery each year (Tables 6.1). These average annual incidental catches represent about 0.46% and 0.05% of the estimated worldwide black-footed and Laysan albatross populations, respectively. At present it is estimated that the size of the breeding and non-breeding populations of black-footed and Laysan albatrosses are about 300,000 and 2.4 million birds, respectively (WPFMC 2000). Black-footed albatrosses are thought to be more assertive in their foraging behavior than other seabirds and are known to follow ships, whether fishing vessels or otherwise. In addition, the longline fishermen report seeing more black-footed albatrosses foraging near their vessels than Laysan albatrosses (McNamara, pers. comm.). Albatross behavior, coupled with their numbers, may explain why so many more black-footed albatrosses interact with Hawaii longline fishery than Laysan albatrosses. Recent satellite telemetry studies have shown that in general the Laysan albatrosses tend to fly to Alaska to forage whereas the black-footed albatrosses fly to the west coast continental U.S. (Anderson and Fernandez, 1998).

The current world breeding population of the Laysan albatross (558,415 birds) is roughly ten times that of the black-footed albatross (61,866 birds), yet more black-footed albatrosses have been recorded to interact with the Hawaii-based longline fishery, suggesting that the latter species is more seriously affected (WPFMC 2000). At present, it is estimated that the size of the breeding and non-breeding populations of black-footed and Laysan albatrosses are about 300,000 and 2.4 million birds, respectively (WPFMC 2000). These average annual incidental catches

represent about 0.6% and 0.06% of the estimated worldwide black-footed and Laysan albatross populations, respectively.

Even though no short-tailed albatrosses have been reported interacting with a Hawaii-based longline vessel or its gear, NMFS estimated that the range of maximum annual interactions in the Hawaii longline fishery is between one to three short-tailed albatrosses, based on the at-sea sighting from aboard the NOAA FRS *Townsend Cromwell* and visitations to the NWHI (NMFS 1999). The continued sighting of the lone female short-tailed albatross on Sand Island, Midway Atoll, indicates that if the bird interacted with a Hawaii longline vessel and its gear, the interaction was not lethal. Interactions could occur with no injuries to the bird, but hooking and entanglement interactions often lead to a death. Given the historical levels of fishing effort and no interactions of short-tailed albatrosses with the Hawaii longline fishery, the probability of a single interaction was assessed to be extremely low; and this probability could be reduced if seabird mitigation techniques were employed. Based on a random distribution of the short-tailed albatrosses in the North Pacific, and the area fished by the Hawaii longline fishery, in its Biological Opinion on operation of the Hawaii-based longline fishery on the short-tailed albatross, the USFWS estimated that 334 short-tailed albatrosses are in the area where the fishery operates and that up to 2.2 birds will be taken each year (USFWS 2000).

Current Mitigation Efforts

Background Information

Measures taken by the WPFMC in the early 1990s to manage the pelagic species fishery also had the additional effect of reducing the incidental catch of seabirds by Hawaii-based longline vessels. These measures include limiting the size of the longline fleet and prohibiting longline fishing in a 50 nautical mile area (protected species zone) around the NWHI. Specific action by the WPFMC to reduce the incidental catch of seabirds began in 1996, when the WPFMC and the USFWS conducted a workshop in September of that year in Honolulu to inform longline fishermen of the problem and various mitigation measures. The book *Catching Fish, Not Birds* by Nigel Brothers (1995) was translated into Vietnamese and Korean and copies were sent to all holders of a federal Hawaii longline limited access permit. A second workshop informing fishermen of the problem was held in January 1997. At that time, the USFWS also distributed a laminated card showing various species of albatross and describing possible mitigation methods. The card was issued in both English and Vietnamese.

Assessments of the level of voluntarily adoption of mitigation measures by Hawaii longline fishermen indicated that the education program described above was only partially successful. Two dockside visits by WPFMC and USFWS staff in mid-1997 to examine what mitigation measures, if any, were being employed revealed that, of the 12 longline vessels surveyed, five used weighted hooks, one used bait dyed blue to camouflage it in the water, three towed a trash bag or buoy, one scared birds with a horn, one distracted the birds by strategically discarding offal and two vessels took no measures. A mail survey of 128 Hawaii-based longline vessels was conducted by the Environmental Defense Fund during the same period. Ten of the 18 fishermen

that responded to a question regarding mitigation measures employed indicated that they were actively using some type of measure, such as reducing the use of deck lights at night, adding weights to increase the sink rate of the fishing line during setting, strategically discarding offal to distract birds, using a line-setting machine or setting the line under-water.

In October 1997, NMFS observers deployed on Hawaii-based longline vessels began recording which mitigation measures, if any, were being used voluntarily by fishermen. Information from the observer program for 1998 showed that nearly all vessels used some measure, the most common being to avoid setting the line in the vessel wake. About 55% of the vessels thawed the bait before baiting hooks, 29% of the vessels set at night and 11% avoided discarding unused bait while setting the fishing line. Only two percent of the vessels used a towed deterrent or blue-dyed bait.

In October 1998, a seabird population biology workshop was convened in Honolulu to make a preliminary assessment of the impact of fishing by the Hawaii-based longline fleet on the black-footed albatross population in the NWHI. The incidental catch of seabirds by fishing vessels was identified as a source of chronic or long term mortality. It was noted that the impact of the interactions would be more serious if the albatrosses killed were predominantly adult birds because this would result not only in the loss of chicks, but also the loss of many breeding seasons as the surviving mate must find another mate and establish a pair bond. However, banding data analyzed at the workshop suggested that it is predominantly immature juvenile birds that are interacting with longline boats. This finding is consistent with that of Brothers (1991), who observed that about four times as many juvenile as adult albatrosses are caught in the Southern Bluefin tuna (*Thunnus maccoyii*) longline fisheries.

In anticipation that regulatory measures would be required to further reduce the incidental catch of seabirds in the Hawaii longline fishery, the WPFMC in 1998 contracted Garcia and Associates to assess which mitigation methods would be most effective for local vessels and under actual commercial fishing conditions. As reported in McNamara *et al*. (1999), the study assessed the effectiveness of various mitigation methods aboard Hawaii-based longline vessels under actual fishing conditions. The mitigation techniques evaluated included several of those identified by Alexander, Robertson and Gales (1997) as being effective in other fisheries, such as night setting, towed deterrents, modified offal discharge practices and thawed bait. In addition, Garcia and Associates evaluated blue-dyed bait, the effectiveness of which appeared promising based on limited use by Hawaii-based longline vessels, but which had not been scientifically assessed. Because data collected by the NMFS Observer Program show that Hawaii-based longline vessels targeting swordfish had higher incidental catches of seabirds than did vessels targeting tuna (Table 11), Garcia and Associates tested the effectiveness of mitigation measures primarily during swordfish trips. The criteria used by Garcia and Associates to evaluate the effectiveness of mitigation measures included the number of attempts on (chases, landings and dives) and interactions (physical contact) with fishing gear as well as actual hookings and mortalities.

In early 1999, the NMFS Honolulu Laboratory assessed the effectiveness of several seabird mitigation methods during a cruise on a NOAA research vessel in the waters around the NWHI (Boggs, in press). This study was designed to supplement the field test of towed deterrents and blue-dyed bait conducted by Garcia and Associates, and to evaluate an additional measure: weighted branch lines. The advantage of using a research vessel to test the effectiveness of mitigation measures was that fishing operations could be controlled to improve the opportunities for observation, comparison and statistical analysis. For example, by setting gear in daylight researchers greatly increased the number of bird interactions with the gear in the presence and absence of each mitigation method. Easily regurgitated net pins were substituted for hooks in the research to avoid injuring seabirds.

During the WPFMC meeting in June 1999, the Council requested that NMFS provide analyses of the ecological and economic impacts of the mitigation measures evaluated by Garcia and Associates and the NMFS Honolulu Laboratory. In addition, the WPFMC requested that a range of geographical areas in which the measures would be applied be considered in the impact analyses in order to determine the geographical area that would offer the greatest protection for seabirds with the least negative economic impact on fishermen. The geographical areas considered were: 1) north of 25° N. latitude; 2) north of 23° N. latitude; 3) within the EEZ around the Hawaiian Islands; 4) within the EEZ around the Hawaiian Islands north of 23° N. latitude; and 5) within the EEZ around the Hawaiian Islands north of 25° N. latitude.

These mitigation measures and management areas were combined to create four management alternatives. The alternatives range from taking no action (Alternative 1) to prohibiting longline fishing within the EEZ north of 23° N. latitude (Alternative 4). Both alternatives 2 and 3 allow longline fishing within the EEZ, but require that vessel operators utilize two or more mitigation measures from a list of six tested measures (Table 6); the difference between the two alternatives being that Alternative 2 allows the fishermen to select which measures to employ while Alternative 3 assigns this decision to the WPFMC.

In October 1999, the WPFMC voted to require all Hawaii-permitted longline vessels to choose and employ two or more mitigation measures from a list of six tested measures (Alternative 2) while fishing north of 25° N. latitude. In addition, all Hawaii-permitted longline fishermen would be required to annually attend a NMFS workshop on longline protected species interaction mitigation methods and seabird handling technique. All Hawaii longline fishermen would also be required to release seabirds that are caught by longline gear in a manner that maximizes their long-term survival.

A formal biological consultation under Section 7 of the Endangered Species Act was conducted in association with the WPFMC action to determine the effects of the Hawaii-based longline fleet on the short-tailed albatross. This consultation resulted in the issuance of a Biological Opinion (BO) by the consulting agency, USFWS, on November 28, 2000. That BO concluded that the fishery may adversely affect the short-tailed albatross and contained several terms and conditions, which are based on a suite of seabird mitigation measures that were initially

developed by the WPFMC. In general the terms and conditions (a) require all vessels registered for use under a Hawaii longline limited access permit (Hawaii longliner) using longline gear north of 23° N. to use thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longline gear (Figure 5); (b) require all Hawaii longliners, when making shallow sets (targeting swordfish or mixed targets) north of 23° N, to set the longline at least one hour after sunset and complete the setting process by sunrise, using only the minimum vessel lights necessary[3]; (c) require all Hawaii longliners, when making deep sets (targeting tuna) north of 23° N., to employ a line setting machine with weighted branch lines; (d) require all operators and crew on Hawaii longliners to follow certain handling techniques to increase the likelihood that any short-tailed albatross brought onboard the vessels alive is released in a manner that ensures its long-term survival; and (e) require all operators of Hawaii longliners to complete a protected species educational workshop conducted by NMFS.

To comply with the terms and conditions of the BO, NMFS promulgated seabird mitigation measures under an emergency interim rule (66 FR 31561, June 12, 2001) in conjunction with Court-ordered sea turtle mitigation measures (in CMC v. NMFS). It is NMFS's intent to make permanent, via a regulatory amendment under the WPFMC's Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region, the BO's mitigation measures for short-tailed albatross (Table 7) and additional mitigation measures approved by the WPFMC (February 2001, 108th meeting) to protect to all seabirds and include vessel owners as mandatory participants in an annual protected species workshop conducted by NMFS.

The synergetic effect of the emergency regulations that were promulgated by NMFS in June 2001, primarily to protect sea turtles and the short-tailed albatross, will have a positive impact on the Black-footed albatross and Laysan albatross. Specifically, the regulations prohibit all Hawaii longliners from engaging in shallow-style longline fishing to target swordfish which is the major cause of incidental takes of turtles and seabirds. This prohibition coupled with the measures of the BO to protect the short-tailed albatross, i.e., required use of line-setting machines to enable the setting of the longline gear deep and quicker, mandatory use of thawed, blue-dyed bait to visually mask it from the seabirds, and the required practice by the vessel in discharging offal strategically to distract the seabirds from attacking the baited hooks, are expected to substantially reduce the incidental take of the Black-footed and Laysan albatross by the Hawaii-based longline fishery. These mitigation measures are applicable to all seabirds, not only to one species, such as the short-tailed albatross.

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[3] On March 30, 2001, the United States District Court, District of Hawaii, in Center for Marine Conservation v. NMFS , among other orders to protect and conserve sea turtles, prohibited all Hawaii longliners from targeting swordfish north of the equator. This prohibition, which was promulgated as an emergency interim rule on a June 12, 2001, rendered moot the BO's terms and conditions directed toward Hawaii longliners using shallow set longline gear to target swordfish or mixed pelagic target species north of 23° N. latitude.

Seabird Mitigation Measures Tested

Prohibiting offal discharge during setting and hauling
Garcia and Associates (McNamara *et al*., 1999) report that the retention of offal on-board the vessel during the longline haul led to more attempts (chases, landings and dives) and interactions (physical contact with gear) than if the offal was discarded (Table 8). The retention of offal on-board may increase the hooking of seabirds by longline gear because there is no readily available alternative food source in the water during fishing operations that would distract seabirds from baited hooks. A similar finding was reported in a study of seabird bycatch in longline fisheries targeting Patagonian toothfish (*Dissostichus eleginoides*) in the southern Indian Ocean (Cherel and Weimerskirch, 1995). Based on these observations by the Garcia and Associates, as well as the study by Cherel and Weimerskirch (1995), this mitigation measure does not appear to be effective.

Discharging offal strategically
The Cherel and Weimerskirch (1995) study reported that when offal was retained the seabird mortality rate was high, but the release of homogenized offal during line setting reduced the incidental catch of seabirds by up to 92%. Garcia and Associates (McNamara *et al.,* 1999) also reported that discharging offal strategically is an effective interaction mitigation measure during the longline set (Table 9). However, the researchers note that there is little or no offal generally available during setting operations. Further, the supply of offal may be low when fish catch rates are low or tuna are the target species. Consequently, this mitigation method requires the preparation and storage of offal for use during the longline set, especially when catches are low. The negative side of using offal as a mitigation method is that seabirds will still associate longline vessels as a source of food.

Setting at Night
Of all the interaction mitigation methods tested by Garcia and Associates (McNamara *et al*., 1999), night setting was the simplest measure to employ, and was found to reduce seabird mortalities during the longline set by 73% (Table 9). Overall, mortality of seabirds during night portions of setting operations are far lower than during daylight portions of sets.

Night setting is less effective in reducing interactions with Laysan albatross than with black-footed albatross, possibly because Laysan albatross are more likely to forage at night (Harrison and Seki, 1987). The effectiveness of night setting as an interaction mitigation measure may be diminished if chemical light sticks are attached to branch lines as the light sticks may slow the sink rate of baited hooks and illuminate the bait. Aft-facing deck lights aboard the vessel or bright moonlight also can reduce the effectiveness of this measure by illuminating baited hooks at the water's surface.

Dyeing bait blue
Both Garcia and Associates (McNamara *et al*., 1999) and Boggs (in press) reported that blue-dyed bait was the most effective measure tested in mitigating seabird interactions and mortalities

during the longline set (Tables 9 and 10). Garcia and Associates (McNamara *et al*., 1999) noted that blue-dyed bait is also a highly effective mitigation measure during longline hauling even though soaking many hours in the water may cause the blue color of the bait to fade (Tables 8 and 9).

In the Garcia and Associates study (McNamara *et al*., 1999), both the control bait (undyed) and the treatment bait (blue-dyed) were completely thawed before use. Boggs (in press), however, found that blue-dyed bait is an effective mitigation measure even if the bait is used in a partially frozen condition (Table 10). However, bait must be completely thawed before it can be effectively dyed, and it is expected that commercial fishermen will generally not re-freeze the bait once it has been dyed. Also, thawed bait sinks faster than frozen bait during the longline set, thereby reducing the time that baited hooks are accessible to seabirds (Brothers *et al*. 1998). However, as albatrosses use both sight and smell to locate food, there is a real potential for the seabirds to learn that the blue-dyed bait is food. Given the possibility that the seabirds will learn that blue-dyed bait is food, this mitigation measure will require continual monitoring for effectiveness.

Deploying towed deterrents

Of all the mitigation methods tested by Garcia and Associates (McNamara *et al*., 1999), the tori line and towed buoy system were found to be the most effective measures to reduce attempts and interactions during hauling of the longline (Table 8), but towed deterrents are less effective mitigation measures during the longline set (Table 9). Boggs (in press) also found that a tori line was less effective than blue-dyed bait or weighted branch lines during the setting operations (Table 10). The researchers noted that some individual seabirds either are not scared away from baited hooks at the water's surface during their initial encounter with tori lines or towed buoys or lose their fear of these devices over time.

Garcia and Associates indicated that towed deterrents are less effective in reducing mortalities of Laysan albatross than mortalities of black-footed albatross, possibly because Laysan albatross have a more aggressive or methodical foraging behavior that causes them to continue to dive on baited hooks (McNamara *et al*., 1999). This is contrary to the dogma that black-footed albatrosses have more aggressive foraging behaviors than that of Laysan albatrosses. Garcia and Associates also noted that the effectiveness of towed deterrents may be greatly reduced in rough weather, and towed deterrents may become entangled with fishing gear if not closely monitored. An entanglement leaves baited hooks accessible to seabirds unless another towed deterrent is immediately deployed (McNamara *et al*., 1999).

Weighting branch lines

Boggs (in press) reports that adding 60 g of weight to the branch lines reduced interactions by 92% (Table 10). Boggs also noted that the attachment of chemical light sticks to the weighted branch lines did not significantly reduce the sink rate of the baited hooks. The sink rate of weighted branch lines was not measured by Boggs (in press). However, Brothers *et al*. (1995) report that the sink rate of frozen bait weighing 150 to 250 grams is 20 cm/sec when a 10 gram

weight is attached and 40 cm/sec when a 50 gram weight is used. These sink rates were measured in three meter deep laboratory tanks and demonstrate that in still seawater, sink rates increase substantially with the addition of weight up to about 50 grams and level off as more weight is added. According to Brothers *et al.* (1995), therefore, a frozen bait weighted with about 50 g of lead should sink to 3 m depth approximately 30 m behind a longline vessel setting at 8 knots.

Albatrosses are surface feeders and do not dive as deeply as smaller seabirds or seabirds that are specialized to plunge dive such as boobies (Bergin, 1997; Brothers, 1991; Brothers *et al.*, 1999; Harrison *et al.*, 1983). For example, the wandering albatross (*Diomedia exulans*) dive to a maximum depth of 0.6 m (Prince *et al.*, 1994), and the shy albatross (*Thalassarche cauta*) dive to a maximum depth of 3.5 m (Hedd *et al.*, 1997). Black-footed and Laysan albatrosses have been observed diving after sinking bait using an underwater video camera (C. Boggs, pers. comm.). The deepest dives observed were about two body lengths, which is equal to about 1.6 m. Because albatrosses are shallow divers, relatively small increases in hook sink rates could substantially reduce the incidental catch of seabirds by Hawaii-based longline vessels. The negative aspect to increasing the amount of weight by the hook is that this will also increase the possibility of injury to longline fishermen.

Using line-setting machines with weighted branch lines

The NMFS Honolulu Laboratory assessed the mitigative effectiveness of a line-setting machine used in combination with weighted branch lines (Table 11). NMFS observer records from 1994 to 1998 show that Hawaii-based longline vessels targeting tuna (0.013 birds hooked/set) have substantially lower seabird interactions than those vessels targeting swordfish (0.758 birds hooked/set). The use of a line-setting machine is often a key indicator of the branch line construction and terminal tackle, including the presence of a lead sinker within a meter of the hook which increases the sink rate of baited hooks. Although the actual sink rate of a baited hook deployed with a line-setting machine has not been measured, use of a line-setting machine is likely to increase the hook sink rate by removing line tension during the set. However, the use of a line-setting machine alone, without weighted branch lines, does not appear to increase the hook sink sufficiently to significantly reduce the incidental catch of seabirds (B. McNamara and J. Cook, pers. comm.).

Summary of effectiveness of mitigation measures

Overall estimates of the effectiveness of mitigation measures in reducing the incidental catch of seabirds in the Hawaii longline fishery (Table 12) were computed by averaging the impacts on seabird hooking found by Garcia and Associates (McNamara *et al.*, 1999) (Tables 8 and 9), Boggs (in press) (Table 10), and by NMFS observers (Table 11).

Studies of the effectiveness of an array of mitigation measures suggest that all of the measures presented in Table 12 have the potential to significantly reduce the incidental catch of albatrosses in the Hawaii longline fishery. On the other hand, no mitigation measure is totally effective on its own. Furthermore, combining use of mitigation measures is necessary if any single measure

significantly loses it effectiveness under certain circumstances (e.g., night setting during a full moon or use of tori line during rough seas) or gradually loses its effectiveness (e.g., if seabirds become habituated to a particular towed deterrent, or blue-dyed bait). Combining use of two or more measures is highly likely to improve overall mitigation effectiveness, although it is uncertain by how much. Due to time constraints, each of these measures were only tested against a control, no combinations have yet been tested.

Possible future seabird mitigation methods and research

One method that appears to offer a great deal of promise for the future are devices that ensure that birds are denied access to baited hooks by setting the line underwater. The simplest of these methods is a metal capsule which can be thrown into the water and retrieved. The baited hook from a branch line is placed in the capsule and the capsule thrown into the sea as the branch line is set. The rapid sink rate of the heavy metal capsule means that by the time the baited hook is released from therein, it is too far below the surface for birds to dive on and retrieve the bait. Trials with bait capsules have shown themselves to be effective on pelagic longline vessels in New Zealand (J. Molloy, Department of Conservation, New Zealand, pers. comm.)

A more expensive but effective method may be to have the branch line set through funnel attached to the boat, with the funnel end well below the water surface. This method removes the visual cue of a hand-thrown baited hook to seabirds and immediately places baited hooks outside the diving range of vulnerable albatross species (between 1.6 m and 3 m; C. Boggs, pers. comm.; Hedd *et al.*, 1997; Prince *et al.*, 1994). Experimental observations in New Zealand on pelagic longline vessels have shown that at 100 m behind the vessel, hooks set with an underwater setting chute will be about 3 m deeper in the water column than hooks set by hand (J. Molloy pers. comm.).

Another approach to reducing the incidental catch of seabirds in longline fisheries is to increase the sink rate of the baited hooks. A light stick manufacturer (Lindgren-Pitman, Inc.) has just completed the tooling for a battery-driven light stick. This new light stick is negatively buoyant so it should increase the sink rate of the baited hook, thereby reducing the amount of time the baited hooks stay at the surface and available to the birds.

Currently, hook sink rates are for different gear types in the Hawaii pelagic longline fishery are unknown. In theory, a “bird safe” hook sink rate could be determined for Hawaii longline vessels. Albatrosses are surface feeders and rarely dive deeper than two or three meters. Fishing gear configurations and vessel operations could be modified to achieve a hook sink rate that would greatly reduce the amount of time a baited hook remained at the surface and available to seabirds. For instance, in the Southern Hemisphere, New Zealand longline vessels that sink their baited hooks at a minimum of 0.3 m/sec are permitted to fish in the daylight. This is a new approach to solving the seabird bycatch problem in New Zealand and is still under investigation.

Methods which might be considered but for which there is no compelling evidence of their efficacy include artificial baits or lures with reduced palatability, water cannons and acoustic

deterrents to scare birds, and possible high-tech solutions such as the use of intense magnetic fields to disorientate seabirds. However, it is important to continually assess new mitigation methods, and modifications to existing methods, both to improve their efficacy and ease of use, and to cope with possible habituation by seabirds to particular methods.

Collecting albatross foraging information at sea is complicated by the highly migratory nature of the birds, yet there is a need to determine the localities and significance of these feeding areas and to learn about the factors that govern the availability of food at these areas. Placing satellite tags on seabirds is one way to gather spatial and temporal information of albatrosses while at sea. Satellite telemetry studies of albatrosses would yield information on the patterns of flight, time spent in specific regions, and the distances traveled on a daily basis. Results from satellite tag studies could offer an explanation on how the albatrosses exploit oceanic resources.

Besides gaining valuable information of albatross foraging behaviors, satellite tags could also serve as a form of mitigation. For instance, satellite telemetry studies would yield more concise information regarding the spatial distribution and movement patterns of the endangered short-tailed albatrosses. If the short-tailed albatrosses visiting the NWHI were tracked on a daily basis, the foraging patterns and migratory routes of these birds in and out of Hawaiian waters would be more defined. A clearer picture of the potential for interactions between a short-tailed albatross and the Hawaii-based longline fishery could be learned if the daily tracks of these birds were compared to the positions of known fishing activities.

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Table 1. List of common and scientific names of fishes caught by Hawaii pelagic longline fleet and protected marine resources that may be encountered by the fleet.

Common name	Scientific Name
PELAGIC MANAGEMENT UNIT SPECIES	
Billfish	
Swordfish	*Xiphias gladius*
Black marlin	*Makaira indica*
Blue marlin	*Makaira mazara*
Striped marlin	*Tetrapturus audax*
Shortbill spearfish	*T. angustirostris*
Sailfish	*Istiophorus platypterus*
Tunas	
Bigeye tuna	*Thunnus obesus*
Albacore	*T. alalunga*
Yellowfin tuna	*T. albacares*
Northern bluefin tuna	*T. thunnus orientalis*
Skipjack tuna	*Katsuwonus pelamis*
Kawakawa	*Euthynnus affinis*
Sharks	
Blue shark	*Prionace glauca*
Thresher (big eye)	*Alopias superciliosus*
Mako (short fin)	*Isurus oxyrinchus*
White tip (oceanic)	*Carcharhinus longimanus*
Tiger shark	*Galeocerdo cuvieri*
Miscellaneous sharks	Families Carcharhinidae, Alopiidae, Sphyrnidae, and Laminidae
Miscellaneous Pelagic Management Unit Species	
Mahimahi	*Coryphaena hippurus*
Wahoo (ono)	*Acanthocybium solandri*
Moonfish	*Lampris guttatus*
Pomfret	Family Bramidae
Oilfish	Family Gempylidae
MISCELLANEOUS PELAGICS	
Lancet fish	*Alepisaurus* spp.
Barracuda	*Sphyraena barracuda*
Brown stingray	*Dasyatis violacea*
PROTECTED SPECIES	
Hawaiian monk seal	*Monachus schauinslandi*
Humpback whale	*Megaptera novaengliae*
Dolphins	Family Delphinidae
Green turtle	*Chelonia mydas*
Olive ridley turtle	*Lepidochelys olivacea*
Hawksbill turtle	*Eretmochelys imbricata*
Leatherback turtle	*Dermochelys coricea*
Laysan albatross	*Phoebastria immutabilis*
Black-footed albatross	*P. nigripes*
Short-tailed albatross	*P. albatrus*
Brown booby	*Sula leucogaster plotus*
Wedge-tailed shearwater	*Puffinus pacificus*

Table 2. Summary of the Hawaii-based longline vessel entry and exit patterns for 1998.

Activity	Number of Vessels
Total Entries	16
New Vessels	7
Reactivated Vessels	9
Total Exits:	7
Inactive Vessels	2
Left Hawaii	5
Total Active[1] Vessels	114

[1]Active vessels indicate longline vessels taking at least one trip during the calendar year.
Source: Ito and Machado 1999.

Table 3. Summary of vessels, trips, and hooks by trip type by the Hawaii-based longline fishery 1991 to 2000.

Year	Number of Active Vessels	Number of Trips	Number of Hooks (million)
Fleet			
1991	141	1670	12.3
1992	123	1265	11.7
1993	122	1192	13.0
1994	125	1106	12.0
1995	110	1125	13.3
1996	103	1100	14.4
1997	105	1125	15.6
1998	114	1140	17.4
1999	119	1137	19.1
2000	125	1103	20.3
Swordfish Trips			
1991	98	291	2.4
1992	66	277	2.8
1993	19	319	4.0
1994	74	310	3.5
1995	44	136	1.2
1996	33	92	0.93
1997	26	78	0.84
1998	32	84	1.0
1999	31	65	0.7
2000	18	37	0.4
Tuna Trips			
1991	104	556	5.2
1992	55	458	5.3
1993	61	542	6.5
1994	83	568	7.0
1995	78	682	9.7
1996	76	657	10.4
1997	83	745	12.2
1998	92	760	13.5
1999	87	776	15.4
2000	90	814	17.2
Mixed Trips			
1991	94	823	4.7
1992	72	530	3.7
1993	59	331	2.6
1994	51	228	1.5
1995	49	307	2.4
1996	51	351	3.1
1997	44	302	2.5
1998	50	296	2.9
1999	50	296	3.0
2000	50	252	2.6

Mixed trips refer to those that target a combination of swordfish and tuna species. Source: Ito and Machado 1999; NMFS Honolulu Laboratory longline logbook preliminary data, 2000.

Table 4. Number of active vessels, total catch, and total fishing effort by the Hawaii-based longline fishery, 1991 to 2000.

Year	Number of Active Vessels	Number of Trips	Total Catch (million lbs)	Total Effort (million hooks)
Fleet				
1991	141	1670	19.6	12.3
1992	123	1265	21.1	11.7
1993	122	1192	25.3	13.0
1994	125	1106	18.4	12.0
1995	110	1125	29.7	13.3
1996	103	1100	21.5	14.4
1997	105	1125	27.1	15.6
1998	114	1140	28.6	17.4
1999	119	1137	28.3[1]	19.1
2000	125	1103	23.8	20.3

[1] Updated 2000. Source: Ito and Machado 1999; NMFS Honolulu Laboratory longline logbook preliminary data, 2000.

Table 5. Estimated annual total incidental catch of albatrosses in the Hawaii longline fishery based on catches recorded by NMFS observers on monitored fishing trips.

Black-footed Albatross				
Year	Estimated Take	95% Prediction Interval		Previous Estimate (P. Kleiber 1999)
		Lower Bound	Upper Bound	
1994	1,830	1,457	2,239	1,994
1995	1,134	899	1,376	1,979
1996	1,472	1,199	1,811	1,568
1997	1,305	1,077	1,592	1,653
1998	1,283	1,028	1,601	1,963
1999	1,301	1,021	1,600	—
Laysan Albatross				
Year	Estimated Take	95% Prediction Interval		Previous Estimate (P. Kleiber 1999)
		Lower Bound	Upper Bound	
1994	2,067	1,422	2,948	1,828
1995	844	617	1,131	1,457
1996	1,154	835	1,600	1,047
1997	985	715	1,364	1,150
1998	981	679	1,360	1,479
1999	1,019	688	1,435	—

Source: NMFS Honolulu Laboratory, McCracken 2000a.

Table 6. Description of mitigation measures evaluated by Garcia and Associates (McNamara *et al*. 1999), Boggs and NMFS Honolulu Laboratory.

Mitigation Measure	Description
A. Discharge offal strategically:	While gear is being set or hauled, fish, fish parts or bait must be discharged on the opposite side of the vessel from which the longline is being set or hauled. If a swordfish is landed, the liver should be removed and the head severed from the trunk, the bill removed and the head cut in half vertically. The heads and livers should be periodically thrown overboard on the opposite side of the vessel from which the longline is being set or hauled. Because the supply of offal may be low when fish catch rates are low or tuna are the target species, this mitigation method requires the preparation and storage of offal for use during the longline set, especially when catches are low. The intent of this measure is to divert seabirds from baited hooks to other food sources.
B. Night setting:	The longline set must begin at least one hour after local sunset and the setting process be completed at least one hour before local sunrise, using only the minimum vessel's lights necessary for safety. The purpose of setting fishing gear during hours of darkness is to reduce the visibility to seabirds of baited hooks at the water's surface.
C. Blue-dyed and thawed bait:	An adequate quantity of blue dye must be maintained on board, and only bait dyed a color that conforms to WPFMC/NMFS standards may be used (See Appendix I). All bait must be completely thawed before the longline is set. The objective of dyeing bait blue is to reduce the attractiveness to seabirds of baited hooks at the water's surface. In addition, completely thawed bait tends to sink faster than frozen bait during the longline set, thereby reducing the time that baited hooks are accessible to seabirds.
D. Towed deterrent:	A line with suspended streamers (tori line) or a buoy that conforms to WPFMC/NMFS standards must be deployed when the longline is being set and hauled (See Appendix I). These devices scare seabirds from baited hooks at the water's surface as well as provide a physical barrier that reduces the ability of seabirds to approach the hooks.
E. Weighted branch lines:	At least 45 grams of weight must be attached to branch lines within one meter of each baited hook. The purpose of attaching weights to branch lines is to increase the sink rate of baited hooks, thereby reducing the availability of baited hooks to seabirds.
F. Line-setting machine with weighted branch lines:	The longline must be set with a line-setting machine (line shooter) so that the longline is set faster than the vessel's speed. In addition, weights of at least 45 grams must be attached to branch lines within one meter of each baited hook. The purpose of this measure is to remove line tension during the set, thereby increasing the mainline sink rate and reducing the time that baited hooks are at the surface and accessible to seabirds.

Table 7. Emergency Interim Rule: Seabird Mitigation Measures for the Hawaii-based Longline Fishery (Effective: June 12 - December 10, 2001)

50 CFR 660.35 Seabird take mitigation measures

(a) While on a trip using longline gear to fish for Pacific pelagic management unit species north of 23° N. lat., a vessel registered for use under a Hawaii longline limited access permit must:

(1) Maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye on board the vessel during a fishing trip;

(2) Use completely thawed bait to fish for Pacific pelagic management unit species.
(3) Use only bait that is dyed blue of an intensity level specified by a color quality control card issued by NMFS.

(4) Retain sufficient quantities of offal, between the setting of longline gear for the purpose of discharging the offal strategically in a manner described in paragraph (a)(6)

(5) Remove all hooks from offal prior to discharging the offal in a manner described in paragraph (a)(6)

(6) Discharge fish, fish parts (i.e., offal), or spent bait while setting or hauling longline gear on the opposite side of the vessel from where the longline gear is being set or hauled.

(7) Use a line-setting machine or line-shooter to set the main longline.

(8) Attach a weight of at least 45 g to each branch line within 1 m of the hook.

(9) Remove the bill and liver of any swordfish that is incidentally caught, sever its head from the trunk and cut it in half vertically; and periodically discharge the butchered heads and livers overboard on the opposite side of the vessel from which the longline is being set or hauled.

(b) Seabird handling techniques.
If a short-tailed albatross (Phoebastria albatrus) is incidentally taken anywhere at-sea by a vessel registered for use under a Hawaii longline limited access permit:

(1) The hooked or entangled bird must be brought on board the vessel.
(2) The vessel operator must observe whether the bird is: (i) Holding its head erect and responding to noise and motion stimuli; (ii) Breathing without noise; (iii) Capable of flapping and retracting both wings to normal folded position on its back; and (iv) Standing on both feet with toes pointed forward.

(3) If the short-tailed albatross exhibits all of the traits described in paragraph (b)(2) of this section, the vessel operator must release the bird after it is dry.

(4) If the short-tailed albatross fails to exhibit all of the traits described in paragraph (b)(2) of this section, the vessel operator must contact NMFS immediately.

(5) A short-tailed albatross that is brought on board the vessel dead must be frozen immediately, with identification tags attached directly to the specimen, and a duplicate identification tag attached to the bag or container holding the specimen. Leg bands, if attached, must not be removed from the specimen, and the specimen must be submitted to NMFS within 72 hours following completion of the fishing trip.

50 CFR 660.36 Protected species workshop.

(a) Each year the operator of a vessel registered for use under a Hawaii longline limited access permit must attend and be certified for completion of a workshop conducted by NMFS on mitigation, handling, and release techniques of turtles and seabirds and other protected species.

(b) A protected species workshop certificate or other proof of completion of a protected species workshop will be issued by NMFS annually to a vessel operator who has completed the workshop.

(c) An operator of a vessel registered for use under Hawaii longline limited access permit must have on board the vessel while engaged in longline fishing a valid protected species workshop certificate or copy issued by NMFS.

(66 FR 31561, June 12, 2001)

Table 8. Garcia and Associates results: effectiveness of various mitigation measures in reducing seabird attempts, interactions and hookings during longline hauling. Values in parentheses are the number of attempts, interactions or hookings per thousand hooks corrected for the number of birds present.

Mitigation Measure	Percent Reduction in Attempts[1]	Percent Reduction in Interactions[2]	Percent Reduction in Hookings[3]
Prohibit offal disharge	-65 (25.5)	-15 (1.3)	26 (0.4)
Blue-dyed bait	67 (5.2)	93 (0.1)	100 (0)
Towed Deterrent - Tori line	92 (1.2)	93 (0.1)	57 (0.2)
Towed Deterrent - Towed buoy	87 (2.0)	85 (0.2)	62 (0.2)
Control	(15.5)	(1.2)	(0.5)

[1]Defined as a seabird chasing, landing near or diving on baited hooks but not coming into physical contact with fishing gear.
[2]Defined as a seabird coming into physical contact with baited hooks but not becoming hooked or killed.

Source: McNamara *et al*. 1999.

Table 9. Garcia and Associates results: effectiveness of various mitigation measures in reducing seabird attempts, interactions and mortalities during longline setting. Values in parentheses are the number of attempts, interactions or mortalities per thousand hooks corrected for the number of birds present.

Mitigation Measure	Percent Reduction in Attempts[1]	Percent Reduction in Interactions[2]	Percent Reduction in Mortalities
Discharging offal strategically	62 (29.4)	53 (15.4)	86 (0.3)
Night setting	NA	NA	73 (0.6)
Blue-dyed bait	49 (39.3)	77 (7.6)	95 (0.1)
Towed Deterrent - Towed buoy	52 (37.1)	51 (16.1)	88 (0.3)
Towed Deterrent - Tori line	39 (47.1)	52 (15.7)	79 (0.5)
Control	(76.7)	(32.8)	(2.23)

[1]Defined as a seabird chasing, landing near or diving on baited hooks but not coming into physical contact with fishing gear.
[2]Defined as a seabird coming into physical contact with baited hooks but not becoming hooked or killed.
Source: McNamara *et al*. 1999.

Table 10. NOAA research results: effectiveness of various mitigation measures in reducing seabird contacts during longline setting in tests aboard a NOAA research vessel.

Mitigation Measure	Percent Reduction in Contacts[1]
Blue-dyed bait (Thawed and partially frozen)	95
Tori line	76
Weighted branch line	92

[1]Defined as a seabird coming into physical contact with baited hooks with a high likelihood of being hooked.

Source: Boggs

Table 11. Incidental catch of albatrosses in the Hawaii longline fishery by set type based on NMFS observer records from 1994-1998.

Targeted Fish During Set	Observed Bird Catch	Number of Observed Sets	Bird Catch/Set
Swordfish	370	488	0.758
Mixed (Swordfish and Tuna)	472	946	0.499
Tuna[1]	16	1,250	0.013

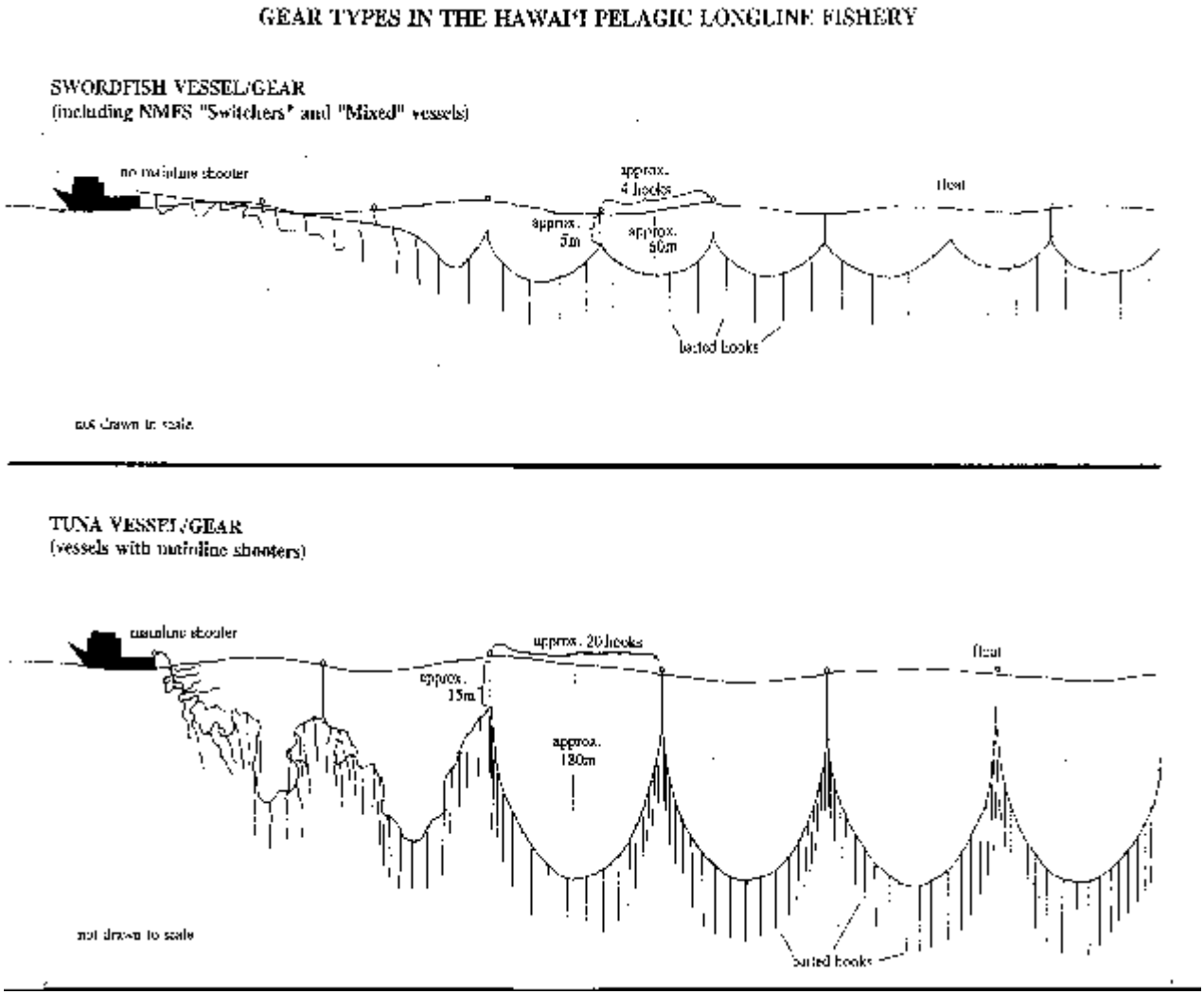
[1]All vessels targeting tuna use a line-setting machine with weighted branchlines.
Source: NMFS Honolulu Laboratory.

Table 12. Summary of estimated effectiveness of various mitigation measures in reducing the incidental catch of black-footed albatrosses (BF) and Laysan albatrosses (LA) in the Hawaii longline fishery.

Mitigation Measure	Species	Percent Reduction in Incidental Catch
Discharge offal strategically [1]	BF	83
	LA	91
Night setting [1]	BF	95
	LA	40
Blue-dyed bait [1,2]	BF	95
	LA	90
Towed deterrent [1]	BF	86
	LA	71
Weighted branch lines [2, 3]	BF	93
	LA	91
Line-setting machine with weighted branch lines [3]	BF	98
	LA	97

Source: McNamara *et al.* (1999)[1] ; Boggs in review[2]; NMFS Honolulu Laboratory[3].

Figure 1. Gear types in the Hawaii-based pelagic longline fishery. Longline vessels targeting swordfish set the longline at a shallow depth (5-60 m), and the longline gear is configured to sink comparatively slowly. The mainline is set without the use of a line-setting machine and between 800-1,500 hooks are set with 3-5 hooks per float. Swordfish vessels use branch lines with weights (60-80 grams) 5-7 meters from the hook and buoyant luminescent light sticks approximately 2-3 meters from the hook. Longline vessels targeting tuna use a line-setting machine (i.e., line-shooter) and deploy between 18-28 branch lines between floats with lots of sag to reach as deep as 400 meters. These vessels also use branch lines with 40-80 grams of weight less than one meter from the hook.



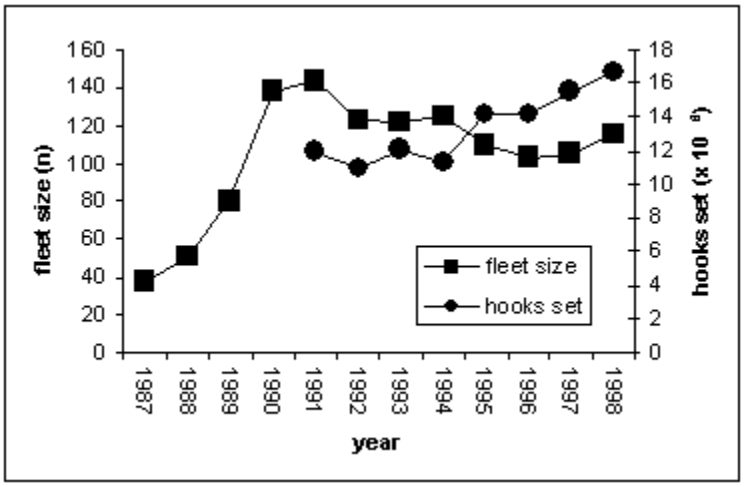


Figure 2. Summary of fishing effort in the Hawaii-based pelagic longline fishery.

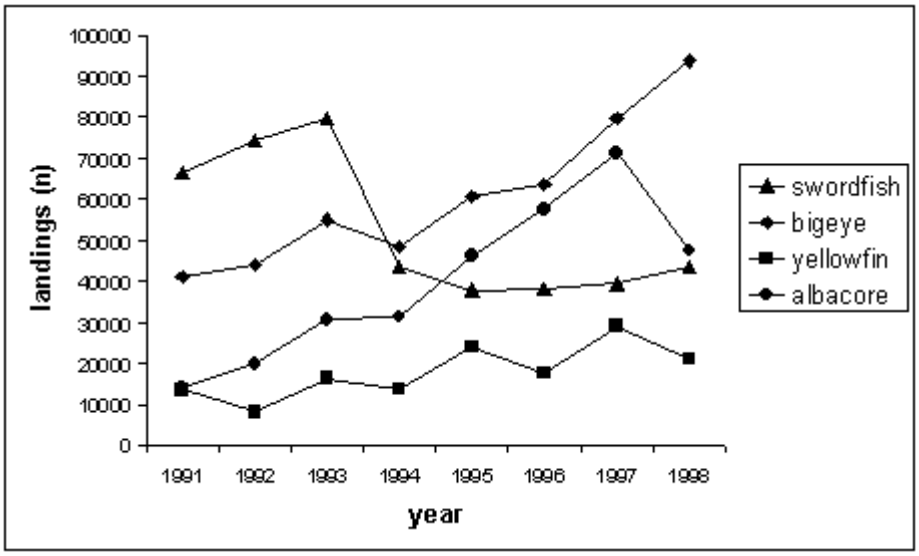


Figure 3. Distribution of Hawaii-based pelagic longline landings.

Figure 4. The average catch composition of the Hawaii-based pelagic longline fishery between 1991 and 1998 (NMFS Honolulu Laboratory longline logbook data).

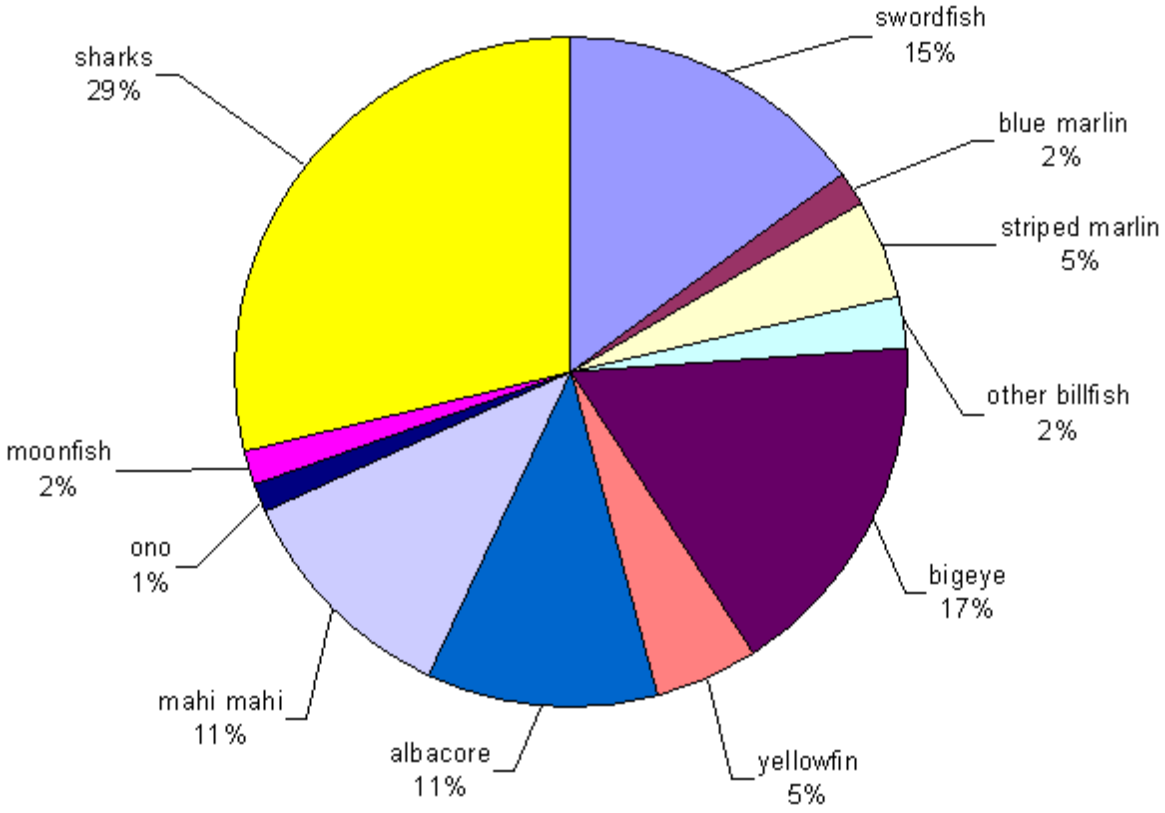
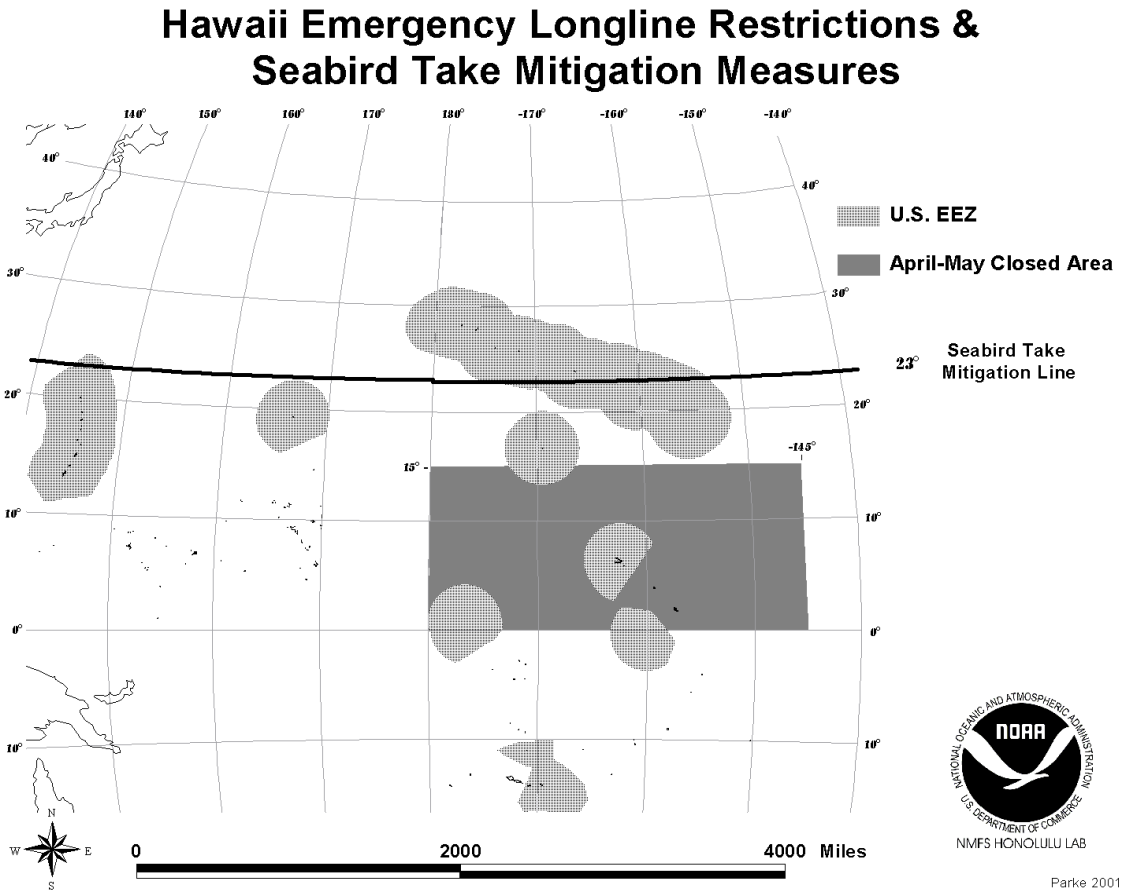


Figure 5. Chart of Emergency Hawaii-based Longline Fishery Area Closure and Seabird Measures.___



North Pacific Fishery Management Council

Introduction

With jurisdiction over the 900,000 square mile EEZ off Alaska, the North Pacific Fishery Management Council (NP Council) has responsibility for developing FMPs for groundfish management in the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA), including cod, pollock, flatfish, mackerel, sablefish, and rockfish species harvested mainly by trawlers, hook and line longliners, and pot fishermen. The groundfish fisheries are managed under the Fishery Management Plan for Groundfish of the Gulf of Alaska and the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands Area. Both fishery management plans (FMP) were developed by the NP Council under the Magnuson-Stevens Act. The GOA FMP was approved by the Secretary of Commerce and became effective in 1978 and the BSAI FMP became effective in 1982. Both FMPs were recently updated: the GOA FMP on July 6, 1999 and the BSAI FMP on June 30, 1999.

The Northern Pacific Halibut Act of 1982 (NPHA), P.L. 97-176, 16 U.S.C. 773c(c) requires NMFS to develop regulations governing the Pacific halibut catch in U.S. waters which are in addition to, but not in conflict with, regulations of the International Pacific Halibut Commission (IPHC). The NP Council also makes allocative and limited entry recommendations for halibut, though the IPHC is ultimately responsible for conservation of halibut.

Seabird Bycatch Assessment

Based on the following information, the NMFS Alaska Region has determined that seabird bycatch is a problem in the hook-and-line groundfish and Pacific halibut fisheries off Alaska. Therefore, according to the FAO *International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries*, the NMFS Alaska Region – in collaboration with the North Pacific Council and the FWS – implemented and will continue to implement as necessary the action items described in the U.S. NPOA-S**.**

Description of Fisheries

The current hook-and-line fisheries can best be characterized according to the area fished and/or the vessel type (Table 1). Relatively large catcher-processor vessels are more common in the BSAI whereas smaller catcher vessels, of diverse size classes, account for most of the harvest activity in the GOA. Obvious similarities occur between these different groups, but differences in gear type, bait used, hooks set per day, setting speed, and other vessel and gear characteristics do occur.

BSAI

Pacific cod has dominated the landings of the hook-and-line fishery. Pacific cod was taken by Japanese hook-and-line and trawl operation beginning in the early 1960s and joined by vessels from the Soviet Union in 1971. The average harvest from 1971-1976 was 50,000 metric tons (mt). Foreign fisheries were phased out by the domestic fleet by 1988. Catches have fluctuated around 165,000 mt since 1985. The Pacific cod total allowable catch (TAC) is apportioned by gear type and by season. Commercial fishing for Pacific cod occurs near the edge of the continental shelf at depths averaging 170 m in 1996. The Pacific cod fishery generally is open from January to May and September to December and harvests are typically constrained by halibut bycatch limits.

Sablefish was targeted by Japanese freezer longliners since 1959. Catches peaked in 1962 at 28,500 mt and averaged about 13,000 mt from 1963-1972. Vessels from the Soviet Union entered the fishery in 1967. Catches dropped to less than 5,000 mt in 1974, increased to 8,000 mt in 1987, and have since declined. The sablefish TAC is apportioned among gear types, fixed gear and trawl. Commercial fishing for sablefish occurs on the upper continental slope at depths averaging 500 m in 1996. Since 1995, sablefish has been managed under the Individual Fishing Quota (IFQ) system and the season is from March 15 to November 15. Twenty percent of the hook-and-line and pot gear sablefish allocation is a sablefish Community Development Quota (CDQ) reserve.

Greenland turbot has been targeted by trawl and hook-and-line gear. Significant amounts are also retained as bycatch in other fisheries (particularly sablefish). Most fishing occurs in May along the shelf edge and slope at depths averaging 600 m in 1996, as well as along the Aleutian Islands. Catches averaged about 30,000 mt during the 1960s. Catches increased to 60,000 mt in 1974, and remained in the 50,000 mt range through 1983. Catch has remained at or below 10,000 mt since 1986.

Rockfish are harvested by both trawl and hook-and-line gear. Small quantities of Pacific ocean perch were also harvested by hook-and-line gear in 1995. Most of the rockfish catch in hook-and-line fisheries is caught incidentally in the sablefish, Pacific cod and Greenland turbot fisheries.

In 2000, the total BSAI hook-and-line groundfish catch was 111,041 mt, representing 7.6 percent of the total groundfish catch (Table 2). In 1998, 77 catcher vessels and 43 catcher/processors operated in the BSAI (Table 3) and targeted sablefish, Pacific cod, Greenland turbot, and rockfish. The BSAI hook-and-line groundfish fleet is characterized predominantly by the larger catcher/processor vessels (freezer-longliners). Catcher-processor vessels accounted for 98.3 percent of the average 3-year harvest from 1996 to 1998 (Table 5). Of the 43 catcher/processor vessels operating in 1998, 79 percent (34) were longer than or equal to 100 ft LOA (Table 3). Seventeen vessels in the BSAI are eligible for the multi-species CDQ program. Based on

observer data collected from 1993 to 1999, the average annual estimate of total number of hooks deployed in the BSAI is approximately 148 million (Table 7).

GOA

Sablefish are an important demersal species of the slope region. Annual catches averaged about 1,500 mt in 1930-50, and exploitation rates remained low until the Japanese hook-and-line fleet expanded into the Gulf. Catches rapidly escalated during the mid 1960s and peaked in 1972. Evidence of declining stock abundance led to significant fishery restrictions from 1977 to 1985 and total catches were reduced substantially. Since 1995, sablefish has been managed under the IFQ system and the fishery occurs from March 15 to November 15.

Pacific cod are a widespread demersal species found along the continental shelf from inshore waters to the upper slope. Catches of Pacific cod increased throughout most of the 1980's in response to a year class(es) which recruited to the fishery around 1980. Annual total catches dropped to about 14,000mt in 1985 as foreign effort began to be phased out, then grew again as the capacity of the domestic fleet increased. The 1991 and 1992 catches reached record levels of approximately 77,000 mt and 80,000 mt, respectively. Presently, the Pacific cod stock is exploited by a multiple-gear fishery, including trawl, hook-and-line, and pot components; the hook-and-line fishery occurs generally from January through March. Trawlers account for the majority of landings with pot gear catches increasing in recent years.

Rockfish have been landed incidental to other groundfish and halibut fisheries in Southeast Alaska since the turn of the century. The directed fishery for demersal shelf rockfish in East Yakutat increased substantially in 1991. The decline in directed harvest since 1992 is a consequence of in-season management to ensure that enough TAC remains for bycatch in the halibut fishery.

In 2000, the total GOA hook-and-line groundfish catch was 29,800 mt, representing 14.6 percent of the total groundfish catch (Table 2). A total of 853 catcher vessels and 18 catcher/processors operated in the GOA (Table 3) and targeted sablefish, Pacific cod, deep-water flatfish, and rockfish. The GOA hook-and-line groundfish fleet is characterized predominantly by the smaller catcher vessels (Table 1). Catcher vessels accounted for 77.7 percent of the average 3-year harvest from 1996 to 1998 (Table 5). Of the 853 catcher vessels operating in 1998, 99 percent (845) were less than 100 ft LOA and 85 percent (728) were less than 60 ft LOA (Table 3). Based on observer data collected from 1993 to 1999, the average annual estimate of total number of hooks deployed is approximately 30 million (Table 7).

The total number of hook-and-line catcher vessels that caught groundfish off Alaska in 1998 was 873 and the total number of hook-and-line catcher-processor vessels that caught and processed groundfish off Alaska in 1998 was 43 (Table 3). These numbers account for the vessels that operated in both the BSAI and GOA.

Pacific halibut fishery

The Pacific halibut fishery occurs primarily on the continental shelf (50 to 200 m depth) and more rarely on the upper slope (to 400 m depth). During the spring through fall fishing period, Pacific halibut move into shallow water to feed, from the greater winter spawning depths (greater than 400 m depth). In most areas, the continental shelf extends 5 to 100 km offshore, although the shelf extends nearly 800 km in the eastern Bering Sea.

The IFQ program for Pacific halibut was implemented in 1995 to address these over-capitalized fisheries. Under the program, a specified amount of catch is available to eligible persons holding Quota Shares. The IFQ season is from March 15 to November 15. In 1998, 51 million pounds of halibut were harvested by 1247 vessels (Table 6). Based on IPHC catch and effort data, the total number of hooks deployed in 1998 was estimated to be approximately 20 million (IPHC, 2000).

Description of the Gear Used

Groundfish

Hook-and-line gear in Alaska is fished demersally; the gear is designed to sink to the seafloor. In 1996, the average set length was 9 km for the sablefish fishery, 16 km for the Pacific cod fishery, and 7 km for Greenland turbot. Twelve-inch gangions with hooks are attached to the groundline at regular intervals. The average hook spacing in these 3 fisheries is 1.2 m, 1.4 m, and 1.3 m, respectively. Therefore, the average number of hooks per set for the 3 fisheries is 7500, 11,428, and 5385, respectively. The gear is baited by hand or by machine, with smaller vessels generally baiting by hand and larger vessels by machine. Circle hooks are usually used, except for modified J-hooks on some vessels with machine baiters. In the Pacific cod fishery, typically two lines are set and hauled in a day. The vessel travels at a speed of approximately five to seven knots and the gear is usually deployed from the vessel stern during a two-hour set. Radar-reflecting buoys are connected to both ends of the groundline. Most of the hook-and-line vessels in the BSAI targeting Pacific cod are freezer/longliners, many of which use autobaiting systems (Sigler, NMFS pers. comm.).

Hook-and-line vessels targeting sablefish or Greenland turbot set gear in deeper water on the continental slope. Many smaller vessels participate in both the BSAI and GOA fisheries, and fewer are equipped with autobaiting machines.

Halibut

Halibut gear may vary from gear used for groundfish. Traditionally, a unit of gear, or "skate" consists of groundline, gangions, and hooks; the standard “skate” being 0.54 km long with 100 hooks spaced at 5.4 m intervals (hook spacing may vary from 1.5m to 7m). The number of skates deployed in a string varies from 4 to 12, and depends on factors such as the size of the fishing area and the likelihood of snagging on the bottom. Short branch lines (gangions) 1 to 1.5 m long are attached to the groundline and a hook is attached to the end of the gangion. Hooks in

the halibut fishery are typically size 16/0 circle hooks. Since the inception of the IFQ fishery, more fishermen are combining halibut fishing with other target species and use a smaller 13/0 hook in the mixed fisheries. Each end of the string is attached to an anchor and buoy line and marked at the surface for detection when gear is retrieved. The skates with baited hooks are set over a chute at the stern of the vessel. Average soak time is 12 hours per skate, but can vary according to fishing area, time of year, and bait used. Baits used in the halibut fishery are either fresh or frozen and historically have included herring, squid, or salmon.

Traditionally, gangions have been tied to the groundline at a set spacing (conventional gear), but more recently gangions may be attached to the groundline with a metal snap fastener (snap-on gear). Snap-on gear is used commonly on small vessels. Conventional gear is set and retrieved in coils. When snap-on gear is set, the hooks are baited and the gangions are attached to the groundline as it unwinds from the drum. Hook intervals can be changed with each set. When the gear is retrieved, the hooks are unsnapped and stored (Trumble, IPHC pers. comm.).

Current Seabird Mitigation Efforts

Regulations

NMFS began monitoring seabird/fishery interactions off Alaska in 1990. NMFS required operators of hook-and-line vessels fishing for groundfish in the BSAI and GOA and federally-permitted hook-and-line vessels fishing for groundfish in Alaska waters adjacent to the BSAI and to the GOA, to employ specified seabird avoidance measures to reduce seabird bycatch and incidental seabird mortality in 1997 (62 FR 23176, April 29, 1997). Measures were necessary to mitigate hook-and-line fishery interactions with the short-tailed albatross and other seabird species. Prior to 1997, measures were not required but anecdotal information suggests that some vessel operators may have used mitigation measures voluntarily. NMFS required seabird avoidance measures to be used by operators of vessels fishing for Pacific halibut in U.S. Convention waters off Alaska the following year (63 FR 11161, March 6, 1998). See the proposed rules as well as the EA/RIR/FRFAs that were prepared for these rulemakings for further discussion of the measures and the development of the regulations (62 FR 10016, March 5, 1997; 62 FR 65635, December 15, 1997; NMFS 1997, 1998).

Regulations at 50 CFR 679.24(e) and 679.42(b)(2) require that all applicable hook-and-line fishing operations must be conducted in the following manner:

1. Use hooks that when baited, sink as soon as they are put in the water.

- If offal is discharged while gear is being set or hauled, it must be discharged in a manner that distracts seabirds from baited hooks, to the extent practicable. The discharge site on board a vessel must either be aft of the hauling station or on the opposite side of the vessel from the hauling station.
- Make every reasonable effort to ensure that birds brought aboard alive are released alive and that wherever possible, hooks are removed without jeopardizing the life of the bird. For a vessel longer than or equal to 26 ft (7.9m) length overall (LOA), the operator of the

vessel must employ one or more of the following seabird avoidance measures:

- Tow a streamer line or lines during deployment of gear to prevent birds from taking hooks; Tow a buoy, board, stick or other device during deployment of gear at a distance appropriate to prevent birds from taking hooks. Multiple devices may be employed;
- Deploy hooks underwater through a lining tube at a depth sufficient to prevent birds from settling on hooks during deployment of gear; or Deploy gear only during the hours specified in regulation ["hours of darkness" '679.24(e)(3)(iv)], using only the minimum vessel's lights necessary for safety.

Hours that Hook-and-Line Gear Can Be Deployed for Specified Longitudes. Hours are Alaska local time.

	Longitude		
Calendar Month	Shoreward to 150EW	151 to 165EW	166 to 180EW
January	1800-0700	1900-0800	2000-0900
February	1900-0600	2000-0700	2100-0800
March	2000-0500	2100-0600	2200-0700
April	2100-0400	2200-0500	2300-0600
May	2200-0300	2300-0400	2400-0500
June	(hook-and-line gear cannot be deployed during June)		
July	(hook-and-line gear cannot be deployed during July)		
August	2200-0400	2300-0500	2400-0600
September	2000-0500	2100-0600	2200-0700
October	1900-0600	2000-0700	2100-0800
November	1800-0700	1900-0800	2000-0900
December	1700-0700	1800-0800	1900-0900

Pending Changes to the Current Regulations

At its April 1999 meeting, the NP Council recommended that NMFS revise existing seabird avoidance regulations in the following ways:

- Applicable vessels greater than 35 ft (10.7m) length overall (LOA) and using hook-and-line gear must use the prescribed seabird avoidance measures. This revision would effectively exempt IFQ Category D vessels, any vessels less than or equal to 35 ft (10.7 m) LOA, from using seabird avoidance measures.
- Weights must be added to groundlines to cause the groundline to sink out of reach of seabirds.
- Hooks embedded in fish offal must be removed prior to offal discharge.
- Applicable vessels must use either a bird scaring line or night-setting.
- More specific instructions for the deployment of a bird scaring line are provided.
- Buoy bags, bird bags, or float devices would qualify as a bird scaring line but towing a board or stick would not.
- Use of a lining tube would have to be accompanied by the use of a bird scaring line.

NMFS has postponed this rulemaking that is based on the NP Council's recommendation. NMFS is awaiting the final research results from the Washington Sea Grant Program's (WSGP) two-year study evaluating the effectiveness of seabird avoidance measures to guide in the revision of the current seabird regulations. These final research results will be presented by WSGP and recommendations made to the NP Council for regulatory changes at the October 2001 Council meeting (see Research section here).

Outreach and Education

Providing information about the causes of seabird bycatch and its mitigation through the use of effective measures is a critical component in efforts to reduce the bycatch. Providing this information to all interested parties---the longline fishing industry, state and federal agencies responsible for fisheries management and seabird conservation and management, environmental groups, and the general public is necessary. Public outreach programs regarding the reduction in seabird bycatch in Alaska hook-and-line fisheries have included: Letters and information packets mailed to fishermen, brochures, laminated albatross identification guides, newspaper articles, news releases and information bulletins, radio interviews, information on internet homepages and a seabird bycatch listserver, and an information booth and seminar at Fish EXPO (industry trade show), among others. A symposium at the February 1999 annual meeting of the Pacific Seabird Group, "*Seabird by-Catch: Trends, Roadblocks, and Solutions"* addressed a wide array of seabird bycatch issues. See the NMFS Alaska Region's seabird link at its website for an updated list that includes the Alaska Region's seabird-related public outreach activities (**http://www.fakr.noaa.gov/protectedresources/seabird_akractivities.pdf**).

Current Research Efforts

The FWS Biological Opinion (as required by Section 7 of the Endangered Species Act) on the effects of the BSAI and GOA groundfish fisheries on the short-tailed albatross required NMFS to develop a plan to evaluate the effectiveness of the seabird avoidance measures that were required in 1997. During the public comment period of the proposed rule (62 FR 10016, March 5, 1997), critics of the proposed regulations argued that the more stringent measures required by Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in southern oceans should be adopted in Alaska's fisheries. Although similar to NMFS regulations in many ways, CCAMLR regulations are more restrictive in that they require vessels to set longlines only at night, and to deploy streamer lines at all times during fishing operations. At that time, no scientific data existed on the effectiveness of any deterrent measures in Alaska's fisheries. The appropriateness of the CCAMLR measures for the conditions of the BSAI and GOA was therefore unknown. NMFS and FWS agreed to endorse more flexible requirements initially for Alaska to allow fishermen, managers and scientists to experiment with devices and determine their effectiveness. Testing the effectiveness of seabird bycatch avoidance measures will allow NMFS to better ascertain if they are effective in the Alaskan fisheries. Once measures have been tested, NMFS will be better able to revise regulations to maximize their effectiveness. This may

include specific performance standards for the seabird avoidance measures, if appropriate (NMFS 1997).

The Biological Opinion issued by FWS in 1998 on the effects of the Pacific halibut fishery off Alaska on the short-tailed albatross required NMFS to apply the plan developed to test the effectiveness of seabird avoidance measures in the groundfish fisheries to the Pacific halibut fishery also. The plan must also be implemented and a final report on the evaluation of avoidance measures submitted to USFWS by December 31, 2000.

NMFS completed and submitted to FWS a *Test Plan to Evaluate Effectiveness of Seabird Avoidance Measures Required in Alaska's Hook-and-Line Groundfish and Halibut Fisheries* (Test Plan; see the Test Plan on NMFS' AKR website at http://www.fakr.noaa.gov/protectedresources/testplan.pdf). The Test Plan focuses on three key components to evaluate the effectiveness of seabird avoidance measures: 1) Experimental testing of avoidance measures, 2) collection of information on avoidance measures by observers on commercial vessels, and 3) solicit and gather information from fishermen on the effectiveness of seabird avoidance measures.

The Washington Sea Grant Program (WSGP) began experimental research studies in 1999 to test the effectiveness of selected seabird bycatch deterrent measures in the IFQ halibut and sablefish fishery and in the BSAI Pacific cod freezer-longliner fishery. Paired streamer lines and weighted gear are the two deterrent measures being tested against a control (no deterrent measure) in the IFQ fishery. Line shooters, lining tubes, and weighted gear are the three deterrent measures being tested against a control in the BSAI Pacific cod fishery. This experimental study continued for its second season in 2000. Results will be presented by WSGP at the NP Council meeting in October 2001. In addition, the observer data seabird protocol that is collected on hook-and-line vessels has been amended to more directly reflect on the effectiveness of the measures that are used.

Monitoring of Seabird Bycatch

The monitoring of seabird/fishery interactions by NMFS in the groundfish fisheries began in 1990 and was expanded during the 1993, 1997, 1999 and 2000 seasons. The collection of seabird bycatch data was integrated into an existing comprehensive data-gathering observer program designed to collect data for a wide variety of management and research purposes. Data include: total catch and effort, catch composition, prohibited species bycatch, and other biological information. The major change in 1993 was to have observers provide genus or species identifications of incidentally caught seabirds. During species composition sampling, the observer makes a reliable (to species or species group) identification and records the numbers and weights of birds in the sample. FWS and NMFS use these incidental mortality data by seabird species to calculate bycatch rates of the observed hauls and to extrapolate numbers of seabirds incidentally caught from the observed portions of the fleet to the unobserved portion, resulting in an estimate of total seabird bycatch. Other observer-collected information that

NMFS forwards to FWS is: Sightings of sensitive species (six species of special concern whose populations are very small or declining), any bird/vessel interactions, document collisions of birds with the vessel superstructure, and detailed information found on the leg bands of banded seabirds. NMFS coordinated with the FWS to update the seabird section of the NMFS Observer Manual. This included the incorporation of a standardized FWS form for the reporting of sightings of sensitive species. This is the same FWS form that is available to fishermen to report sightings of short-tailed albatrosses.

Observers began providing information about what seabird avoidance measures were being used on hook-and-line vessels in 1997. This information collection was expanded in early 1999 to incorporate more detailed information about the frequency of use of the measures during a fishing trip and specific characteristics of the different avoidance measures, for example, what line weighting regimes are used (number and size of weights, weight spacing on the groundline), construction and deployment characteristics of towed streamer lines and buoy bags, and if offal is discharged for the purpose of distracting seabirds away from baited hooks. Special projects are also being considered that would collect this seabird/gear interaction data on a haul-by-haul basis, rather than by the cruise or trip. The collection of more detailed and specific data will better allow for an analysis of the effectiveness of the avoidance measures at reducing seabird bycatch rates. Beginning in 2000, observers will record the type of seabird avoidance measure that is being used on vessels fishing with hook-and-line gear on a haul-by-haul basis. This will allow for a more detailed analysis of seabird bycatch estimates based on the type of avoidance measure being used, i.e. some indication of the effectiveness of the avoidance measure.

The duties of fisheries observers in the groundfish fisheries off Alaska include (in order of priority): recording incidental take of short-tailed albatrosses and marine mammals, recording fishing effort and catch information, sampling for species composition, documenting compliance problems, collecting biological data on prohibited species, collecting sexed length frequencies and otoliths from the appropriate predominant species, log sightings of "species of interest" seabirds and marine mammals, and completing any assigned special projects (NMFS 1999). On vessels with hook-and-line gear, NMFS observers are instructed to observe the line as it is comes out of the water and to tally every single animal (target fish, fish bycatch, seabird species, etc.) that comes up on that line (for sampled hauls). This tally includes any animals that fall off the hook and are not physically hauled onboard. Observers are instructed to make the best possible identification of these animals, to species or species group, and to estimate their weight (Fitzgerald, pers. comm.).

Recent studies evaluating seabird mortality in the Japanese tuna longline fishery around Australia suggest that more specialist observers may be required to collect more accurate and reliable information on bird catch rates (Gales *et.al.* 1998, Brothers *et.al.* 1998a). Observers on Japanese tuna longline vessels in the Australian Fishing Zone were asked to record details of "passive observations," that is, watch the actual hauling of the longline while not distracted by the additional routine fish sampling tasks. The purpose was for the observer to gain an overall impression of the operation and to assess the number of seabird discards (i.e., birds hooked but

not hauled aboard). Seabird bycatch rates were higher for these "passive observations" than for hauls in which the observers were also responsible for fish sampling tasks. The author suggests that more accurate and reliable information on bird catch rates could be attained by: 1) spending more time watching the set to record numbers of birds hooked, 2) spending more time watching for discards to get a more accurate measure of the catch rate, and 3) collecting comprehensive observations on use of mitigation measures (Gales *et.al.* 1998). Based on this description of observer activities in the tuna longline fisheries, NMFS observers in Alaska hook-and-line fisheries are engaged in "passive observations". They are not performing other fish sampling duties while observing the haul and tallying species that are hooked (Fitzgerald, pers. comm.)

The FWS Biological Opinion on the effects of the Pacific halibut fishery off Alaska on the short-tailed albatross requires that all observations and takes of the seabird to be monitored and reported to the FWS. A FWS form to report such encounters was distributed to groundfish and halibut fishermen in 1998. The FWS also requires that NMFS prepare and implement a plan to investigate all options for monitoring the Pacific halibut fishery in waters off Alaska for interactions with the short-tailed albatross, including the use of onboard observers. Preparation of this plan was initiated in 1999. Although the FWS encourages self-reporting of short-tailed albatross encounters, substantial evidence exists that self-reporting by itself is an inadequate method for monitoring protected species encounters in a fishery. The FWS encourages the use of observers on halibut vessels over 60 ft (18.3 m) LOA.

Given that observers are not currently required on Pacific halibut vessels, NMFS and FWS requested the IPHC to monitor sightings of short-tailed albatross and incidental catch of seabirds by Pacific halibut fishermen during 1998. IPHC requested halibut fishermen to maintain records of sightings and incidental catch in their logbooks and the IPHC port samplers interviewed fishermen for seabird information. Despite potential reservations about the reliability of self-reported information for protected species, the pattern of seabird bycatch and short-tailed albatross sightings gained through self-reports is consistent with other available information. In 1998, 457 vessels made both halibut and sablefish landings and 24 percent of these vessels were $\geq$ 60 ft (18.3 m) LOA, therefore groundfish observer coverage requirements would apply (Table 8) and seabird bycatch data would have been collected on these vessels.

NMFS is required to prepare and implement a plan to investigate all options for monitoring the incidental take of the endangered short-tailed albatross (*Phoebastria albatrus*) in the Pacific halibut fishery in waters off Alaska. NMFS would then institute appropriate changes to the fishery as a result of its investigation.

NMFS contracted with the International Pacific Halibut Commission (IPHC) to prepare a report entitled, "*A Feasibility Study that Investigates Options for Monitoring Bycatch of the Short-tailed Albatross in the Pacific Halibut Fishery off Alaska".* The purpose of this report is to provide NMFS with the information that is necessary for its determination of a suitable and cost-effective method to monitor the Pacific halibut fishery for seabird bycatch and is therefore

responsive to the above reasonable and prudent measures. The report was submitted to NMFS in December 2000. NMFS will initiate the development of the required monitoring plan.

Incidental Catch Estimation Procedures

A report using 1993–1997 data from the longline fishery describes seabird incidental catch estimation methods and procedures developed by USFWS, in consultation with NMFS (Stehn et al. 2001). Similar methods and procedures were developed by NMFS and used to calculate preliminary estimates using 1993–1999 data for all groundfish fisheries (M. Perez, NMFS, Alaska Fisheries Science Center – personal communication). Standard statistical procedures for estimating a population total from a sample were used. NMFS calculated rates and estimates for all gears, statistical fishing areas, regions (BSAI or GOA), vessel types (processors, motherships, and catcher-only vessels), time periods (annual or each of 13 four-week periods in a year) for each year from 1993 to 1999, and seabird species or species groups. Eleven groups of seabirds were chosen for analysis: short-tailed albatross, black-footed albatross, Laysan's albatross, unidentified albatross, fulmars, gulls, shearwaters, unidentified tubenoses (procellarids), alcids, other bird species, and unidentified seabirds (those not identified to one of the other ten groups). Preliminary incidental catch estimates were based on the number of seabirds by species in samples from observed hauls and the total commercial fish catch as estimated by the NMFS blend program.

The NMFS method utilized two measures of fishing effort: total tons of groundfish catch per haul or set (all gears), and the number of hooks or pots per set for both the longline and pot fisheries, respectively. The NMFS Observer Program NORPAC database records the weight of the catch by species in the species composition samples and the estimated weight of the entire catch (all species combined) in the whole haul or set. NORPAC also records the number of hooks or pots in the sample and the estimated number of total hooks or pots in the whole set. The number of observed birds in a species composition sample per effort (tons or hooks or pots) of that sample was used to extrapolate the number of seabirds to the whole haul or set, and similarly upwards to the whole fishery, including the unobserved effort. The unobserved weight of fish was calculated by subtracting the known weight of sampled fish on observed hauls from the estimated total weight of fish (all hauls).

The estimated total number of birds caught was the sum of observed birds in the catch and the estimated unobserved birds. For each species or species group, the number of unobserved birds was estimated by multiplying the ratio of the number of observed birds of that species or species group caught per weight of sampled groundfish from observed hauls times the total estimated weight of groundfish caught in unobserved hauls. Both the catch rate of birds (number of birds per weight of fish, or birds per 1,000 hooks) and the catch rate of fish (total weight of all fish species per hook/pot/net) were assumed to be equal for observed and unobserved hauls of the same gear, area, and time period. These assumptions may not hold, not necessarily because the presence of the observer may change the fishing practices of the skipper or crew, but rather because, for some other operational reason, the smaller (unobserved) vessels may have different catch rates than the large or mid-sized vessels. The constant catch rates for birds and/or fish

among vessel size categories are untested and critical assumptions. If different catch rates do exist for different vessel size categories, then the average area catch rates and the estimates of the total seabird incidental catch number may be overestimated or underestimated.

At the February 1999 North Pacific Fishery Management Council's meeting, the Council's Science and Statistical Committee stated in its minutes that ". . . Because incidental catch is so small, estimation of the total take of short-tailed albatross is problematic. Uncertainty exists on how the known take of albatross should be expanded to the unobserved portion of the fishery." NMFS and USFWS recognize that this uncertainty exists. Until 1995, a reported take of a short-tailed albatross had not occurred within the observer sample and subsequently, the estimation of short-tailed albatross take in the longline fisheries was even more uncertain. As previously noted, the number of unobserved birds is calculated by multiplying the ratio of the number of birds caught per weight of fish (or 1,000 hooks) sampled from observed hauls by the total estimated weight of fish (or 1,000) hooks) in unobserved hauls. This same procedure was used for all seabird species, including the short-tailed albatross, that were observed in the longline sets sampled by observers. If the sets sampled by observers are not representative of all sets in the longline fishery, a substantial bias could exist in the ratio of the number of birds caught per weight of groundfish caught or 1,000 hooks of line set. In the NMFS preliminary analysis of 1993–1999 observer data, only three of the albatross taken were identified as a short-tailed albatross (and all from the BSAI region). Of the albatross taken, not all were identified. This analysis of 1993–1999 data resulted in an average estimate of two short-tailed albatrosses being taken annually in the BSAI groundfish hook-and-line fishery and zero short-tailed albatross being estimated taken annually in the GOA groundfish hook-and-line fishery. The incidental take limit established in the USFWS biological opinions on the effects of the hook-and-line fisheries on the short-tailed albatross is based on the actual reported takes and not on extrapolated estimated takes.

The risk to seabirds of getting caught in fishing gear varies with bird species and gear type. Other factors that influence risk include season and location of fishing. Occurrence and density of seabird species at sea vary greatly at different places and times, according to habits of the birds, breeding activities, migration, and habitats, abundance, and movements of forage species.

Preliminary estimates of the annual seabird incidental catch for the Alaska groundfish fisheries, based on 1993–1999 data, indicate that approximately 17,000 seabirds are taken annually in the combined BSAI and GOA groundfish fisheries (14,600 in the BSAI; 2,300 in the GOA) at average annual rates of 0.10 and 0.06 birds per 1,000 hooks in the BSAI and GOA, respectively (Table 7). Preliminary estimates of total incidental catch of seabirds by species or species groups in the BSAI and GOA longline fisheries are found in Table 10.

Of the estimated 14,600 seabirds that are incidentally caught in the BSAI, the species composition is 60 percent fulmars, 17 percent gull species, 12 percent unidentified seabirds, 5 percent albatross species, 4 percent shearwater species, and 2 percent all other species (Figure 1). Of the estimated 2,300 seabirds that are incidentally caught in the GOA, the species composition is 47 percent fulmars, 37 percent albatrosses, 6 percent gull species, 6 percent

unidentified seabirds, 3 percent shearwater species, and less than 1 percent all other species (Figure 2). Five endangered short-tailed albatrosses were reported caught in the longline fishery since reliable observer reports began in 1990: two in 1995, one in 1996, and two in 1998, all in the BSAI. Both birds caught in 1995 were in the Unimak Pass vicinity and were taken outside the observers' statistical samples; the bird caught in 1996 was near the Pribilof Islands in an observer's sample; the two short-tails taken in 1998 were in observers' samples.

It is difficult at this time to make valid comparisons of bird incidental catch rates between regions (Table 7). It is not possible to discern whether the differences between the BSAI and GOA estimated incidental catch rates are due to vastly different levels of fishing effort in each region, different vessel types used in each region (small catcher vessel in GOA and large catcher/processors in the BSAI), different distribution and abundance of birds, and so on. An analysis of covariance would allow for a valid statistical comparison of regional incidental catch rates.

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Table 1. PREDOMINANT HOOK-AND-LINE VESSEL AND GEAR CHARACTERISTICS BY AREA AND VESSEL TYPE AND VESSEL SIZE

AREA AND VESSEL TYPE	BSAI/CATCH. PROCESSOR	GOA/ CATCHER VESSEL	GOA/SMALL C. VESSEL
Mean Vessel Length (LOA)	143ft (125-164) & 181 (165-234)	76 ft (60-124)	44 ft (< 60)
Target Fishery	Pacific cod, sablefish	Halibut , sablefish	Halibut, sablefish
Gear Type	Auto-bait, hand-bait (3 vessels)	Conventional, hand-bait	Snap-on
Bait Used	Squid	Herring, salmon, squid	Herring, salmon, squid
Average Hooks Set per Day	35,000 to 50,000	approximately 20,000	1,000 to 5,000
Setting Speed	4 to 6 knots	4 to 6 knots	2 to 3 knots
Fishing Day Cycle	Continuously	16 hours on, 8 hours off	2 sets per day
Distance Behind Stern that Gear Enters Water	5 to 10 ft	6 to 8 ft	1 to 3 ft
Height Above Water that Gear is Set	3 to 6 ft	3 to 6 ft	1 to 3 ft

Table 2. GROUNDFISH HOOK-AND-LINE FISHERY STATISTICS

Groundfish hook-and-line target species include: BSAI--Pacific cod, sablefish, Greenland turbot, and rockfish; GOA--sablefish, Pacific cod, rockfish

2000	Total Catch (mt)	
	BSAI	GOA
All groundfish	1.47 million	204 K
H&L portion	111 K	29.8 K
% H&L of Total	7.6 %	14.6 %

1999	Total Catch (mt)	
All groundfish	1.30 million	228 K
H&L portion	98.6 K	27.6 K
% H&L of Total	7.6%	12.1%

1998	Total Catch (mt)	
	BSAI	GOA
All groundfish	1.54 million	245 K
H&L portion	130 K	25.5 K
% H&L of Total	8.5%	10.4%

Table 3.--Numbers of hook-and-line vessels that caught groundfish off Alaska by area, vessel-length class (feet), 1994-2000 (excluding catcher-processors).

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
	<60	60-99	100-124	>124	<60	60-99	100-124	>124	<60	60-99	100-124	>124
1994	1149	181	14	0	60	26	1	0	1165	185	15	0
1995	901	148	14	2	73	60	3	0	935	151	17	2
1996	821	140	8	5	59	54	4	2	848	141	9	6
1997	822	118	8	3	49	49	3	0	833	119	8	3
1998	739	117	5	3	39	37	1	0	752	123	5	3
1999	766	111	7	2	34	38	2	3	780	118	7	5
2000	856	105	8	2	55	39	3	2	880	112	8	4

Numbers of hook-and-line vessels that caught and processed groundfish off Alaska by area and vessel-length class (feet),
1994-2000.

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
	<60	60-99	100-124	>124	<60	60-99	100-124	>124	<60	60-99	100-124	>124
1994	3	13	12	24	1	15	13	28	3	16	13	28
1995	4	9	8	15	1	7	11	28	4	9	11	28
1996	4	6	8	9	1	7	10	26	4	7	10	26
1997	2	6	8	9	3	7	8	26	4	8	8	26
1998	2	2	6	8	3	6	7	27	3	6	7	27
1999	3	4	9	13	2	3	10	26	4	4	10	26
2000	1	3	10	7	1	3	11	28	1	3	12	28

Note: Includes only vessels that fished part of Federal TACs.
Source: 2000 Economic SAFE Document, Tables 28 and 29. Blend estimates, NMFS permits.
National Marine Fisheries Service, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115-0070.

Table 4.--Numbers of smaller hook-and-line vessels that caught groundfish off Alaska by area, vessel-length class (feet), 1994-2000 (excluding catcher-processors).

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
	<26	26-35	36-59	>59	<26	26-35	36-59	>59	<26	26-35	36-59	>59
1994	57	153	939	195	8	13	39	27	63	157	945	200
1995	41	132	728	164	4	21	48	63	44	148	743	170
1996	42	114	665	153	5	12	42	60	47	124	677	156
1997	46	115	661	129	1	14	34	52	46	121	666	130
1998	30	112	597	125	4	13	22	38	31	117	604	131
1999	32	124	610	120	4	7	23	43	33	130	617	130
2000	39	147	670	115	4	16	35	44	42	161	677	124

Numbers of smaller hook-and-line vessels that caught and processed groundfish off Alaska by area and vessel-length class (feet), 1994-2000.

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
	<26	26-35	36-59	>59	<26	26-35	36-59	>59	<26	26-35	36-59	>59
1994	0	0	3	49	0	0	1	56	0	0	3	57
1995	0	0	4	32	0	0	1	46	0	0	4	48
1996	0	0	4	23	0	0	1	43	0	0	4	43
1997	0	0	2	23	0	0	3	41	0	0	4	42
1998	0	0	2	16	0	0	3	40	0	0	3	40
1999	0	0	3	26	0	0	2	39	0	0	4	40
2000	0	0	1	20	0	0	1	42	0	0	1	43

Note: Includes only vessels that fished part of Federal TACs.
Source: 2000 Economic SAFE Document, Tables 28 and 29. Blend estimates, NMFS permits. National Marine Fisheries Service, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115-0070.

Table 5. AVERAGE HOOK-AND-LINE GROUNDFISH HARVEST LEVELS BY VESSEL TYPE AND AREA

BSAI	Number of Vessels[1]	1996-1998 Average Harvest (mt)	Percent of Average Harvest
Total Harvest	----	133,435	100.0
By Catcher-processor	44	131,102	98.3
By Catcher vessel	101	2,333	1.7

GOA	Number of Vessels[1]	1996-1998 Average Harvest (mt)	Percent of Average Harvest
Total Harvest	----	28,594	100.0
By Catcher-processor	25	6,389	22.3
By Catcher vessel	920	22,205	77.7

[1]Number of vessels in 1997.

Table 6. PACIFIC HALIBUT FISHERY STATISTICS

2000: 52 million pound commercial take
1999: 56 million pound commercial take
1998: 51 million pound commercial take
1997: 51 million pound commercial take
1996: 47 million pound commercial take

Number of vessels making IFQ landings in 1998

Vessel Size Category	Halibut Only	Sablefish Only	Halibut/Sablefish
<26’	223	1	0
26' to <35'	376	1	11
35' to <60'	601	12	335
60' to <125'	47	5	108
125'+	0	6	3
Total	1247	25	457

Source: NMFS and IPHC.

Table 7. PRELIMINARY ANNUAL ESTIMATES, BY AREA, OF TOTAL NUMBERS AND BYCATCH RATES OF SEABIRDS TAKEN IN LONGLINE FISHERIES

Year	Effort (No. of Hooks in 1,000s)	No. of Birds	Bycatch Rate No. of Birds per 1,000 Hooks	Percent of Hooks Observed
Bering Sea and Aleutian Islands				
1993	135,581	8,704	0.06	22.3
1994	134,783	10,985	0.08	24.6
1995	141,430	19,892	0.14	24.3
1996	141,540	8,404	0.06	23.8
1997	176,409	18,208	0.10	22.6
1998	175,357	24,871	0.14	23.5
1999	156,087	13,087	0.08	25.2
Average Annual Estimates				
1993–1996	134,095	11,707	0.09	24.5
1997–1999	169,285	18,642	0.11	23.7
1993–1999	148,455	14,580	0.10	24.2
Gulf of Alaska				
1993	56,291	3,102	0.06	10.3
1994	49,452	2,571	0.05	4.9
1995	42,156	2,927	0.07	12.8
1996	33,134	2,321	0.07	10.8
1997	28,000	741	0.03	10.0
1998	29,339	2,270	0.08	8.1
1999	31,894	1,846	0.06	8.6
Average Annual Estimates				
1993–1996	45,258	2,818	0.06	9.5
1997–1999	29,744	1,566	0.05	8.9
1993–1999	38,609	2,287	0.06	9.3

Source: NMFS, 2001. Alaska Groundfish Fisheries DRAFT Programmatic Supplemental Environmental Impact Statement. USDC NOAA, National Marine Fisheries Service, Alaska Region; Juneau, Alaska, and Seattle, Washington, January 2001. This table reflects 2 corrected rows, the GOA average annual estimates for 1997-1999 and 1993-1999.

Table 8. PRELIMINARY ESTIMATED TOTAL INCIDENTAL CATCH OF SEABIRDS BY SPECIES OR SPECIES GROUPS IN BERING SEA AND ALEUTIAN ISLANDS AND GULF OF ALASKA LONGLINE FISHERIES, 1993–1999

Year	Actual Number Taken [b]	STAL	BFAL	LAAL	NFUL	Gull	SHWR	Unidentified Tubenoses	Alcid	Other	Unidentified ALB	Unidentified Seabird	Total
Bering Sea and Aleutian Islands													
1993	1,942	0	16	639	4,262	854	81	0	16	4	272	1,753	7,897
1994	2,700	0	28	317	5,130	1,684	659	374	4	4	81	2,701	10,985
1995	4,832	0	74	428	10,086	3,940	338	342	4	193	78	4,409	19,892
1996	2,002	4	21	248	5,432	1,507	567	13	38	55	63	458	8,404
1997	4,123	0	9	353	13,898	2,694	305	62	0	124	13	751	18,208
1998	5,851	9	9	1,492	15,587	4,616	1,169	17	55	94	4	1,819	24,871
1999	3,293	0	16	616	8,310	2,194	620	413	4	79	0	835	13,087
Average Annual Estimate													
1993-1996		1	35	406	6,175	1,979	407	182	15	63	123	2,321	11,707
1997-1999		3	11	823	12,513	3,159	703	171	20	98	6	1,135	18,642
1993-1999		2	25	580	8,814	2,468	530	177	17	78	74	1,817	14,582
Gulf of Alaska													
1993	318	0	78	371	2,009	117	146	0	0	10	10	361	3,102
1994	126	0	41	918	1,265	41	102	0	0	0	41	163	2,571
1995	374	0	454	172	931	196	70	0	0	23	759	321	2,927
1996	250	0	984	371	863	56	19	0	0	0	0	28	2,321
1997	74	0	120	50	461	70	20	0	0	0	0	20	741
1998	184	0	308	247	1,542	123	37	0	0	0	12	0	2,269
1999	159	0	267	499	534	395	93	0	0	12	0	46	1,846
Average Annual Estimate													
1993- 1996		0	459	383	1,267	119	82	0	0	11	264	235	2,820
1997-1999		0	225	255	815	192	49	0	0	4	4	23	1,567
1993-1999		0	360	328	1,073	148	68	0	0	8	156	146	2,287

Notes: [a]Species or species group codes.
[b]Actual number taken is the total number of seabirds recorded dead in the observed hauls.

STAL – Short-tailed albatross
LAAL – Laysan's albatross
BFAL – Black-footed albatross
NFUL – Northern fulmar
Gull – Unidentified gulls (herring gulls, glaucous gulls, glaucous-winged gulls)
SHWR – Unidentified shearwaters (unidentified dark shearwaters, sooty shearwaters, short-tailed shearwaters)
Unidentified Tubenose – Unidentified procellariiformes (albatrosses, shearwaters, petrels)
Alcid – Unidentified alcids (guillemots, murres, puffins, murrelets, auklets)
Other – Miscellaneous birds (could include loons, grebes, storm-petrels, cormorants, waterfowl, eiders, shorebirds, phalaropes, jaeger/skuas, red-legged kittiwakes, black-legged kittiwakes, terns)
Unidentified ALB – Unidentified albatrosses (could include short-tailed albatrosses, Layson's albatrosses, black-footed albatrosses)

Source: NMFS, 2001. Alaska Groundfish Fisheries DRAFT Programmatic Supplemental Environmental Impact Statement. USDC NOAA, National Marine Fisheries Service, Alaska Region; Juneau, Alaska, and Seattle, Washington, January 2001.

Table 9. SEABIRDS CAUGHT ON VESSELS AND REPORTED BY NMFS OBSERVERS IN THE SAMPLED PORTION OF HOOK-AND-LINE HAULS IN THE BSAI AND GOA GROUNDFISH FISHERIES FROM 1993 TO 1997.

ALBATROSS SPECIES (ALBA)

* Short-tailed Albatross
* Laysan Albatross
* Black-footed Albatross

*NORTHERN FULMAR (NOFU)

GULL SPECIES (GULL)
* Unidentified Gull
* Glaucous-winged Gull
* Glaucous Gull
* Herring Gull

SHEARWATER SPECIES (SHWR)
Unidentified Shearwater
Dark shearwater species
* Sooty Shearwater
* Short-tailed Shearwater
* Storm petrel species
Unidentified tubenose species

OTHER SPECIES (OTHR)
* Black-legged Kittiwake
Alcid species
* Cormorant species
* Waterfowl species
* Guillemot species
Murre species
* Common Murre
* Thick-billed Murre
* Loon species
* Auklet/Murrelet species

* Unique species or species group

Figure 1. **Relative species composition of bird incidental catch in the longline fisheries in the Bering Sea and Aleutian Islands. Preliminary average annual estimates, 1993–1999. Source:** NMFS, 2001. Alaska Groundfish Fisheries DRAFT Programmatic Supplemental Environmental Impact Statement. USDC NOAA, National Marine Fisheries Service, Alaska Region; Juneau, Alaska, and Seattle, Washington, January 2001.

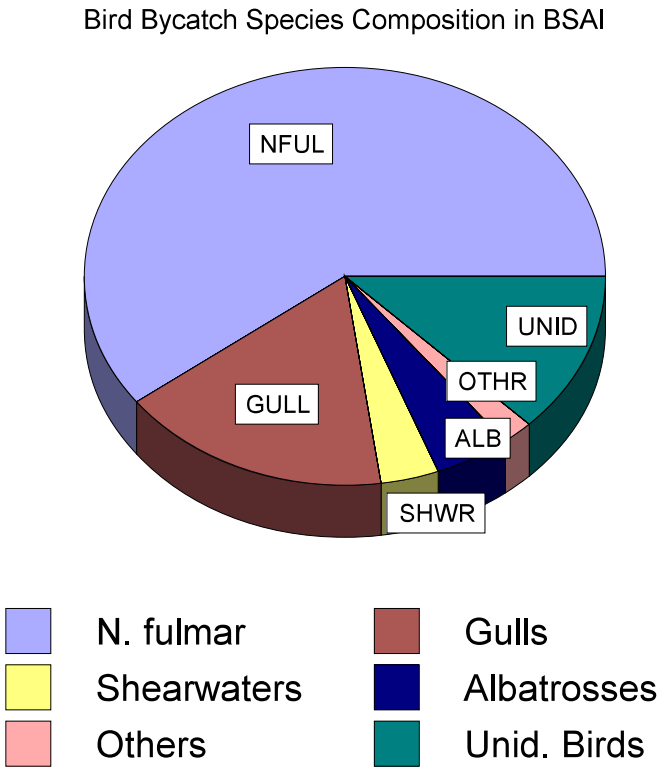
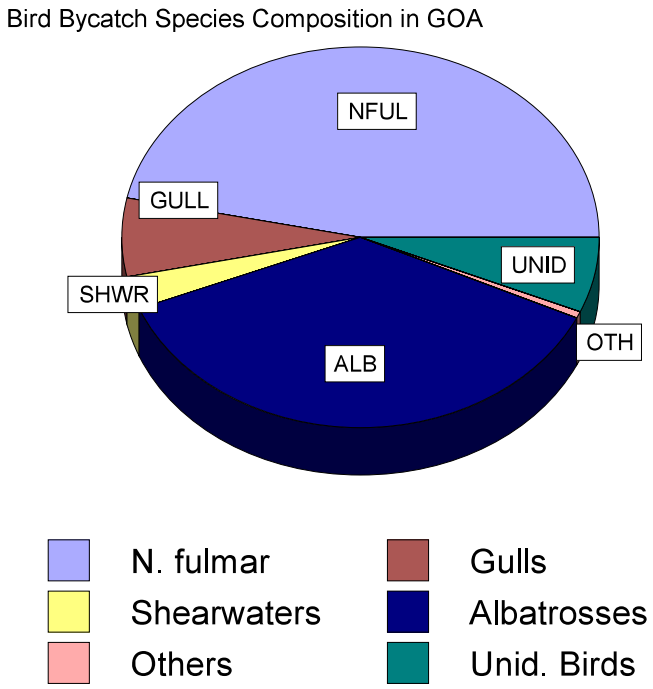


Figure 2. **Relative species composition of bird bycatch in the longline fisheries in the Gulf of Alaska. Preliminary average annual estimates, 1993–1999. Source:** NMFS, 2001. Alaska Groundfish Fisheries DRAFT Programmatic Supplemental Environmental Impact Statement. USDC NOAA, National Marine Fisheries Service, Alaska Region; Juneau, Alaska, and Seattle, Washington, January 2001.



Pacific Fishery Management Council

Introduction

The Pacific Fishery Management Council (Pacific Council) also has a unique management process that includes American Indian tribes as well as state and federal representatives. It has management responsibility for groundfish and coastal pelagic species within the U.S. EEZ off the states of Washington, Oregon, and California. It has the additional responsibility for making management recommendations to the International Pacific Halibut Commission (IPHC).

There are two species complexes that use longlines, the groundfish and highly migratory species (HMS) fisheries. The groundfish fishery includes rockfish (55 species), flatfish (12 species), sharks and skates, roundfish, and others. Note that "roundfish" species include economically important species such as Pacific whiting or hake, sablefish, and lingcod. The Groundfish FMP was developed in 1978 by the Pacific Council and approved by the Secretary of Commerce in 1982. This FMP has been amended nine times, with the most recent Amendment 10 in 1997. The HMS fisheries within the Pacific Council management area include tunas, swordfish, marlins, sailfish, oceanic sharks, and others. These species are harvested by both commercial and recreational fisheries and by foreign fishing fleets, but only a fraction of the total harvest is taken within U.S. waters. There is currently no FMP for these species within the Pacific Council management area. The Pacific Council, however, is currently holding discussions with the Western Pacific and North Pacific Fishery Management Councils to develop a combined management regime for these species.

Seabird Bycatch Assessment

There have not been specific seabird bycatch assessments in these fisheries.

Description of Fisheries

Highly Migratory Species (HMS)
There is currently no fishery management plan for HMS within the Pacific Council authority. A scoping document was publicly circulated in September 1999 to gather comment on the various provisions of a proposed FMP, including bycatch concerns.

West Coast Groundfish
The groundfish fishery is predominantly prosecuted with trawl gear, although there is a limited number of longline vessels actively engaged in the fishery. Although there are no regulations directly relating to seabird bycatch or mitigation requirements, there is currently a combination of limited entry, gear restrictions, vessel landing limits, and time/area closures in place to control effort in the fishery, thereby also limiting opportunities for seabird interactions.

Current Seabird Mitigation Efforts

None of the regulatory actions for these fisheries have directly addressed seabird mitigation techniques or gear modification.

New England Fishery Management Council

Introduction

The groundfish fleet of New England is one of the most recognizable in the world, and is the oldest commercial fishery in the United States. The New England Fishery Management Council (NE Council) has develops management plans for groundfish in New England waters, including Georges Bank and the Gulf of Maine. This species complex, managed under the Northeast Multispecies Fishery Management Plan (Groundfish FMP), currently includes Atlantic cod (*Gadus morhua*), witch flounder (*Glyptocephalus cynoglossus*), American plaice (*Hippoglossoides platessoides*), yellowtail flounder (*Limanda ferruginea*), ocean pout (*Macrozoarces americanus*), haddock (*Melanogrammus aeglefinus*), silver hake (*Merluccius bilinearis*), pollock (*Pollachius virens*), winter flounder (*Pseudopleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), redfish (*Sebastes faciatus*), red hake (*Urophycis chuss*), white hake (*Urophycis tenuis*), Atlantic halibut (*Hippoglossus hippoglossus*), and offshore hake (*Merluccius albidus*). These species are harvested mainly by trawlers and hook-and-line longliners. The initial Groundfish FMP was approved by the Secretary of Commerce and became effective in 1986 and has undergone 24 frameworks adjustments and nine amendments. This ninth amendment added Atlantic halibut to the list of species managed under the Groundfish FMP.

Other less-utilized species were harvested and landed as the major groundfish fisheries declined. Concerned with the decreasing size of landed monkfish (*Lophius americanus*), fishermen and dealers requested the development of management measures to protect the species. The monkfish fishery is now managed jointly by the NE Council and the Mid-Atlantic Fishery Management Council under the Monkfish FMP of 1998.

Seabird Bycatch Assessment

No formal seabird assessments have been conducted. There are relatively few interactions between seabirds and demersal longline fisheries in this region. Fishermen report that most of these rare interactions involve shearwaters and “large gulls” (Openshaw pers. comm. 1999; Beideman pers. comm. 1999).

The Northeast has had limited observer coverage on its groundfish longline fleet. Responsibilities for maintaining the observer data shifted to the Southeast Region in 1996. Because of the historical emphasis on trawl and pot gear in most of the region’s fisheries, much

of the seabird bycatch research has not been on longline gear. One comparison of observed interaction rates between seabirds and commercial fishing gear in New England from 1991 through 1993 found sink gillnets to also have many seabird interactions (Lanza and Griffin 1997).

Amendment 5 (1993) assessed the seabird risk in this fishery as follows:
Seabirds In addition to marine mammals and sea turtles, seabirds are vulnerable to entanglement in commercial fishing gear (Proposed Regime to Govern Interactions Between Marine Mammals and Commercial Fishing Operations, 1991). The interaction has not been quantified in the Northeast multispecies groundfish fishery, but impacts are not considered significant. Endangered and threatened bird species, which include the roseate tern and piping plover, are not impacted by the groundfish gear (Paul Nickerson, U.S. Fish and Wildlife, pers. comm.)

Description of Fisheries

The Northeast Groundfish complex includes many of the traditional groundfish species. Of the fourteen species included in the management plan, only a few are targeted by demersal longline gear, notably Atlantic cod. The decline of many of these fisheries had decreased the total number of longline sets for groundfish species. There are few groundfish longline vessels from this region, with trawling and pot fishing being the dominant non-HMS gear types.

The Groundfish FMP has a number of regulations in place due to the depleted status of most groundfish stocks in the region. These regulations range from a restrictive limited entry program to area closures to prohibitions on gear types, and all serve to reduce the number of opportunities for seabird interactions. There is no specific regulation regarding the reduction of seabird bycatch or the mandatory use of mitigation techniques. There is relatively little known about the effects of groundfish longline gear on regional seabird populations.

The Atlantic Halibut fishery was historically important to the New England fisheries, particularly in the nineteenth century, but the resource has been depleted for such a long time that most landings of this species are incidental catches from other directed fisheries. Current participation in the halibut fishery is approximately 50 vessels, almost all of which occur in state waters of Maine during April and May. The gear per vessel consists of "one to ten tub trawls [demersal longlines] consisting of 40-100 hooks each [which are then set] over the gravel and clay bottom." (NEFMC 1998)

Although mostly in state waters, some vessels may have also fished in the EEZ. Amendment 7 to the Groundfish FMP, however, prohibited "fishing in the EEZ (and federally permitted vessels fishing in state waters) with gear capable of catching groundfish, such as longlines, unless fishing under DAS [the "days-at-sea" management regime] or in an approved exempted or experimental fishery." (NEFMC 1998) There are no such fisheries for halibut now in effect, and hence seabird bycatch in this historical longline fishery should not exist at this time.

Monkfish for many years was considered an underutilized species in this region, and only recently has been targeted directly using trawls, gill nets and the occasional longline gear. Today, most of the landings are still bycatch rather than from the directed fishery. Many sea scallop vessels in particular land a substantial number of monktails and livers.

Current Seabird Mitigation Efforts

There are no regulatory measures in place in these fisheries specifically addressing seabird mortality, although there are provisions such as the three large area closures (Closed Area I, Closed Area II, and the Nantucket Lightship Closed Area) and the rolling Gulf of Maine closed areas. These closed areas may provide an additional element of protection by eliminating the possibility of an interaction.

Mid-Atlantic Fishery Management Council

Introduction

The Mid-Atlantic Fishery Management Council (MA Council) includes members from New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina (North Carolina also has a seat on the South Atlantic FMC). This council has primary responsibility for the development of the following FMPs: a) Summer Flounder, Scup, Black Sea Bass; b) Atlantic Bluefish; c) Atlantic Mackerel, Squid and Butterfish; and d) Tilefish. The MA Council also jointly manages the monkfish and spiny dogfish fisheries with the NE Council.

Seabird Bycatch Assessment

No specific seabird assessments have been conducted for these fisheries, because observer data indicate that there are very few interactions between longline gear and seabirds in the MA Council's area of jurisdiction.

Description of Fisheries

Summer Flounder, Scup, Black Sea Bass; Atlantic Bluefish; Atlantic Mackerel, Squid and Butterfish

The species (*Pleuronectes americanus*, *Stenotomus chrysops*, *Centropristis striatus*; *Pomatomus saltatrix*; *Scomberomorus sp.*, *Loligo* and *Illex spp.*, *Peprilus tricanthus*) covered under these management plans are not actively pursued commercially with longline gear, therefore seabird interactions with longlines do not happen. Longline fishing gear is technically approved, however, for all these species (64 FR 67511-67524). In particular, the Atlantic mackerel, squid and butterfish fisheries do not use longlines either recreationally or commercially, and so there are no interactions in these fisheries between seabirds and longlines (Seagraves 1999).

Tilefish (*Lopholatilus camaeleonticeps*) have historically been retained in varying amounts as incidental catch in other fisheries and by recreational anglers. Vessels targeting tilefish generally use longline gear (MAFMC 1999). A Tilefish FMP was adopted by the MA Council and approved by NMFS on May 10, 2001.

No research has been conducted on the seabird bycatch of this fishery. It has been reported, however, that because of the limited number of participants in this fishery and the nature of the gear, the seabird bycatch is very close to zero (Hoff pers. comm. 1999). Some measures found within this FMP, however, reduce this potential bycatch even further. In addition to the required licensing and permitting regulations, this FMP implements a quarterly-set commercial quota, limited entry to the fishery, and closure of the fishery for one month. In addition, the imposition of a 10-year rebuilding schedule for the species will require decreasing landings, reducing even further the longline fishing effort.

Current Seabird Mitigation Efforts

There are no management measures currently in place for seabird bycatch mitigation.

South Atlantic Fishery Management Council

Introduction

The South Atlantic Fishery Management Council (SA Council) develops FMPs for the fisheries in Federal waters off the coasts of North Carolina, South Carolina, Georgia, and the East Coast of Florida. The SA Council has also developed a joint FMP for the bluefish stock with the Mid-Atlantic Council. In the fisheries managed by the SA Council longlines are only used regularly in the Snapper-Grouper fishery.

Seabird Bycatch Assessment

There have not been specific seabird bycatch assessments in this fishery, although interactions between the fishery and seabirds are believed to be rare.

Description of Fisheries

The "Snapper-Grouper Complex" for management purposes consists of "demersal tropical and subtropical species which generally occupy the same type of habitat and are caught by common fishing methods on the Continental Shelf off the southeastern United States. In this fishery, there are eight families consisting of 69 species" (SAFMC 1983).

Fishing for groupers and snappers began commercially in the South Atlantic bight in the late 19th century, although landings until the 1950s remained in the range of a few thousand pounds (SAFMC 1983). Technological improvements and changes in gear types increased annual commercial harvests of snappers and groupers to almost 400,000 pounds in 1990, but these landings have since decreased to 23,528 pounds in 1998 (NMFS 1999). Demersal longlining is one of four main gear types used in this fishery, with recent landing statistics indicating that longlines are rarely used in the current fishery. The gear consists of circle hooks on 12-18 inch gangions, which are then connected by clips to a longline one to five miles long. Many vessels use a hydraulic pump to power the longline reel.

The Southeast Fishery Science Center (SEFSC) has been responsible for all pelagic observer programs in the Atlantic since 1996. From 1992 to 1995, the SEFSC concentrated observer efforts below the 35° N. latitude, although occasionally gathering data from above that line. Longline fishing in this region results in occasional turtle interactions, resulting in more observer coverage than might otherwise exist.

Table 1. South Atlantic Fishery Management Council Longline Fishery Summary.

	Snapper-Grouper Complex[1]
Longline Target Species	(not available)
Season	(not available)
Gear Types	Trap, hook-and-line, trawls, longline
Bait Used (longline)	(not available)
Average Sets per Day (longline)	One
Number of Hooks per Set	500-600
Area Fished	(not available)
Percent Observer Coverage	(not available)
Number of Longline Vessels in Fishery	30-45
Mean Longline Vessel Length (LOA)	(not available)

[1] Data from SAFMC 1983

Current Seabird Mitigation Efforts

Regulatory actions in this fishery have not been implemented specifically for seabird protection. However, some regulations, such as Amendment 9 from 1994, significantly reduced the range and most likely the total number of longline sets within the South Atlantic management region.

Caribbean Fishery Management Council

Introduction

The Caribbean Fishery Management Council's (Caribbean Council) area of jurisdiction encompasses the combined EEZs of the Commonwealth of Puerto Rico and the Territory of the U.S. Virgin Islands, the only Council that does not include any U.S. state. This council is also unique in its management of stocks that are shared among many nations within the Caribbean Sea. The "Reeffish Fishery of the Commonwealth of Puerto Rico and the Territory of the U.S. Virgin Islands" (Reeffish FMP) includes over 350 different species, although the Reeffish FMP only specifically addresses the "64 most commonly landed species" (CFMC 1990). This fishery also includes a high percentage of artesinal fisheries, with much of the total catch consumed within the region.

Seabird Bycatch Assessment

Although the FMP and subsequent revisions have addressed marine mammal and turtle interactions, there has been no formal assessment conducted of seabird bycatch within this management area.

Description of Fisheries

The only longline fishery component of this region under the purview of the Caribbean Fishery Management Council is the deep-water reef fishery. This is a recently developed longline fishery, however, with the original FMP not even listing longline gear in its description of the reef fisheries (CFMC 1985). These deep-water species were generally harvested with fish traps/pots and electric reels, although demersal longlines were employed to "a limited extent" (CFMC 1993). Amendment 2 of this FMP further noted that the total catches of these deep-water snapper species in Puerto Rico declined from 340 metric tons (mt) in 1979 down to 80 mt in 1990.

Current regulations will likely have little effect on the longline take of seabirds due primarily to the low usage of longline gear in this fishery. Specific time-area closures may have an additional effect to reduce interactions simply by eliminating other fishing areas that may otherwise have

been targeted by the longline reef fish fishery. Note, however, that legally registered vessels do not have to have a specific permit to fish in this fishery (50 CFR 669.4, 28 August 1985).

Current Seabird Mitigation Efforts

There have not been specific seabird bycatch assessments in this fishery, although interactions between the fishery and seabirds are believed to be very rare.

Gulf of Mexico Fishery Management Council

Introduction

The Gulf of Mexico Fishery Management Council (GM Council) manages species within the U.S. EEZ of the Gulf of Mexico. The fisheries that occasionally use demersal longlines are collectively managed under the Reef Fish Fishery Management Plan. This FMP encompasses many species, and has been amended 16 times since its initial implementation in 1984.

Seabird Bycatch Assessment

Although the FMP and subsequent revisions have addressed marine mammal and turtle interactions, there has been no formal assessment conducted of seabird bycatch within this management area.

Description of Fisheries

There are 42 species identified in the fishery management unit, with approximately an additional 15 included in the fishery (GMFMC 1989). The historical reef fish fisheries occur in water shallower than 100 fathoms, yet due to geomorphic characteristics in the Gulf of Mexico, only an estimated 5.7 percent of the U.S. EEZ is considered reef fish habitat (GMFMC 1989). There are current proposals to remove some of these species from the FMP.

The development of the reef fish fisheries was the first demersal target fishery in the Gulf of Mexico, and standard hook-and-line gear was the prevalent gear type from the 1840s until the broad introduction of fish traps and longlines in the late 1970s. The commercial fishery is comprised of vessels using handlines or “bandit rigs”, traps and pots, and longlines. The longline fleet in the Gulf currently targets three general regions: the western Gulf off the Texas coast, the eastern Gulf off the west-central Florida coast, and the northeast Gulf off the Florida panhandle (GMFMC 1989). Longline gear is similar to that used in other reef fisheries, with the longline measuring between one and six miles long with gangions placed about 10-20 feet apart.

Table 2. Gulf of Mexico Fishery Management Council Longline Fisheries Summary.

	Reef Fish
Longline Target Species	Red snapper, yellowedge grouper, golden tilefish
Season	(not available)
Gear Types	Handline, trap, pot, demersal longline[2]
Bait Used (longline)	Seasonal: mullet, eels, skate, pollock, spanish mackerel, spanish sardines, cigar minnows, squid[2]
Average Sets per Day (longline)	Up to five[2]
Number of Hooks per Set	120-500 per mile[2]
Area Fished	the western Gulf off the Texas coast, the eastern Gulf off the west-central Florida coast, and the northeast Gulf off the Florida panhandle
Percent Observer Coverage	(not available)
Number of Longline Vessels in Fishery	(not available)
Mean Longline Vessel Length (LOA)	(not available)

[2] From Prytherch (1983) in the GMFMC Reef Fish FMP Amendment 1 (1989)

Current Seabird Mitigation Efforts

There have been many regulations that have resulted in the reduction of total longline fishing effort, including closed seasons, reductions in TACs, and even closed areas. In part because longline interactions with seabirds are believed to be rare, none of the regulatory actions for this fishery have directly addressed seabird mitigation techniques or gear modification.

Atlantic Ocean/Gulf of Mexico Highly Migratory Species

[to be added at a later date]

February 28, 2001

Appendix III. NMFS National Bycatch Plan Executive Summary

Bycatch – defined as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear – has become a central concern of the commercial and recreational fishing industries, resource managers, scientists, and the public, both nationally and globally. Bycatch concerns stem from the apparent waste that discards represent when so many of the world's marine resources either are utilized to their full potential or are overexploited. These issues apply to fishery resources as well as to marine mammals, sea turtles, seabirds, and other components of marine ecosystems.

Congress has responded to these concerns by increasing requirements of the Marine Mammal Protection Act, the Endangered Species Act, and, most recently, the Sustainable Fisheries Act[1] to reduce or eliminate bycatch. The Magnuson-Stevens Fisheries Conservation and Management Act highlighted the need for bycatch management in fishery management plans by requiring that *conservation and management measures shall, to the extent practicable, minimize bycatch and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch*. Globally, the United Nations Food and Agriculture Organization's Code of Conduct for Responsible Fisheries, to which the United States is a signatory, also emphasizes bycatch reduction.

The national goal of the National Marine Fisheries Service's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch.

Responding to these issues and increasing regulatory requirements, in 1992 the U.S. commercial fishing industries initiated a series of workshops to develop strategies to reduce bycatch and to increase the industry's and the public's understanding of bycatch issues. Their recommendations, as well as those from recreational fishing and environmental groups and the public, have prompted the National Marine Fisheries Service to prepare this plan, clearly articulating the agency's objectives, priorities, and strategies regarding bycatch. This plan includes national and regional bycatch objectives; specific recommendations concerning data collection, evaluation, and management actions necessary to attain the objectives; and an assessment if the state of knowledge about bycatch in the nation's marine fisheries. The last of these is intended to serve as a benchmark for measuring progress in bycatch reduction.

Because there are little data available on the retained incidental and unobserved mortality

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[1] *The Sustainable Fisheries Act amended the Magnuson Fishery Conservation and Management Act and renamed it the Magnuson-Stevens Fishery Conservation and Management Act.*

components of bycatch, the assessment of bycatch focuses on the availability of quantitative discard estimates from the nation's fisheries, the significance of those discards to the health of the fishery and protected stocks, and progress in addressing bycatch issues associated with each of the fisheries evaluated. Some quantitative information on finfish discards was available for about half of the species or species groups; the availability of such estimates is disproportionate among regions of the country and among fisheries within regions.

Review of bycatch reduction efforts completed or under way indicates that successful programs share common characteristics that form the basis for the following seven national objectives of this plan:

1. Determine the magnitude of bycatch and bycatch mortality.
2. Determine the population, ecosystem, and socio-economic impacts of bycatch and bycatch mortality.
3. Determine whether current conservation and management measures minimize bycatch to the extent practicable and, if not, select measures that will.
4. Implement and monitor selected bycatch management measures.
5. Improve communications with all stakeholders on bycatch issues.
6. Improve the effectiveness of partnerships with groups and individuals external to the National Marine Fisheries Service.
7. Coordinate NMFS activities to effectively implement this plan.

To accomplish these objectives, recommendations are made in the following six areas:

1. bycatch monitoring and data collection programs;
2. research on the population, ecosystem, and socio-economic effects of bycatch;
3. research to increase the selectivity of fishing gear and to increase the survival of fish and protected species that are inadvertently encountered by fishing gear;
4. incentive programs for fishermen to improve bycatch performance;
5. analysis of the implications of conservation and management measures for bycatch; and
6. exchange of information and development of cooperative management approaches.

Recommended actions in the six areas range from developing strategies for a long-term integrated scientific approach to the collection of biological, economic, and social data to providing information that will help define the benefits and costs associated with managing bycatch. The plan does not attempt an intraregional needs prioritization. Instead, it suggests a seven-step decision-making framework to evaluate national and regional bycatch research and management.

The development of this plan has brought into focus the fact that there is a multi-faceted and complex set of problems associated with bycatch that affects nearly all aspects of

fishing operations. Regionally, the causes and implications of bycatch share some characteristics, but often differ since the status of exploitation of resources and the way fisheries are prosecuted and managed can vary substantially. Bycatch management can be accomplished with a wide variety of measures, depending on the specific characteristics of fisheries. As a result, no single solution to the "bycatch problem" exists. Rather, fishermen, managers, scientists, conservationists, and other interest groups must work together to craft a balanced approach to addressing bycatch – one that will promote the sustainability of our nation's living marine resources.

Reference: *Managing the Nation's Bycatch: Programs, Activities, Recommendations for the National Marine Fisheries Service,* NOAA, U.S. Department of Commerce, Washington, D.C. June 1998, 174 pp.

October 30, 2000

Appendix IV. FWS Waterbird Bycatch Policy Statement

It is the policy of the U.S. Fish and Wildlife Service that the Migratory Bird Treaty Act of 1918, as amended, legally mandates the protection and conservation of migratory birds. Avian conservation is of significant concern to many in the United States. Substantial numbers of waterbirds (especially seabirds, but also waterfowl, shorebirds, and other related wading species) are killed annually in fisheries, making waterbird bycatch a serious conservation issue and a violation of the underlying tenets of the MBTA. The goal of the U.S. Fish and Wildlife Service is the elimination of waterbird bycatch in fisheries. The Service will actively expand partnerships with Regional, national, and international organizations, States, tribes, industry, and environmental groups to meet this goal. The Service, in cooperation with interested parties, will aggressively promote public awareness of waterbird bycatch issues, and gather the scientific information to develop and provide guidelines for management, regulation, and compliance. This policy statement was approved by FWS on October 30, 2000.

February 28, 2001

Appendix V. Summaries of Relevant Statutes: Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Endangered Species Act (ESA), and Migratory Bird Treaty Act (MBTA)

Magnuson-Stevens Fishery Conservation and Management Act

Through the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Congress delegated to the Secretary of Commerce, who then delegated to the National Marine Fisheries Service (NMFS), broad authority to conserve and manage sustainably the fishery resources of the United States in its exclusive economic zone. To assist the Secretary in this duty, Congress created 8 regional fishery management councils. Their principal task is to prepare, with public participation, for the Secretary's review and approval fishery management plans (FMPs) for fish within their geographic areas of authority, except for certain Atlantic highly migratory species. Under the Magnuson-Stevens Act, the Secretary, through NMFS, maintains exclusive authority over Atlantic highly migratory species, such as certain sharks, tunas, and billfishes. All FMPs and regulations implementing them, whether prepared by NMFS or prepared by a regional fishery management council and submitted to NMFS for review, must be consistent with 10 national standards set out in section 301 of the Magnuson-Stevens Act, the provisions set out in section 302 of the Magnuson-Stevens Act detailing the mandatory contents of all FMPs, regulations implementing recommendations by international organizations in which the United States participates, and all other applicable law, such as the National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, and Coastal Zone Management Act.

Of the 10 national standards of the Magnuson-Stevens Act, national standard 9 states that "[c]onservation and management measures shall, to the extent practicable, minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." Section 303(a)(11) of the Magnuson-Stevens Act requires that all FMPs "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, minimize bycatch and minimize the mortality of bycatch which cannot be avoided." The Magnuson-Stevens Act defines "fish" broadly to include all finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Because the Magnuson-Stevens Act explicitly excludes seabirds from the definition of "fish," the definition of "bycatch," -- "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards" -- also does not include seabirds. Nevertheless, conservation and management measures to reduce seabird-fishery interactions may be implemented under authority of the Magnuson-Stevens Act. The Magnuson-Stevens Act contains civil and criminal penalties for violations of certain provisions.

Endangered Species Act

The Endangered Species Act (ESA) protects species of plants and animals that have been listed through regulations as threatened or endangered. A threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An endangered species is any species, other than some species of the Class Insecta, that is in danger of extinction throughout all or a significant portion of its range. The National Marine Fisheries Service (NMFS) has jurisdiction over cetaceans, pinnepeds (except walruses), commercially harvested estuarine molluscs and crustaceans, marine fish, anadromous fish, certain other species (e.g., Johnson's seagrass), and sea turtles before they reach the beach. The Fish and Wildlife Service of the Department of the Interior (FWS) has jurisdiction over all other species, including seabirds. After a species is listed as threatened or endangered, NMFS or FWS is required to designate critical habitat and develop and implement recovery plans for the threatened and endangered species. Every Federal agency must ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The provisions of the ESA extend to actions within the territory of the United States, state and Federal waters, and by U.S. entities on the high seas. For example, the National Marine Fisheries Service must ensure that its authorization of the conduct of a fishery is not likely to jeopardize the continued existence of any endangered or threatened seabird species. Federal agencies must consult with NMFS or FWS to avoid, minimize, or mitigate the impacts of their activities on listed species. In the case of listed seabirds, NMFS must consult with FWS.

The ESA prohibits the taking of any individual of an endangered species. “Take” is defined broadly and includes harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any of these types of conduct. The Secretaries may issue permits for the incidental take of listed species. The ESA includes civil and criminal penalties for violations of its provisions.

Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act, it is unlawful to pursue, hunt, take, capture, kill, possess, trade, or transport any migratory bird, or any part, nest, or egg of a migratory bird, included in treaties between the United States and Great Britain, Mexico, Japan, or the former Union of Soviet Socialists Republics, except as permitted by regulations issued by the Department of the Interior. Violations of the Migratory Bird Treaty Act carry criminal penalties; any equipment and means of transportation used in activities in violation of the Act may be seized by the United States government and, upon conviction, must be forfeited to it. To date, the Migratory Bird Treaty Act has been applied to the territory of the United States and coastal waters extending 3 miles from shore.

January 10, 2001

Appendix VI. Presidential Executive Order 13186–Responsibilities of Federal Agencies to Protect Migratory Birds

Presidential Documents

Federal Register
Vol. 66, No. 11
Wednesday, January 17, 2001

Title 3—

The President

Executive Order 13186 of January 10, 2001

Responsibilities of Federal Agencies To Protect Migratory Birds

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in furtherance of the purposes of the migratory bird conventions, the Migratory Bird Treaty Act (16 U.S.C. 703–711), the Bald and Golden Eagle Protection Acts (16 U.S.C. 668–668d), the Fish and Wildlife Coordination Act (16 U.S.C. 661–666c), the Endangered Species Act of 1973 (16 U.S.C. 1531–1544), the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4347), and other pertinent statutes, it is hereby ordered as follows:

Section 1. *Policy.* Migratory birds are of great ecological and economic value to this country and to other countries. They contribute to biological diversity and bring tremendous enjoyment to millions of Americans who study, watch, feed, or hunt these birds throughout the United States and other countries. The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds. Such conventions include the Convention for the Protection of Migratory Birds with Great Britain on behalf of Canada 1916, the Convention for the Protection of Migratory Birds and Game Mammals-Mexico 1936, the Convention for the Protection of Birds and Their Environment-Japan 1972, and the Convention for the Conservation of Migratory Birds and Their Environment-Union of Soviet Socialist Republics 1978. These migratory bird conventions impose substantive obligations on the United States for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act (Act), the United States has implemented these migratory bird conventions with respect to the United States. This Executive Order directs executive departments and agencies to take certain actions to further implement the Act.

Sec. 2. *Definitions.* For purposes of this order:
(a) ''Take'' means take as defined in 50 C.F.R. 10.12, and includes both ''intentional'' and ''unintentional'' take.
(b) ''Intentional take'' means take that is the purpose of the activity in question.
(c) ''Unintentional take'' means take that results from, but is not the purpose of, the activity in question.
(d) ''Migratory bird'' means any bird listed in 50 C.F.R. 10.13.
(e) ''Migratory bird resources'' means migratory birds and the habitats upon which they depend.
(f) ''Migratory bird convention'' means, collectively, the bilateral conventions (with Great Britain/Canada, Mexico, Japan, and Russia) for the conservation of migratory bird resources.
(g) ''Federal agency'' means an executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104.
(h) ''Action'' means a program, activity, project, official policy (such as a rule or regulation), or formal plan directly carried out by a Federal agency. Each Federal agency will further define what the term ''action'' means with respect to its own authorities and what programs should be included in the agency-specific Memoranda of Understanding required by this order. Actions delegated to or assumed by nonfederal entities,

or carried out by nonfederal entities with Federal assistance, are not subject to this order. Such actions, however, continue to be subject to the Migratory Bird Treaty Act.

(i) ''Species of concern'' refers to those species listed in the periodic report ''Migratory Nongame Birds of Management Concern in the United States,'' priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.11.

Sec. 3. *Federal Agency Responsibilities.* (a) Each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations.

(b) In coordination with affected Federal agencies, the Service shall develop a schedule for completion of the MOUs within 180 days of the date of this order. The schedule shall give priority to completing the MOUs with agencies having the most substantive impacts on migratory birds.

(c) Each MOU shall establish protocols for implementation of the MOU and for reporting accomplishments. These protocols may be incorporated into existing actions; however, the MOU shall recognize that the agency may not be able to implement some elements of the MOU until such time as the agency has successfully included them in each agency's formal planning processes (such as revision of agency land management plans, land use compatibility guidelines, integrated resource management plans, and fishery management plans), including public participation and NEPA analysis, as appropriate. This order and the MOUs to be developed by the agencies are intended to be implemented when new actions or renewal of contracts, permits, delegations, or other third party agreements are initiated as well as during the initiation of new, or revisions to, land management plans.

(d) Each MOU shall include an elevation process to resolve any dispute between the signatory agencies regarding a particular practice or activity.

(e) Pursuant to its MOU, each agency shall, to the extent permitted by law and subject to the availability of appropriations and within Administration budgetary limits, and in harmony with agency missions:

(1) support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;

(2) restore and enhance the habitat of migratory birds, as practicable;

(3) prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable;

(4) design migratory bird habitat and population conservation principles, measures, and practices, into agency plans and planning processes (natural resource, land management, and environmental quality planning, including, but not limited to, forest and rangeland planning, coastal management planning, watershed planning, etc.) as practicable, and coordinate with other agencies and nonfederal partners in planning efforts;

(5) within established authorities and in conjunction with the adoption, amendment, or revision of agency management plans and guidance, ensure that agency plans and actions promote programs and recommendations of comprehensive migratory bird planning efforts such as Partners-in-Flight, U.S. National Shorebird Plan, North American Waterfowl Management Plan, North American Colonial Waterbird Plan, and other planning efforts, as well as guidance from other sources, including the Food and Agricultural Organization's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries;

(6) ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern;

(7) provide notice to the Service in advance of conducting an action that is intended to take migratory

birds, or annually report to the Service on the number of individuals of each species of migratory birds intentionally taken during the conduct of any agency action, including but not limited to banding or marking, scientific collecting, taxidermy, and depredation control;

(8) minimize the intentional take of species of concern by: (i) delineating standards and procedures for such take; and (ii) developing procedures for the review and evaluation of take actions. With respect to intentional take, the MOU shall be consistent with the appropriate sections of 50 C.F.R. parts 10, 21, and 22;

(9) identify where unintentional take reasonably attributable to agency actions is having, or is likely to have, a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. With respect to those actions so identified, the agency shall develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the Service. These principles, standards, and practices shall be regularly evaluated and revised to ensure that they are effective in lessening the detrimental effect of agency actions on migratory bird populations. The agency also shall inventory and monitor bird habitat and populations within the agency's capabilities and authorities to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts;

(10) within the scope of its statutorily-designated authorities, control the import, export, and establishment in the wild of live exotic animals and plants that may be harmful to migratory bird resources;

(11) promote research and information exchange related to the conservation of migratory bird resources, including coordinated inventorying and monitoring and the collection and assessment of information on environmental contaminants and other physical or biological stressors having potential relevance to migratory bird conservation. Where such information is collected in the course of agency actions or supported through Federal financial assistance, reasonable efforts shall be made to share such information with the Service, the Biological Resources Division of the U.S. Geological Survey, and other appropriate repositories of such data (e.g, the Cornell Laboratory of Ornithology);

(12) provide training and information to appropriate employees on methods and means of avoiding or minimizing the take of migratory birds and conserving and restoring migratory bird habitat;

(13) promote migratory bird conservation in international activities and with other countries and international partners, in consultation with the Department of State, as appropriate or relevant to the agency's authorities;

(14) recognize and promote economic and recreational values of birds, as appropriate; and

(15) develop partnerships with non-Federal entities to further bird conservation.

(f) Notwithstanding the requirement to finalize an MOU within 2 years, each agency is encouraged to immediately begin implementing the conservation measures set forth above in subparagraphs (1) through (15) of this section, as appropriate and practicable.

(g) Each agency shall advise the public of the availability of its MOU through a notice published in the **Federal Register**.

Sec. 4. *Council for the Conservation of Migratory Birds.* (a) The Secretary of Interior shall establish an interagency Council for the Conservation of Migratory Birds (Council) to oversee the implementation of this order. The Council's duties shall include the following: (1) sharing the latest resource information to assist in the conservation and management of migratory birds;

(2) developing an annual report of accomplishments and recommendations related to this order;

(3) fostering partnerships to further the goals of this order; and

(4) selecting an annual recipient of a Presidential Migratory Bird Federal Stewardship Award for contributions to the protection of migratory birds.

(b) The Council shall include representation, at the bureau director/administrator level, from the Departments of the Interior, State, Commerce, Agriculture, Transportation, Energy, Defense, and the Environmental Protection Agency and from such other agencies as appropriate.

Sec. 5. *Application and Judicial Review.* (a) This order and the MOU to be developed by the agencies do not

require changes to current contracts, permits, or other third party agreements.

(b) This order is intended only to improve the internal management of the executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

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THE WHITE HOUSE,

January 10, 2001.

[FR Doc. 01–1387
Filed 1–12–01; 8:45 am]
Billing code 3195–01–P

August 1, 2001

Appendix VII. Interagency Seabird Working Group (ISWG) Information

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August 1, 2001

Appendix VIII. NMFS Regional Administrators, Regional Science Center Directors, Highly Migratory Species Division, and Regional Fishery Management Council Contact Information

NMFS Regional Offices and Facilities:

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Division Chief, HMS
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National Marine Fisheries Service
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Regional Fishery Management Councils:

Council	States/Commonwealth States	Executive Director and Address
New England	Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut	Paul J. Howard 50 Water Street The Tannery - Mill 2 Newburyport, MA 01950
Mid-Atlantic	New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, North Carolina	Daniel T. Furlong Federal Building, Room 2115 300 South New Street Dover, DE 19904
South Atlantic	North Carolina, South Carolina, Georgia, Florida	Robert K. Mahood 1 Southpark Circle Suite 306 Charleston, SC 29407
Gulf of Mexico	Texas, Louisiana, Alabama, Mississippi, Florida	Wayne E. Swingle 3018 U.S. Highway 301 North Suite 1000 Tampa, FL 33619
Caribbean	Virgin Islands, Puerto Rico	Miguel A. Rolon 268 Munoz Rivera Ave. Suite 1108 San Juan, PR 00918
Pacific	California, Washington, Oregon, Idaho	Donald O. McIsaac 7700 NE Ambassador Place Suite 200 Portland, OR 97220
North Pacific	Alaska, Washington, Oregon	Clarence G. Pautzke 605 W. 4th Ave. Room 306 Anchorage, AK 99501
Western Pacific	Hawaii, American Samoa, Northern Marianas Islands, Guam	Kitty M. Simonds 1164 Bishop Street Suite 1400 Honolulu, HI 96813