WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Longline Fishery

A Framework Adjustment to the
Western Pacific Pelagic Fisheries Management Plan

Including an Environmental Assessment and
Regulatory Impact Review/Final Regulatory Flexibility Analysis

Implementing the Terms and Conditions contained in the
Biological Opinion of the U.S. Fish and Wildlife Service for the
Effects of the Hawaii-based Domestic Longline Fleet on the Short-tailed Albatross
Issued November 28, 2000, as Amended on October 18, 2001

Revised March 29, 2002

Western Pacific Regional Fishery Management Council
1164 Bishop St., Suite 1400
Honolulu, HI 96813

2.0 Summary

Hawaii-based pelagic longline fishing vessels inadvertently hook and kill black-footed albatrosses (*Phoebastria nigripes*) and Laysan albatrosses (*Phoebastria immutabilis*) that nest in the Northwestern Hawaiian Islands (NWHI). On rare occasions Wedge-tailed and sooty shearwaters are also incidentally caught by these vessels. However, there are no reports of interactions between the fishery and the endangered short-tailed albatross (*Phoebastria albatrus*).

In October 1999, the Council recommended three measures to mitigate the harmful effects of fishing by vessels registered under Hawaii longline limited access permits (Hawaii-based longline vessels) on seabirds. The first measure required vessel operators fishing with longline gear north of 25° N. latitude to employ two or more of the following seabird deterrent techniques: 1) maintain adequate quantities of blue dye on board and use only completely thawed, blue-dyed bait; 2) discard offal while setting and hauling the line in a manner that distracts seabirds from hooks; 3) tow a NMFS-approved deterrent (such as a tori line or a buoy) while setting and hauling the line; 4) deploy line with line-setting machine so that the line is set faster than the vessel's speed and attach weights equal to or greater than 45 grams to branch lines within one meter of each hook; 5) attach weights equal to or greater than 45 grams to branch lines within one meter of each hook; 6) begin setting the longline at least one hour after sunset and complete the setting process at least one hour before sunrise, using only the minimum vessel's lights necessary for safety. The second measure directed vessel operators to make every reasonable effort to ensure that birds brought onboard alive are handled and released in a manner that maximizes the probability their long-term survival. The final measure required all vessel owners and operators to annually complete a protected species educational workshop conducted by the National Marine Fisheries Service (NMFS).

NMFS published a proposed rule for the Hawaii-based longline fishery based on the Council's recommended measures (65 FR 41424, July 5, 2000). However, the agency did not proceed with the publication of a final rule, as the U.S. Fish and Wildlife Service (USFWS) had indicated it was developing a Biological Opinion (BiOp) for the fishery under section 7 of the Endangered Species Act (ESA) for the short-tail albatross. This endangered species has been documented in small numbers (2-3 birds) in the NWHI, and the USFWS BiOp, published on November 28, 2000, concluded that the Hawaii-based longline fishery (as proposed including cumulative effects) was not likely to jeopardize the continued existence of the short-tailed albatross.

The USFWS BiOp was based on the operations of the Hawaii-based longline fishery prior to December 1999, and anticipated that the fishery would take 15 short-tailed albatrosses during the seven year period addressed in the consultation (2.2 short-tailed albatrosses annually from 2000-2006). The BiOp considered a "take" to include not only injury or mortality to a short-tail albatross caused by longline gear, but also any short-tail albatross striking at the baited hooks or mainline gear during longline setting or haulback.

The BiOp included several non-discretionary measures to be employed by the Hawaii-based longline fishery and implemented by NMFS. All Hawaii-based vessels operating with longline gear north of 23° N., must use thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longline gear. When making deep sets (targeting tuna) north of 23° N., Hawaii-based vessel operators must employ a line-setting machine with weighted branch lines (minimum weight = 45 g). In addition, all longline vessel operators and crew must follow certain handling techniques to ensure that short-tailed albatrosses brought onboard alive are released in a manner that maximize the probability of their long-term survival, and vessel operators must annually complete a protected species educational workshop conducted by NMFS. Other mitigation measures such as towed deterrents, or the use of weighted branch lines without a line-setting machine (in the case of swordfish or mixed target sets), are optional. Although currently prohibited by a June 12, 2001, emergency rule implemented to protect sea turtles, the BiOp requires vessel operators making shallow sets above 23° N. to begin setting the longline at least one hour after local sunset and complete the setting process by local sunrise, using only the minimum vessel lights necessary. On October 18, 2001, the USFWS amended the BiOp to include traditional basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines. The BiOp's Terms and Conditions were implemented by NMFS under emergency action on June 12, 2001, and remain in effect until June 8, 2002.

Under the Council's original seabird mitigation measures, vessel operators and owners were both required to annually attend a protected species workshop conducted by NMFS. Further, the Council measures required that all seabirds (not just short-tailed albatrosses) were to be handled and released in a manner that maximizes the probability of their long-term survival. As these two components of the Council's measures are more conservative than those in the USFWS BiOp, this regulatory amendment combines the terms and conditions of the BiOp, and the Council's workshop and seabird handling requirements.

As noted above, the measures in the USFWS BiOp were developed for the operational profile of the Hawaii-based longline fishery prior to 1999. Since then, NMFS has implemented a prohibition on shallow set pelagic longline fishing for swordfish north of the equator by Hawaii-based longline vessels. That measure was a part of the emergency interim measures for sea turtle conservation and will also terminate on June 8, 2002.

Those emergency regulations also include a large area closure for Hawaii longline vessels between the equator and 15° N. during April and May. Fishing under the new regulations would not appear to pose any increased threat to the short-tailed albatross. Indeed, the elimination of shallow set longline fishing has caused a significant reduction in the incidental take of seabirds by the fishery during 2001. This was a factor in NMFS' decision to reinitiate consultation under the ESA with the USFWS on August 15, 2001. That consultation is ongoing.

3.0 Table of Contents

1.0 Cover Sheet 1
2.0 Summary 2
3.0 Table of Contents 4
3.1 List of Tables 5
3.2 List of Figures 7
4.0 Introduction 8
4.1 Responsible agencies 8
4.2 Public review process and schedule 8
4.3 List of preparers 10
5.0 Purpose and Need for Action 11
6.0 Management Objective 12
7.0 Initial Actions 14
8.0 Management Alternatives 19
9.0 Consistency with National Standards for Fishery Conservation and Management 24
10.0 Relationship to Other Applicable Laws and Provisions of the Magnuson-Stevens Act . 26
10.1 National Environmental Policy Act 26
10.1.5 FONSI Statement 63
10.2 Regulatory Flexibility Act 65
10.3 Executive Order 12866 66
10.4 Coastal Zone Management Act 66
10.5 Endangered Species Act 67
10.6 Marine Mammal Protection Act 70
10.7 Paperwork Reduction Act 71
10.8 Other Applicable Laws 71
10.9 Traditional Indigenous Fishing Practices 72
11.0 Appendix I: Proposed Specifications for Selected Mitigation Measures 73
12.0 Appendix II: Regulatory Impact Review/Regulatory Flexibility Analysis 82
13.0 Appendix III: Future seabird mitigation research and monitoring seabirds at sea 102
14.0 Appendix IV: Background Information 108
15.0 Appendix V: Proposed Regulations 127
16.0 References 129

3.1 List of Tables

Table 7.1. Comparing the seabird measures proposed in the Council's original action to those contained in the USFWS Biological Opinion on the Effects of the Hawaii Longline Fishery on the Short-tailed Albatross 18

Table 8.1. Description of mitigation techniques evaluated by Garcia and Associates (McNamara *et al.*1999), Boggs (2001) and NMFS, SWFSC Honolulu Laboratory..... 20

Table 10.1. Estimated annual total incidental catch of albatross in the Hawaii longline fishery based on catches recorded by NMFS observers on monitored fishing trips 33

Table 10.2. Incidental catch of albatrosses in the Hawaii longline fishery by set type based on NMFS observer records from 1994-1999 34

Table 10.3. 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 39

Table 10.4. 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 41

Table 10.5. NOAA research results: effectiveness of various mitigation measures in reducing seabird contacts during longline setting in tests aboard a NOAA research vessel 42

Table 10.6. 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. 44

Table 10.7. Incidental catch of albatrosses in the Hawaii longline fishery by area and set type based on NMFS observer records from 1994-1999. 46

Table 10.8. Potential decrease in the total incidental catch of black-footed albatrosses (BF) and Laysan albatrosses (LA) in the Hawaii longline fishery if various mitigation measures are used in alternative management areas 51

Table 10.9. Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) for species managed under the Pelagics, Crustaceans, Bottomfish and Seamount Groundfish, Precious Corals Western Pacific Fishery Management Plans 61

Table 12.1. Economic effects of mitigation measures applied to all vessels fishing north of 23° N. 93

Table 12.2. Economic effects of mitigation measures applied to all vessels fishing north of 25° N. 94

Table 12.3. Revenue impacts per set of night setting for swordfish (now prohibited) north of 23° N. 98

Table 12.4. Revenue impacts per set of night setting for swordfish (now prohibited) north of 25° N. 99

Table 12.5. Revenue impacts per set of night setting for tuna north of 23° N. 100

Table 12.6. Revenue impacts per set of night setting for tuna north of 25° N. 101

Table 14.1. Morphometric comparisons between short-tailed, black-footed and Laysan albatrosses. 109

Table 14.2. Short-tailed albatross census counts at Torishima, Japan, between 1977 and 2000. 114

Table 14.3. A summation of current best available figures for the number of breeding pairs of black-footed and Laysan albatross populations for each breeding site 117

Table 14.4. NWHI booby counts at Johnston Atoll, Midway Atoll and Tern Island, French Frigate Shoals, between 1979 and 1996. 118

Table 14.5. Summary of vessels, trips, and hooks by trip type by the Hawaii-based longline fishery 1991 to 1999 123

Table 14.6. Number of active vessels, total catch, and total fishing effort by the Hawaii-based longline fishery, 1991 to 1999. 124

3.1 List of Figures

Figure 10.1. Graph showing the estimated fleet-wide interactions of black-footed (BFAL) and Laysan (LAAL) albatrosses with the Hawaii-based longline fishery during two time periods . . 34

Figure 10.2. Maps A - E show the five potential geographic management areas (Options 1 to 5 in Section 8.0). On each map are two pie charts showing the percentage of total 1994-1998 average annual seabird catches and the percentage of total fishing effort (i.e., fishing sets) that occur in each management area. Also shown on each map is the boundary of the EEZ for the Hawaiian Archipelago . . . . . 48 - 50

Figure 14.1. Summary of fishing effort in the Hawaii longline fishery 122

Figure 14.2. Distribution of this fishing effort with respect to target 124

Figure 14.3. The average catch composition of the Hawaii longline fishery, from NMFS logbook data between 1991 and 1998. 126

4.0 Introduction

4.1 Responsible agencies

The Western Pacific Regional Fishery Management Council (Council or WPRFMC) 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 Pacific remote island areas.[1] Once an FMP is approved by the Secretary of Commerce (Secretary), it is implemented by Federal regulations which are enforced by the National Marine Fisheries Service (NMFS) and the U.S. Coast Guard, in cooperation with state agencies.

For further information, contact:

Kitty M. Simonds
Executive Director
WPRFMC
1164 Bishop St., #1400
Honolulu, HI 96813
Telephone: (808) 522-8220
Fax: (808) 522-8226

Charles Karnella
Administrator
NMFS Pacific Islands Area Office
1601 Kapiolani Blvd., #1110
Honolulu, HI 96814-0047
Telephone: (808) 973-2937
Fax: (808) 973-2941

4.2 Public review process and schedule

Prior to the June 16-18, 1999 Council meeting, an information document was circulated to all interested parties, including all holders of NMFS Hawaii longline limited access permits. This document outlined the nature of the seabird interaction problem and the alternative solutions which the Council was considering. Workshops were conducted by staff of the Council and NMFS Pacific Islands Area Office on May 21 and 28, 1999, to explain the problem to fishermen and discuss with them possible mitigation measures. At their June meeting, the Council considered recommendations made by these fishermen, the Pelagics Standing Committee and other advisory groups such as the Pelagics Fisheries Plan Team and the Science and Statistical Committee. The Council agreed to proceed with further action under the framework process, and the issue was placed on the agenda for the Council meeting on October 18-22, 1999. An updated document describing the issue, alternative ways to resolve the issue, the preferred action and the anticipated impacts of the management alternatives was prepared and distributed to the public with a request for comments.

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

A notice was published in the Federal Register (64 FR 52761, September 30, 1999) summarizing the Council's deliberations and preferred action, and indicating the time and place for the Council meeting to take final action. The Council took final action to recommend measures to reduce seabird interactions with Hawaii-based longliners at the October meeting. A proposed rule was published in the Federal Register (FR 65 41424, July 5, 2000) with a 30 day public comment period. The proposed rule was not finalized.

A formal biological consultation under section 7 of the Endangered Species Act (ESA) to determine the effects of the Hawaii-based longline fleet on the short-tailed albatross was initiated on April 8, 1999, and conducted in association with the Council's action. This consultation resulted in the publication of a Biological Opinion (BiOp) by the consulting agency (the U.S. Fish and Wildlife Service), on November 28, 2000 (USFWS 2000). The BiOp concluded that the fishery may adversely affect short-tailed albatrosses and contained several Terms and Conditions that were implemented by NMFS through an emergency rule, which also included sea turtle mitigation measures (FR 66 31561, June 12, 2001). That emergency rule expired December 10, 2001, and was extended for another 180 days by NMFS, terminating on June 8, 2002 (FR 66 63630, December 10, 2001).

The necessity for the emergency interim rule stemmed primarily from litigation brought by the Earthjustice Legal Defense Fund in February 1999, acting on behalf of the Center for Marine Conservation and Turtle Island Restoration Network versus NMFS. Since December1999 onwards, the Hawaii longline fishery was subject to a range of measures arising from this litigation concerning turtle bycatch in this fishery. These measures included time-area closures, fishing effort limits, and a ban on the use of shallow longline sets to maximize swordfish catches, and were designed to minimize interactions between the longline fishery and sea turtles. A consequence of these various measures to reduce sea turtle takes also affected the level of seabird incidental catch by the Hawaii longline fishery. In particular, the ban on the use of shallow longline sets dramatically reduced the incidental catch of black-footed and Laysan albatrosses.

Further, on August 4, 2000, the District Court of Hawaii directed NMFS to complete a Final Environmental Impact Statement (FEIS) that assessed the environmental impacts of fishing activities conducted under the Fishery Management Plan (FMP) for Pelagic Fisheries of the Western Pacific Region by April 1, 2001. NMFS filed the FEIS with the U.S. Environmental Protection Agency on March 30, 2001. The FEIS contained a description and analysis of the preferred alternative which included, among other things, a series of actions to protect and conserve sea turtles. The sea turtle measures conformed with a BiOp issued by NMFS on March 29, 2001, which analyzed the effects on sea turtles under section 7 of the ESA by fisheries managed under the Council's FMP for pelagic fisheries.

In order to maximize the protection to seabirds, the FEIS preferred alternative stated that the Council's original proposed action from October 1999, would be implemented as an interim rule until replaced by the USFWS Biological Opinion's Terms and Conditions on April 15, 2001. This issue was discussed at the Council's 108th meeting in February 2001, where members noted

that the fishery was operating under an injunction issued by the Court to protect sea turtles effectively closing the Hawaii longline fishery from March 15 to May 31, 2001. While the USFWS BiOp stated that the Terms and Conditions must be implemented by April 15, 2001, the practical effect was that the fishery remained closed after April 15, and therefore would not have an opportunity to take a short-tailed albatross. Thus, NMFS did not publish an interim rule to reduce seabird mortality by Hawaii pelagic longline fishing operations, but instead published an interim emergency rule on June 12, 2001, which contained measures to protect and conserve sea turtles, as well as the Terms and Conditions of the USFWS BiOp.

The seabird measures implemented by the emergency rule are identical to the measures in this document, with the exception of certain additional, more conservative measures, and the inclusion of basket-style, tarred mainline gear. On October 18, 2001, the USFWS amended the BiOp to include basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines, and this has been incorporated into this regulatory amendment. Under the Council's original seabird mitigation measures, vessel operators and owners were both required to annually attend a protected species workshop conducted by the NMFS. A second measure developed by the Council directed vessel operators to make every reasonable effort to ensure that all seabirds brought onboard alive (not just the short-tailed albatross) are released in a manner that maximizes the probability of their long-term survival. As these two components of the Council's proposed measures are more conservative than those in the USFWS BiOp, this regulatory amendment is a combination of the Terms and Conditions of the BiOp, and the Council's workshop and seabird handling requirements. NMFS will not be able to extend the emergency rule for a third time, but proposes to finalize the July 5, 2000, proposed rule by implementing the measures proposed in this document.

4.3 List of preparers

This document was prepared by (in alphabetical order):

Christofer Boggs, Fishery Biologist
National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory

Katherine Cousins, NEPA/Protected Species Coordinator
Western Pacific Regional Fisheries Management Council

Paul Dalzell, Pelagics Coordinator
Western Pacific Regional Fisheries Management Council

Pierre Kleiber, Fishery Biologist
National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory

Marcia Hamilton, Fishery Program Specialist
National Marine Fisheries Service, Pacific Islands Area Office

5.0 Purpose and Need for Action

Hawaii-based pelagic longline fishing inadvertently hook and kill black-footed albatrosses (*Phoebastria nigripes*) and Laysan albatrosses (*Phoebastria immutabilis*) that nest in the Northwestern Hawaiian Islands (NWHI). Black-footed and Laysan albatrosses follow the longline vessels and dive on the baited longline hooks as the vessels deploy their fishing lines. Incidental catches of these seabirds may also occur as the longline is hauled. However, black-footed and Laysan 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 haulback they can be released. Besides the direct mortality to juvenile or adult birds, fishing-related deaths may also have a negative influence on chick survival if one or both parent birds are killed. In addition, the endangered short-tailed albatross (*Phoebastria albatrus*) is known to visit the NWHI, however, there have been no reported interactions between the Hawaii longline fishery and the endangered seabird. Still, short-tailed albatrosses are known to be hooked by demersal longline gear in Alaska, and so there exists a potential that the endangered seabird could be incidentally caught by Hawaii pelagic longline gear. Therefore, the need and purpose for this regulatory action stems not only to reduce longline fishery interactions with the endangered short-tailed albatross, but also to reduce all seabird interactions by Hawaii longline fishing vessels.

To address the need to reduce the incidental catch of seabirds by the Hawaii pelagic longline fishery, the Council took action in October 1999, to recommend to NMFS that they implement regulations requiring Hawaii-based longline fishermen to: (1) employ two or more of six seabird mitigation techniques (see Table 8.1) when longlining north of 25° N. latitude; (2) annually attend a protected species workshop conducted by NMFS; and, (3) release all hooked or entangled seabirds in a manner that maximizes the probability of their long-term survival. NMFS published a proposed rule which would implement these recommendations (FR 65 41424, July 5, 2000), but the agency did not published a final rule.

As a part of the review process for the Council measures, NMFS entered into formal consultation with USFWS under section 7 of the ESA. That consultation resulted in the issuance of a BiOp for the Effects of the Hawaii-Based Domestic Longline Fleet on the Short-tailed Albatross on November 28, 2000 by the USFWS. Under the non-discretionary Terms and Conditions of that BiOp, Hawaii-based longline vessel operators are required (1) to use specified mitigation measures when fishing north of 23° N., (2) to annually attend a protected species workshop, (3) to handle short-tailed albatrosses in a manner that maximizes the probability of their long-term survival, (4) to notify NMFS immediately if they hook or entangle a short-tailed albatross, and (5) to retain all dead short-tailed albatrosses and submit the carcasses upon return to port. NMFS implemented these Terms and Conditions by emergency rule (FR 66 31561, June 12, 2001). Then on October 18, 2001, the USFWS amended the BiOp for the short-tailed albatross to include basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines.

The emergency rule expired on December 10, 2001, and was extended for another 180 days terminating on June 8, 2002 (FR 66 63630, December 10, 2001). Therefore, the primary purpose of this recommendation is to permanently codify those emergency measures which pertain to seabirds (the Terms and Conditions of the USFWS BiOp), and to include basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines. Also included are further Council recommendations that vessel owners (as well as operators) be required to annually attend protected species workshops, and that all seabirds be handled in a manner that maximizes the probability of their long-term survival (not just short-tailed albatrosses).

6.0 Management Objective

The measures in this framework adjustment are mandated by the Terms and Conditions contained in a BiOp issued by the USFWS on November 28, 2000, with the exception of certain more conservative measures developed by the Council and the inclusion of basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines. These have been incorporated into the proposed action of this regulatory amendment. The additional measures developed by the Council include requiring vessel owners, as well as vessel operators, to attend annual protected species workshops conducted by the NMFS, and to have all seabirds (not just short-tailed albatrosses) to be handled in a manner that maximizes the probability of their long-term survival. Therefore, the primary objective of this management action is to further mitigate the harmful effects of fishing by Hawaii-permitted longline vessels on the short-tailed albatross, but the overarching goal is to reduce the harmful effects of fishing by Hawaii-permitted longline vessels on all seabird species.

The short-tailed albatross has been documented in small numbers (2-3 birds) in the NWHI, and the USFWS BiOp concluded that the fishery (as proposed including cumulative effects) is not likely to jeopardize the continued existence of the short-tailed albatross. The Hawaii-based longline fishery for the purposes of the BiOp was the fishery operating as it had prior to any closures or gear prohibitions implemented by NMFS to reduce incidental interactions between the fishery and sea turtles. Under these circumstances, the USFWS anticipated that 15 short-tailed albatrosses may be taken during the seven year period addressed in the consultation (2000-2006), based on estimate of 2.2 short-tailed albatrosses taken by the fishery each year. The incidental take is expected to be in the form of mortality or injury. Given low observer coverage and zero logbook reports of interactions with the short-tailed albatross, the USFWS was not able to calculate the rate at which short-tailed albatrosses forage for bait on hooks or "strike a hook" or estimate the number of birds the fishery might actually kill or injure. To better understand that rate at which birds strike at hooks and are killed or injured, such "taking" will be considered in compliance with the Incidental Take Statement. In addition, "interaction" - defined as an observation of a short-tailed albatross striking at the baited hooks or mainline gear when the vessel conducts setting or haul back operations - will be considered to represent "takes" under the BiOp.

Reports of interactions between Laysan and black-footed albatrosses, however, are reported in the fishery and it is estimated that an average of 1,175 Laysan albatrosses and 1,388 black-footed albatrosses were killed in the Hawaii longline fishery each year between 1994 and 1999 (see Section 10.1.3). Therefore, achieving this objective would reduce a source of mortality for Laysan and black-footed albatross populations in the NWHI, and reduce the risk of interactions between longline vessels and the endangered short-tailed albatross. This objective is consistent with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) which requires consistency with other applicable legislation and defines the term conservation and management as referring to all of the rules, regulations, conditions, methods and other measures which are required to rebuild, restore or maintain any fishery resource and the marine environment and which are designed to assure that irreversible or long-term adverse effects on fishery resources and the marine environment are avoided. Further, the U.S. has adopted similar regulatory measures for reducing incidental catch of albatrosses and other seabirds in the groundfish and Pacific halibut fisheries off Alaska (FR 63 11161, March 5, 1998).

This objective is also consistent with U.S. international policy. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), of which the U.S. is a member, has adopted mitigation measures to reduce the incidental catch of seabirds in commercial fisheries in the Southern Ocean. In addition, the U.S. has participated over the past two years in an international initiative developed from the United Nations Food and Agriculture Organization Committee on Fisheries (FAO-COFI) to reduce the incidental catch of seabirds in longline fisheries worldwide. The FAO-COFI initiative is referred to as the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-SEABIRDS), and complements other FAO-COFI International Plans of Action for managing shark fisheries, and reducing fishing capacity. The IPOA-SEABIRDS calls for concerned countries with longline fisheries to conduct an assessment to determine if a problem exists with respect to the incidental catch of seabirds. If a problem exists, countries should develop a national plan containing the following elements: (1) mitigation methods of proven efficiency and cost-effectiveness; (2) research and development plans to improve and develop mitigation measures and evaluate their effectiveness; (3) education, training and publicity programs to improve the understanding of the problem resulting from the incidental catch of seabirds and the use of mitigation measures; and (4) data collection programs to determine the incidental catch of seabirds in longline fisheries and the effectiveness of mitigation measures.

On February 2001, the U.S. published a National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-seabirds). The measures in this framework adjustment are consistent with the action items of the NPOA-seabirds in that the Council initiated and completed an assessment of seabird interactions with longline fisheries under their jurisdiction, and have developed a mitigation plan. In addition, NMFS collects reliable data via an observer program to determine seabird incidental catch rates and to evaluate the effectiveness of proposed mitigation measures. Further, the Council, in cooperation with NMFS, USFWS, industry and non-governmental organizations, is conducting on-going research to find new methods to deter seabirds from being incidentally caught by longline gear.

7.0 Initial Actions

Measures taken by the Council 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 Council to reduce the incidental catch of seabirds began in 1996, when the Council and the U.S. Fish and Wildlife Service (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 NMFS 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 Council 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.

A Biological Assessment (BA) by the NMFS, Pacific Islands Area Office (PIAO) and incorporated into the BiOp has estimated that 15 short-tailed albatrosses have visited the NWHI over the past 60 years (NMFS 1999). The assessment noted that the historical range of the short-tailed albatross was known to include the waters and coastlines near China, Japan, Korea, Russia, West Coast of the U.S. and British Columbia, Canada. There is not evidence to support that short-tailed albatrosses once bred in the NWHI. Many mariners and a few naturalists (i.e., H. Palmer and G. Munro) visited Midway Atoll between 1859 to 1891 (i.e., prior to the species

being harvested to near extinction by Japanese settlers between 1880 and 1932) with no reports of short-tailed albatrosses. It may be likely that the bird did breed in the NWHI, but currently only two seabirds return to Midway each breeding season with the remaining population returning to Torishima, Japan. The BA concluded that the chance of an interaction between a longline vessel and a short-tailed albatross was extremely low, but it would be reduced further if mitigation measures were employed by longline vessels. The BA also noted that the risk of interactions with fisheries could increase if the short-tailed albatross population grows and the range of the species expands to include its historical range along the west coast of North America.

In October 1998, a seabird population biology workshop was convened at the Council office 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 (WPRFMC 2000). 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 Council in 1998, contracted Garcia and Associates to assess which mitigation methods would be most effective for local vessels 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 NMFS observers show that Hawaii-based longline vessels targeting swordfish had higher incidental catches of seabirds than did vessels targeting tuna (see Table 10.2), 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, SWFSC 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 2001). 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.

Based on observer records from 1994 to 1998, the NMFS, SWFSC Honolulu Laboratory also assessed the mitigative effectiveness of a line-setting machine used in combination with weighted branch lines (see Table 10.2).

In October 1999, the Council recommended three measures to mitigate the harmful effects of fishing by vessels registered under Hawaii longline limited access permits (Hawaii-based longline vessels) on seabirds. The first measure required vessel operators fishing with longline gear north of 25° N. latitude to employ two or more of the following seabird deterrent techniques: 1) maintain adequate quantities of blue dye on board and use only completely thawed, blue-dyed bait; 2) discard offal while setting and hauling the line in a manner that distracts seabirds from hooks; 3) tow a NMFS-approved deterrent (such as a tori line or a buoy) while setting and hauling the line; 4) deploy line with line-setting machine so that the line is set faster than the vessel's speed and attach weights equal to or greater than 45 grams to branch lines within one meter of each hook; 5) attach weights equal to or greater than 45 grams to branch lines within one meter of each hook; 6) begin setting the longline at least one hour after sunset and complete the setting process at least one hour before sunrise, using only the minimum vessel's lights necessary for safety. The second measure directed vessel operators to make every reasonable effort to ensure that birds brought onboard alive are handled and released in a manner that maximizes the probability their long-term survival. The final measure required all vessel owners and operators to annually complete a protected species educational workshop conducted by the National Marine Fisheries Service (NMFS).

NMFS published a proposed rule for the Hawaii-based longline fishery based on the Council's recommended measures (65 FR 41424, July 5, 2000). However, the agency did not proceed with the publication of a final rule, as the U.S. Fish and Wildlife Service (USFWS) had indicated it was developing a Biological Opinion (BiOp) for the fishery under section 7 of the Endangered Species Act (ESA) for the short-tail albatross. This endangered species has been documented in small numbers (2-3 birds) in the NWHI, and the USFWS BiOp, published on November 28, 2000, concluded that the Hawaii-based longline fishery (as proposed including cumulative effects) was not likely to jeopardize the continued existence of the short-tailed albatross.

The USFWS BiOp was based on the operations of the Hawaii-based longline fishery prior to December 1999, and anticipated that the fishery would take 15 short-tailed albatrosses during the seven year period addressed in the consultation (2.2 short-tailed albatrosses annually from 2000-2006). The BiOp considered a "take" to include not only injury or mortality to a short-tail

albatross caused by longline gear, but also any short-tail albatross striking at the baited hooks or mainline gear during longline setting or haulback.

As noted above, the measures in the USFWS BiOp were developed for the operational profile of the Hawaii longline fishery prior to December 1999. However, NMFS included a prohibition on shallow set pelagic longline fishing for swordfish north of the equator by Hawaii longline vessels access permits in the June 12, 2001 *Federal Register* notice. These new regulations also included a large area closure for Hawaii longline vessels between the equator and 15° N. during April and May. Fishing under the new regulations would not appear to pose any increased threat to the short-tailed albatross. Indeed, the elimination of shallow set longline fishing has caused a significant reduction in the incidental take of seabirds by the fishery during 2001 (see Figure 10.1). This was a factor leading to NMFS reinitiating formal section 7 consultation under ESA with USFWS on August 15, 2001. Another reason for reinitiation was a request by a single Hawaii-based longline vessel operator to have traditional tarred rope basket longline gear included as a short-tail albatross mitigation measure when fishing north of 23° N. latitude. Consequently, on October 18, 2001, the USFWS amended the BiOp to include basket-style, tarred mainline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines.

The seabird measures implemented by the interim emergency rule are identical to the measures in this document, with the exception of certain additional and more conservative measures, and the inclusion of basket-style, tarred mainline gear. Under the Council's original seabird mitigation measures, vessel operators and owners were both required to annually attend a protected species workshop conducted by the NMFS. Further, the Council measures required that all seabirds (not just short-tailed albatrosses) were to be handled in a manner that maximizes the probability of their long-term survival. As these two components of the Council's measures were stricter and more conservative than those in the USFWS BiOp, this regulatory amendment is a synthesis of the Terms and Conditions of the BiOp, and the Council's workshop and seabird handling requirements.

As noted above, the measures in the USFWS BiOp were developed for the operational profile of the Hawaii-based longline fishery prior to 1999. Since then, NMFS has implemented a prohibition on shallow set pelagic longline fishing for swordfish north of the equator by Hawaii-based longline vessels. That measure was a part of the emergency interim measures for sea turtle conservation and will also terminate on June 8, 2002.

Those emergency regulations also include a large area closure for Hawaii longline vessels between the equator and 15° N. during April and May. Fishing under the new regulations would not appear to pose any increased threat to the short-tailed albatross. Indeed, the elimination of shallow set longline fishing has caused a significant reduction in the incidental take of seabirds by the fishery during 2001 (Figure 10.1). This was a factor in NMFS' decision to reinitiate consultation under the ESA with the USFWS on August 15, 2001. That consultation is ongoing.

Table 7.1. Comparing the seabird measures proposed in the Council's original action to those contained in the USFWS Biological Opinion on the Effects of the Hawaii Longline Fishery on the Short-tailed Albatross. [*Note: one of the June 12, 2001, emergency measures to reduce sea turtle takes prohibits the targeting of swordfish (i.e., shallow setting) by the Hawaii-based longline fleet.]

Seabird Measures	**Council's Original Action (Alternative 2)**	**USFWS Short-tailed Albatross Biological Opinion/Terms and Conditions (Alternative 1 - Proposed Action)**	
	Above 25° N. Lat.	Above 23° N. Lat.	
A. Seabird Deterrent Methods	All longliners pick at least two (2) from list	Tuna (deep) set	*Swordfish/Mixed (shallow) set
1. Thawed, blue- dyed bait		Required	Required
2. Strategic Offal Discharge		Required	Required
3. Line-Setting machine w/weighted branch lines (minimum wt. = 45 gm); or employ basket-style longline gear		Required	Not Required (Optional)
4. Night Setting		Not Required (Optional)	Required
5. Towed deterrent (buoy/tori line)		Not Required (Optional)	Not Required (Optional)
6. Weighted branch lines (min wt =45 gm)		Not Required (Optional)	Not Required (Optional)
B. Careful handling of hooked seabirds	Required for all seabirds	Vessel operators must contact NMFS immediately if they have a hooked/entangled short-tailed albatross. An injured short-tailed albatross must be retained unless it exhibits all of the following: 1. Head erect and responds to stimuli; 2. Breaths without noise; 3. Wings can flap and retract to normal folding position; 4. Stand on both feet and toes pointed forward.	
C. Annual Protected Species Workshops	Required	Required	

8.0 Management Alternatives

At the June 16-18, 1999 meeting, 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, SWFSC Honolulu Laboratory. In addition, the Council 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.; (3) within the EEZ around the Hawaiian Islands; (4) within the EEZ around the Hawaiian Islands north of 23° N.; and (5) within the EEZ around the Hawaiian Islands north of 25° N. latitude. The findings of the impact analyses (Section 10.1.4.1.2) and seabird mortality mitigation studies (Section 10.1.4.1.1) led the Council to take action at their October 1999 meeting. At this meeting, the Council took action to recommend to NMFS that they implement regulations requiring Hawaii-based longline fishermen to: (1) employ two or more of six seabird mitigation techniques (Table 8.1) when longlining north of 25° N. latitude; (2) annually attend a protected species workshop conducted by NMFS; and, (3) release all hooked or entangled seabirds in a manner that maximizes their post-release survival.

This document examines a combination of mitigation measures and management areas comprising four management alternatives. These range from a No Action Alternative (Alternative 4), to a prohibition on longline fishing within Hawaii's EEZ north of 23° N. (Alternative 5). All alternatives are compared to the 1994-1999 FMP baseline which is the period examined in the USFWS BiOp.

Alternative 1 (the proposed action) consists of the Terms and Conditions contained in the BiOp (as amended on October 18, 2001, to allow the use of basket-style longline gear) which requires the use of several specified mitigation measures when fishing north of 23° N. latitude. Alternatives 2 and 3 both require that vessel operators utilize two or more mitigation techniques when longline fishing north of 25° N. - the major difference between these two alternatives is that one allows the fishermen to select which techniques they will utilize while the other leaves this decision to the Council. The mitigation techniques included in the BiOp are very similar to those identified in Alternatives 2 and 3, however there are some slight differences in the strategic offal discard process in that the BiOp directs fishermen to remove all hooks from offal before it is discarded. In addition, the BiOp (Alternative 1) requires that vessel operators notify NMFS immediately if a hooked or entangled short-tailed albatross fails to recover satisfactorily after being brought onboard a vessel and to retain all dead short-tailed albatrosses for submission upon return to port. Two measures developed by the Council are retained in the proposed action as these measures are considered to be more conservative than the measures in the BiOp. Therefore, under Alternative 1, vessel owners (as well as vessel operators) will be required to attend annual protected species workshops, and vessel operators will be required to handle all seabirds (not just short-tailed albatrosses) in a manner that ensures their long-term survival.

Table 8.1. Description of mitigation techniques evaluated by Garcia and Associates (McNamara *et al.*1999), Boggs (2001) and NMFS, SWFSC Honolulu Laboratory.

Mitigation Technique	Description
A. Blue-dyed and thawed bait:	An adequate quantity of blue dye should be maintained on board, and only bait dyed a color that conforms to Council/NMFS standards should be used (See Appendix I). All bait should 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. Therefore, it is recommended that fishermen throw dyed baited hooks outside the white water of the propellor wash. 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.
B. Discharge offal strategically:	While gear is being set or hauled, fish, fish parts or bait should be discharged on the opposite side of the vessel from which the longline is being set or hauled in a manner to deter seabirds from longline gear. If a swordfish is landed, the liver should be removed and the head should be 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. Fishermen are also instructed to remove all hooks and/or gear from all fish, fish parts or bait prior to discard.
C. Line-setting machine with weighted branch lines or basket-style, tarred mainline:	The longline should 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 should 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. Alternatively, vessel operators could deploy basket-style, tarred mainline gear. The traditional basket-style longline gear should be deployed slack to maximize the speed of sinking.
D. Towed deterrent:	A line with suspended streamers (tori line) or a buoy that conforms to Council/NMFS standards should 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 should 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. Night setting:	Begin setting pelagic longline gear at least one hour after local sunset and complete the setting process 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.

8.1 **Alternative 1 (Proposed Action - Implementation of the Terms and Conditions of the USFWS BiOp):** The operators of all vessels registered for use under a Hawaii longline limited access permit operating with longline gear north of 23° N., must ensure the use of thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longlines. This offal discard must be made from the opposite side of the vessel from which the longline is being set or hauled (no fish, fish parts, or bait may be discarded from the side of the vessel where the longline is being set or hauled), and all hooks must be removed from discarded fish, fish parts or bait prior to its discard. When making deep sets (targeting tuna) north of 23° N., Hawaii longline limited access vessel operators must employ a line-setting machine with weighted branch lines (minimum weight = 45 g), or employ basket-style longline gear. Other mitigation measures such as towed deterrents, use of weighted branch lines without a line-setting machine, (in the case of swordfish or mixed sets) are optional. If a short-tailed albatross is brought onboard alive, vessel operators and crew must ensure that the albatross displays four traits before release, and they must notify NMFS immediately. Included in this Alternative is a requirement that all seabirds brought onboard alive must be handled in a manner that maximizes the probability of their long-term survival once released (See Appendix I). Finally, vessel captains, as well as vessel owners, must annually complete a protected species workshop conducted by NMFS. The setting of shallow sets to target swordfish is prohibited under NMFS' March 29, 2001 Biological Opinion to mitigate interactions between the fishery and sea turtles. However, if the setting of shallow sets is allowed in the future, vessel operators must begin setting the longline at least one hour after local sunset and complete the setting process by local sunrise, using only the minimum vessel lights necessary.

8.2 **Alternative 2:** The operators of all vessels registered for use under a Hawaii longline limited access permit operating with longline gear must: 1) select and employ two or more of the mitigation measures in Table 8.1 when fishing north of 25° N. and; 2) handle and release hooked or entangled seabirds in a manner that maximizes the probability of their survival (See Appendix I). In addition, both vessel owners and vessel captains must annually complete a protected species workshop conducted by NMFS. This alternative includes a range of geographic areas, as discussed in Section 10.1.4.1.2.

8.3 **Alternative 3:** The operators of all vessels registered for use under a Hawaii longline limited access permit must: 1) employ two mitigation measures listed in Table 8.1 (decision as to which specific measures are required would be made by the Council) when fishing north of 25° N. and; 2) handle and release hooked or entangled seabirds in a manner that maximizes the probability of their survival (See Appendix I). In addition, both vessel owners and vessel captains must annually complete a protected species workshop conducted by NMFS. This

alternative includes a range of geographic areas, as discussed in Section 10.1.4.1.2.

8.4 **Alternative 4 (No Action):** The no-action alternative would leave in place current regulations for the Hawaii-based longline fishery as follow:

1. Fishing for pelagic species in the western Pacific EEZs with drift gillnets is prohibited.
2. Each vessel using longline gear to fish for pelagic species in the EEZs around American Samoa, Guam, the Commonwealth of Northern Mariana Islands (CNMI), or other U.S. islands of the western Pacific, and vessels used to transport or land longline-harvested pelagic species shoreward of the outer boundary of these same EEZs, must be registered for use with a general longline permit and must keep daily logbooks detailing species harvested, area of harvest, time of sets, and other information. Also, longline gear used in the western Pacific EEZs must be marked with the official number of the permitted vessel that deploys the gear.
3. Longline vessels must carry a NMFS observer if requested to do so.
4. Each vessel that uses longline gear to fish for pelagic species in the EEZ around Hawaii, or is used to transport or land longline-harvested pelagic species shoreward of the outer boundary of the EEZ around Hawaii, must be registered for use with one of 164 Hawaii-based longline limited entry permits.
5. As requested by NMFS, all vessels registered for use with a Hawaii-based longline limited access permit must carry a NMFS-owned "vessel monitoring system" transmitter.
6. Longline fishing for pelagic species is prohibited in circular areas (known as "protected species zones") 50 nm around the center points of each of the Northwestern Hawaiian Islands (NWHI), plus a 100 nm wide corridor connecting those circular closed areas that are non-contiguous. To avoid gear conflicts with troll and handline fisheries near the Main Hawaiian Islands (MHI), longline fishing is prohibited in areas approximately 75 nm around the islands of Kauai, Niihau, Kaula, and Oahu, and approximately 50 nm off the islands of Hawaii, Maui, Kahoolawe, Lanai, and Molokai. This prohibition is lessened from October 1 through January 30, when the longline closed areas decrease on the windward sides to approximately 25 nm off Hawaii, Maui, Kahoolawe, Lanai, Molokai, Kauai, Niihau, and Kaula, and approximately 50 nm off Oahu[2]. Longline fishing is also prohibited in an area approximately 50 nm off Guam.

In addition, on March 28, 2000, NMFS published a final rule which requires operators of Hawaii-based longline vessels to carry and use dip nets and line-clippers which meet NMFS

---

[2]A few longline vessel owners qualify for exemptions to fish in portions of longline closed areas around the MHI where they can document historical longline fishing activity prior to 1970.

design standards to disengage sea turtles hooked or entangled by longline fishing gear. This rule also includes requirements concerning the handling, resuscitation, and release of sea turtles. Specifically, all incidentally taken sea turtles brought aboard for dehooking and/or disentanglement must be handled in a manner to minimize injury and promote post-hooking survival. If a sea turtle is too large or hooked in such a manner to preclude safe boarding without causing further damage/injury to the turtle, line-clippers must be used to clip the line and remove as much line as possible prior to releasing the turtle. When practicable, comatose sea turtles must be brought on board immediately, with a minimum of injury, and handled as follows: if the sea turtle brought aboard appears dead or comatose, the sea turtle must be placed on its belly (on the bottom shell or "plastron") so that the turtle is right side up and its hindquarters elevated at least six inches (15.24 cm) for a period of no less than four hours and no more than 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. A reflex test, performed by gently touching the eye and pinching the tail of a sea turtle, must be administered by a vessel operator, at least every three hours, to determine if the turtle is responsive. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstances may be placed into a container holding water. A water-soaked towel placed over the eyes, carapace, and flippers is the most effective method in keeping a turtle moist. Those that revive and become active, as well as those that do not revive within 24 hours must be returned to the sea by first putting the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped. The turtle must then be released away from any deployed gear and, if alive, observed to be safely away from the vessel before the propeller is engaged and fishing operations are continued. This rule was initiated and implemented by NMFS and has no expiration date.

Last year NMFS promulgated an emergency interim rule (66 FR 31561, June 12, 2001), implementing those aspects of the FEIS' preferred alternative which are designed to reduce interactions between sea turtles and the Hawaii-based longline fleet. Also included in that emergency rule were measures to reduce interactions between the Hawaii-based longline fleet and seabirds. That emergency rule was also initiated, and subsequently extended (66 FR 63630, December 10, 2001), by NMFS, and remains effective through June 8, 2002. The turtle mitigation components of this emergency rule: (a) prohibit Hawaii-based longline vessels from using longline gear to target swordfish north of the equator; (b) require Hawaii-based longline vessels to deploy longline gear such that the "sag" (deepest point) between any two floats is at least 100 m (328.1 ft) below the sea surface and the float line suspending the mainline beneath a float is at least 20 m (65.6 ft) long, with a minimum of 15 branch lines deployed between any two floats; (c) prohibit possession of light sticks on board a Hawaii-based longline vessel during fishing trips; (d) prohibit Hawaii-based longline vessels from fishing with longline gear during the months of April and May in the area bounded on the south by the equator, on the west by 180° longitude, on the east by 145° W. longitude, on the north by 15° N. latitude; (e) prohibit the transhipment of pelagic fish caught by longline gear within the closed area during April and May to any vessel registered for use under a Western Pacific receiving vessel permit; (f) allow the re-registration of a Hawaii-based longline vessel that has been de-registered from a Hawaii longline limited access permit after March 29, 2001, only during the month of October; (g) require Hawaii-based longline vessel operators to annually attend a protected species workshop

conducted by NMFS; (h) require Hawaii-based longline vessel operators to cease gear retrieval if a sea turtle is discovered hooked or entangled on a longline until the turtle has been removed from the gear or brought onto the vessel's deck; (i) require that hooks be removed from sea turtles as quickly and carefully as possible; however, if a hook cannot be removed, that the line be cut as close to the hook as possible; (j) require that wire or bolt cutters capable of cutting through a longline hook be on board Hawaii-based longline vessels to facilitate cutting of hooks imbedded in sea turtles; (k) require that the additional resuscitation technique of placing the turtle on its back and pumping its breastplate (or "plastron") with hand or foot be used as appropriate and; (l) require that no turtle taken incidentally during the course of fishing or scientific research activities be consumed, sold, landed, offloaded, transshipped, or kept below unless requested by NMFS.

The second aspect of this emergency rule implemented the terms and conditions of the USFWS BiOp, The terms and conditions in that BiOp are based on a suite of seabird mitigation measures developed by the Western Pacific Fishery Management Council and require all Hawaii-based longline vessels fishing north of 23° N. latitude to either use line setting machines to set their mainline, or to set at night in order to reduce interactions with seabirds. In addition, vessel operators must use blue dyed bait, and strategic offal discards when fishing north of 23° N. latitude. Included in the December 10, 2001 extension of this emergency rule is the amendment of the USFWS BiOp to allow the use of basket-style longline gear as an alternative to monofilament longline deployed with a line setting machine.

Longline vessels registered for Hawaii-based longline limited access permits are also subject to the National Wildlife Refuge Administration Act of 1966, as amended, which prohibits fishing activities without a special use permit within the seaward boundaries of National Wildlife Refuges (NWRs) in the Northwestern Hawaiian Islands, at Midway Atoll, Baker Island, Howland Island, Jarvis Island, Johnston Atoll and Rose Atoll and in new NWRs established at Kingman Reef and Palmyra Atoll in January, 2001.

8.5 Alternative 5: Fishing with longline gear is prohibited within the EEZ around the Hawaiian Islands north of 23° N. latitude.

9.0 Consistency with National Standards for Fishery Conservation and Management

National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The proposed action is not expected to have a significant effect on fish stocks or optimum yield (Section 10.1.4.3).

National Standard 2 states that conservation and management measures shall be based upon the best scientific information available. The proposed action is based on scientific information

collected from assessments of the effectiveness of measures to reduce the incidental catch of seabirds in the Hawaii longline fishery and other fisheries outside the Western Pacific Region (Sections 7.0 and 10.1.4.1.1).

National Standard 3 states that, to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination. The proposed action is not expected to have a significant effect on the management of fish stocks as a unit.

National Standard 4 states that conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges. The proposed action is not expected to discriminate between residents of different States or allocate fishing privileges among fishermen.

National Standard 5 states that conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose. The proposed action is not expected to have a significant effect on efficiency (Section 10.3).

National Standard 6 states that conservation and management action shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources and catches. The proposed action is not expected to have a significant effect on fishery resources or catches of target species (Section 10.1.3.4).

National Standard 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. Although some mitigation methods could lead to negative economic impacts on certain vessel operations, the proposed action minimizes these impacts to a certain extent because the use of towed deterrents is optional (Section 10.3).

National Standard 8 states that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities. Although some mitigation methods can lead to negative economic impacts on certain vessel operations, the proposed management measure minimizes these impacts to a certain extent by allowing fishing vessels operators to choose whether they want to use a towed deterrent (Section 10.3). It is likely that those vessels that already use a line-setting machine and weighted branch lines (primarily vessels targeting tuna) would employ this mitigation method. Furthermore, the use of strategic offal discharge, blue-dyed bait or towed deterrents has a negligible impact on catch rates, and the

direct cost of employing these mitigation methods is relatively low. Hawaii longline vessels which set at night primarily were the vessels that targeted swordfish. This form of fishing, deploying shallow set longlines, with lightsticks, to target swordfish is now prohibited north of equator.

National Standard 9 states that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. This measure is not expected to significantly change the catch composition of the Hawaii longline fleet or increase its levels of fish or turtle bycatch (Sections 10.1.4.3 and 10.1.4.2). It is anticipated to maintain recent reductions in the incidental catch of seabirds (Section 10.1.4.1) and to have neutral effects on fishery interactions with marine mammals (Section 10.1.4.2).

National Standard 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. The addition of weight near the hook can be a danger to fishermen if hooks are suddenly pulled loose from the weight of a captive fish. One of the mitigation methods that fishermen making deep sets north of 23° N. latitude must use under the proposed action is the attachment of a weight of at least 45 grams at a distance of one meter from the hook. Night setting is another mitigation method that could be dangerous if vessels are not equipped for this type of operation. However, the proposed action does not require that all vessels utilize weights or set at night; rather, it requires vessel operators that set shallow sets (targeting swordfish or mixed targets) to set at night, while vessels operators targeting tuna must use a line-setting machine and weighted branch lines (minimum weight = 45 grams). Vessel operators that targeted swordfish often set at night, but since NMFS has prohibited shallow-set longline fishing for swordfish north of the equator, to reduce sea turtle takes, it is very unlikely that any vessel will adopt night setting as a seabird mitigation measure. Vessel operators targeting tuna often use line-setting machines and weights of up to 60 grams, and so it is expected that vessels operators employing these mitigation methods will not compromise the safety of human life at sea as they are already familiar with these techniques.

10.0 Relationship to Other Applicable Laws and Provisions of the Magnuson-Stevens Act

10.1 National Environmental Policy Act (NEPA)

This section has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, to assess the impacts on the human environment that may result from the proposed action. In March of 2001, NMFS published a Final Environmental Impact Assessment for the Pelagics Fisheries of the Western Pacific Region (FEIS), which provided an overall assessment of the impacts of the region's pelagic fisheries on the human environment. This is available from the NMFS Southwest regional office (501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802-4213; http://www.nmfs.noaa.gov/).

The FEIS presented a brief summary of the specific issues surrounding the need for mitigating seabird interactions with Hawaii-based longliners. The following Environmental Assessment (EA) tiers off of, and incorporates by reference, that document as well as providing a more detailed and in-depth discussion of the impacts on the affected environment.

10.1.1 Purpose and need for action

The purpose and need for action are described in Section 5.0.

10.1.2 Alternatives

The alternative management measures considered by the Council are described in Section 8.0.

10.1.3 Affected environment and cumulative impacts

The information in this section incorporates by reference details provided in the FEIS for the Fishery Management Plan of the Pelagics Fisheries of the Western Pacific Region, which is available from the NMFS Southwest regional office (501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802-4213; http://www.nmfs.noaa.gov/). For further details, please see the FEIS.

10.1.3.1 Seabirds

Three species of albatross breed and forage in the North Pacific: the short-tailed albatross, the black-footed albatross and the Laysan albatross. NMFS observer data show that interactions occur between the Hawaii-based longline fishery and two species of albatross: the black-footed albatross and the Laysan albatross. Neither the black-footed albatross nor the Laysan albatross are listed as endangered, however, the conservation status of the black-footed albatross is "vulnerable" while the Laysan albatross is listed as a species of "least concern." The short-tailed albatross is listed as "vulnerable" under the World Conservation Union (IUCN) (Croxall and Gales 1998), and as endangered under the U.S. ESA (65 FR 46643, July 31, 2000). The current best estimate of the worldwide population of short-tailed albatrosses is at 1,362 individuals (USFWS 2001). There have been no reports of interactions between the endangered short-tailed albatross and the Hawaii-based longline fishery, but this situation could change in the future as the short-tailed albatross population is annually growing in size at approximately 7.8% (Hasegawa 1982, Cochrane and Starfield in prep).

The current world estimates of the number of breeding pairs of black-footed albatrosses and Laysan albatrosses are about 62,000 and 558,000 respectively (WPRFMC 2000). Ninety-six percent of black-footed albatross nesting sites and more than 99% of Laysan albatross nesting sites are in the Northwestern Hawaiian Islands (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 (WPRFMC 2000).

Unpublished 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 declined by about 1.3 percent. However, some nesting colonies have experienced fluctuations. For instance, between 1987 and 1988, the number of active black-footed albatross nests at French Frigate Shoals decreased by 11.7% from 5,067 to 4,535. Yet, since 1997, the number of active nests at French Frigate Shoals has increased by 20.2%, representing approximately 7% of the total black-footed albatross NWHI population. Recent counts of black-footed albatross breeding pairs on Laysan Island, which is the largest nesting colony for black-footed albatrosses and accounts for more than one-third of the world's population of this species, indicate an increase of 4.2% in 1999, and then a decline of 17% in 2000. On the other hand, counts of black-footed albatross breeding pairs on Midway Atoll between 1996 and 1998, show a decline of 5.5%, however, over a period of eight years (1991-1998) the number of black-footed albatross pairs on Midway Atoll increased by 3.7%.

The number of breeding pairs of Laysan albatrosses in nesting colonies in the NWHI has also fluctuated, with Laysan Island showing a 26% increase in breeding pairs between 1991 to 1996, followed by a 60% decline between 1996 and 1998 (USFWS unpub. data). Overall, between 1991 to 1998, it is estimated that the number of Laysan albatross breeding pairs in the NWHI decreased by at least ten percent. In general, the number of albatross breeding pairs in the NWHI has been fluctuating or decreasing over the last decade, even though human activities have been reduced at most of the nesting colonies.

The slow recovery of NWHI albatross nesting colonies to historical levels, and the noted fluctuations in the numbers of albatross breeding pairs may be related to fluctuations in overall ecosystem productivity (Polovina *et al.* 1994), as well as to the incidental catch of seabirds in longline fisheries. The average annual incidental catches of black-footed and Laysan albatrosses in the Hawaii longline fishery (1994-1999) represent about 0.46% and 0.05% of the total estimated populations of these species, respectively. This source of seabird mortality cannot account for all of the fluctuations in the number of NWHI breeding pairs described above. 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 (WPRFMC 2000), the number of seabirds killed by these vessels is unknown. Other anthropogenic sources of mortality occur at the NWHI seabird nesting colonies, such as at Midway Atoll where seabird deaths occur as a result of birds striking buildings, aircraft, vehicles, trees or high tension wires, or becoming entangled in recreational fishing gear. Further, albatross chicks also die each breeding season due to direct and indirect effects of plastic ingestion. And certainly, if breeding albatrosses are consuming plastic then this factor may also impact their foraging success and ability to maintain their overall reproductive fitness. The number of seabirds impacted by these causes, however, is largely unknown. Also unknown is the number of fledgling albatrosses killed by sharks and disease.

Recent evidence from population studies and modeling exercises suggests that the combination of domestic and foreign longline fisheries in the North Pacific have had a negative impact on the NWHI albatross populations (WPRFMC 2000). Although the emphasis of research to date has been on the impacts of fishing operations on the black-footed albatross population, the modeling exercises conducted at the Black-footed Albatross Population Biology Workshop can be applied to both black-footed and Laysan albatross populations. One finding of the workshop modeling exercises suggests that the sustained growth rate of an albatross population (without any fishing-related mortality) is in the range of zero to about four percent. The modeling exercises also showed that the growth rate of the population will be reduced by an equivalent percentage of the total number of birds killed in the longline fisheries each year. This estimated reduction in growth is a robust estimate in that it is not sensitive to the ratio of juveniles to adults lost, nor is it sensitive to whether the population was growing at zero or four percent. This means that if the total number of birds killed in the longline fisheries each year is of the order of one percent of the total population, then the growth rate of the population will be reduced by slightly more than one percent.

Given that albatrosses can live for at least 40 years and may skip one or two breeding seasons to molt (WPRFMC 2000), a thorough assessment of the impacts of a single mortality source, such as longline fishing by Hawaii-based vessels, requires long term monitoring of seabird population demographics. Juvenile seabirds are caught more often than adults in longline fisheries (Brothers 1991; Boggs 2001; Cousins 2001) and since albatrosses have long maturation periods (up to five years) during which juveniles do not return to the nesting colony, the impacts of the incidental catch of seabirds in longline fisheries on seabird populations may not be detected for several years. Moreover, several mortality sources at the breeding colonies, and the impacts of plastic ingestion on adult foraging success are unknown.

Therefore, to fully understand the impacts of longline fisheries on black-footed and Laysan albatross populations, modelers need to include age-specific survivorship and recruitment rates for both species. Again, due to the life history traits of these albatrosses, considerable time may lapse before the implementation of measures to reduce the incidental catch of seabirds in the Hawaii longline fishery results in measurable changes in the size and recruitment rates of NWHI albatross populations. Understanding the causes of these changes will be hampered by the fact that the Hawaii-based longline fleet is not the only fishery impacting the NWHI albatrosses, nor are fisheries the only possible causes for the observed fluctuation in breeding pair numbers. Consequently, long-term monitoring of NWHI breeding colonies coupled with international data sharing agreements is necessary to fully understand the impact of mitigation measures on albatross populations.

10.1.3.2 Overview of the incidental catch of seabirds in the Hawaii longline fishery

The NMFS, Southwest Fisheries Science Center, Honolulu Laboratory (NMFS, SWFSC Honolulu Laboratory) used data from NMFS observer reports and the NMFS Western Pacific

Daily Longline Fishing Log to estimate the annual incidental catch of black-footed and Laysan albatrosses 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 (WPRFMC 2000). In 1999, Dr. M. McCracken developed a new prediction model to estimate the number of black-footed and Laysan albatrosses incidentally caught by the Hawaii longline fishery during 1999, and then re-estimated takes for earlier years, 1994-1998 (Table 10.1).

For each albatross species, a prediction model was developed that related the number of seabird interactions 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 incidentally caught on each unobserved trip on the basis of the predictor variables recorded in the logbooks for those trips. The total annual incidental catch of seabirds for the fleet was estimated by adding the sum of predicted catches for the unobserved trips to the sum of recorded catches for the observed trips. After exploring several alternative statistical models for incidental catch 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 incidental catches about the expected predicted values was used to construct approximate "prediction intervals" for seabird incidental catch. 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 incidental catch are given in Table 10.1. Estimates of incidental catches 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 1,388 black-footed albatrosses and 1,175 Laysan albatrosses were killed in the Hawaii longline fishery each year (Table 10.1). These average annual incidental catches represent about 0.46% and 0.05% of the estimated worldwide black-footed and Laysan albatross populations, respectively. At presented it is estimated size of the breeding and non-breeding populations of black-footed and Laysan albatrosses are about 300,000 and 2.4 million birds, respectively (WPRFMC 2000).

Black-footed albatrosses are less abundant than Laysan albatrosses at the NWHI, with about 60,000 nesting pairs, versus 558,000 nesting pairs of Laysan albatrosses (WPRFMC 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.). The long term chronic mortality resulting from the fishery may have a deleterious effect on these bird populations, particularly the less abundant black-footed albatross (WPRFMC 2000). Although, one or two short-tailed albatrosses also visit the NWHI each year, no incidental catches of this species have been reported in the Hawaii longline fishery (NMFS 1999). However, short-tailed albatrosses have been killed by the longline fleet in Alaska (NMFS 1998a), and in January 2000, a NMFS observer saw a juvenile short-tailed albatross flying near a Hawaii longline fishing vessel at 33° 09′ N., 147° 49′ W. Therefore, it is possible that interactions could occur with Hawaii-based vessels as the seabird is in the area where the fishery operates.

Data collected by NMFS observers show that when Hawaii-based longline vessels target swordfish (*Xiphias gladius*) the incidental catch of seabirds is far higher than when vessels target tuna (Table 10.2). One reason for this is that vessels targeting swordfish are more likely to operate within the foraging range of the seabirds. Black-footed and Laysan albatrosses nesting in the NWHI forage predominantly to the north and northeast of the Hawaiian Archipelago, flying as far as Alaska or the western coast of the contiguous U.S. (Anderson and Fernandez 1998; WPRFMC 2000). The region of greatest interaction between seabirds and the longline fishery is a latitudinal band between 25° N. and 40° N. stretching from the international dateline to about 150° W. (NMFS unpub. data). This band, referred to as the North Pacific Transition Zone, contains a broad, weak, eastward flowing surface current composed of a series of fronts situated between the Subtropical Gyre to the south and Subarctic Gyre to the north (Roden 1980; Polovina 2000; Seki *et al.* in prep). The convergent fronts are zones of enhanced trophic transfer with high concentrations of phytoplankton, zooplankton, jellyfish and squid (Bakun 1996; Olson *et al.* 1994). The increased level of biological productivity in these zones attracts, in turn, higher trophic level predators such as swordfish, sea turtles and seabirds (Section 14.4.2). Hawaii longline vessels targeting swordfish set their lines where the fish are believed to be moving south through the fronts following squid, the primary prey of swordfish (Seki *et. al.* in prep.). Squid is also the primary prey item for the albatrosses (Harrison *et. al.* 1983). Hence, the albatrosses and the longline vessels targeting swordfish are often present at the same time in the same northern front of high biological productivity.

It is also possible that albatrosses nesting in the NWHI forage predominantly to the north and northeast of the Hawaiian Archipelago because ocean surface winds tend to seasonally diminish near the equator (Peixoto and Oort 1992). Because albatrosses are dependent upon these winds to dynamically soar over the ocean surface (Magnan 1925), it may be less energy efficient for these birds to forage at more southern latitudes. Bird counts made by the NOAA research vessel *Townsend Cromwell* in the tropical latitudes south of Hawaii confirm that albatrosses are rarely encountered south of 25° N. (C. Boggs pers. comm.). Further, satellite tagging of both breeding Laysan and black-footed albatrosses by Wake Forest University has shown that these birds

consistently fly either north or northeast from the Hawaiian Islands when foraging (Anderson and Fernandez 1998).

A second reason that longline vessels targeting swordfish incidentally catch a larger number of seabirds than vessels targeting tuna relates to differences in gear configuration and the depth and time of gear deployment. Longline gear targeting swordfish generally consists of fewer hooks between floats (3-5), branch line (gangion) weights attached further from the hooks and buoyant chemical light sticks. During swordfish fishing the longline is set at a shallow depth (5-60 m), and the line and baited hooks sink comparatively slowly. Consequently, albatrosses following behind a vessel targeting swordfish have a greater opportunity to dive on hooks and become caught. In addition, vessels targeting swordfish often set their lines in the late afternoon or at dusk when the foraging activity of seabirds may be especially high.

Vessels targeting tuna differ from those targeting swordfish in that they generally operate in warm waters further south and set their lines at a relatively deep depth (15-180 m or greater). To facilitate the deployment of fishing gear at these depths vessels usually increase the longline sink rate by employing a hydraulic line-setting machine (line-shooter or line-setter) and branch lines with 40-80 gram weights attached close (20-90 cm) to the hooks. The use of a line-setting machine and weighted branch lines to increase the longline sink rate also reduces the incidental catch of seabirds by decreasing the time that baited hooks are near the surface and accessible to feeding seabirds.

Some longline sets target both swordfish and bigeye tuna (*Thunnus obesus*) and are called "mixed" sets. These sets are typically made with a modified swordfish gear configuration and without the use of a line-shooter.

Hawaii longline vessels which target swordfish have significantly higher rates of seabird interactions than those that target tuna (Table 10.2). One of the measures implemented by NMFS in June 2001, to reduce sea turtle takes prohibits the targeting of swordfish by the Hawaii longline fleet. Thus, the prohibition on targeting swordfish by Hawaii-based longline vessels not only reduces potential interactions between the fleet and sea turtles, but also reduced the incidental catch of seabirds (Figure 10.1). This, in turn, reduces the probability that the fleet may adversely affect the endangered short-tailed albatross. As a consequence, NMFS reinitiated formal section 7 consultation under the ESA with the USFWS on August 15, 2001. That consultation is still on-going. NMFS also requested the USFWS consider the use of basket-style, tarred mainline gear as a seabird mitigation measure. On October 18, 2001, the USFWS amended the current BiOp to include the use of basket-style longline gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines.

Table 10.1. 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 incidental catch	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 incidental catch	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	—

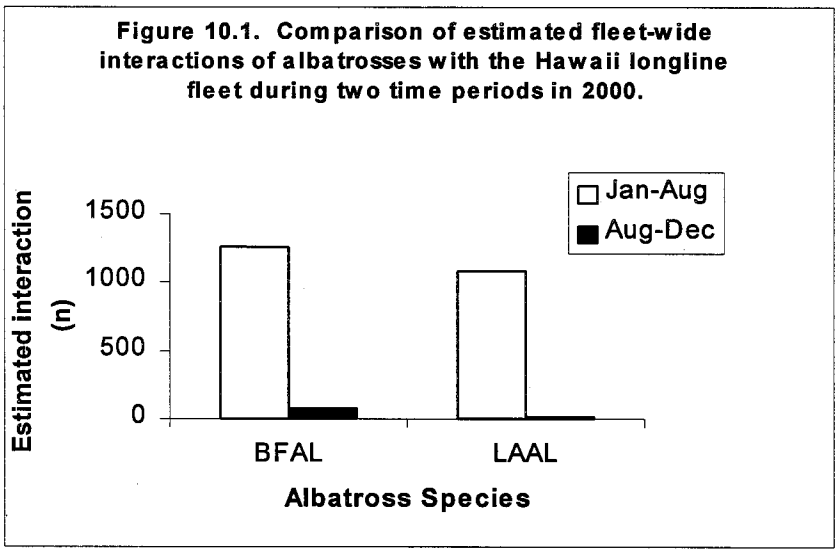
Source: NMFS, SWFSC Honolulu Laboratory, McCracken 2000a.

Table 10.2. Incidental catch of albatrosses in the Hawaii longline fishery by set type based on NMFS observer records from 1994-1998. (Mixed = swordfish and tuna.)

Targeted Fish During Set	Observed Bird Catch	Number of Observed Sets	Bird Catch/Set
Swordfish	300	488	0.615
Mixed	446	948	0.470
Tuna	16	1,252	0.012

Source: NMFS, SWFSC Honolulu Laboratory, unpubl. data.

Figure 10.1. Graph showing the estimated fleet-wide interactions of black-footed (BFAL) and Laysan (LAAL) albatrosses with the Hawaii-based longline fishery during two time periods. During period one (January 1 - August 24, 2000), the fleet was prohibited from fishing within a box (termed "Area A") which was bounded by 28° N., 44° N, 150° W. and 168° W. During period two (August 25 - December 31, 2000), the fleet continued to be prohibited from fishing within Area A, but was also limited to no more than 154 sets (with 100% observer coverage) within the area on either side of Area A and bounded by 28° N. and 44° N. and between 173° E. and 168° W. Further, targeting of swordfish (shallow setting) was prohibited in waters between the equator and 28° N., from 173° E. to 137° W.



10.1.3.3 Sea turtles

All sea turtles are designated under the ESA as either threatened or endangered. The breeding populations of the Mexico olive ridley turtles (*Lepidochelys olivacea*) are currently listed as endangered. Also listed as endangered are the leatherback turtles (*Dermochelys coriacea*) and hawksbill turtles (*Eretmochelys imbricata*). Green sea turtles (*Chelonia mydas*) and loggerhead

turtles (*Caretta caretta*) are listed as threatened, but are afforded the same protection as endangered sea turtles. These five species of sea turtle are highly migratory, or have a highly migratory phase in their life history, and therefore, are susceptible to being incidentally caught by longline fisheries operating in the Pacific Ocean.

The populations of several species of sea turtles have declined in the Pacific as the result of nesting habitat loss and excessive and widespread harvesting for commercial and subsistence purposes (Eckert 1993). Leatherback and loggerhead turtles are the species of principal concern with regard to incidental take in Pacific pelagic longline fisheries. These fisheries are conducted mainly by Japan, Taiwan, Korea and the U.S. There are only two populations of loggerhead turtles in the Pacific, one originating in Australia where serious declines are occurring, and the other in southern Japan (Eckert 1993). Leatherback turtles inhabiting the Pacific mainly originate from nesting beaches in Mexico and Costa Rica where significant declines have been documented; from Indonesia where their status is uncertain but possibly stable; and from Malaysia where the nesting colony is nearly extinct despite 30 years of conservation measures (Eckert 1993).

The diet of the leatherback turtle generally consists of cnidarians (i.e., medusae and siphonophores) in the pelagic environment. Leatherback turtles have the most extensive range of any living reptile and have been reported circumglobally from latitudes 71° N. to 42° S. in the Pacific and in all other major oceans. In a single year a leatherback may swim more than 10,000 km. They lead a completely pelagic existence, foraging widely in temperate waters except during the nesting season, when gravid females return to beaches to lay eggs. Typically leatherback turtles are found in convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters. Hawaii fishers in offshore waters commonly see leatherback turtles, generally beyond the 100 fm curve but within sight of land. Two areas where sightings often take place are off the north coast of Oahu and the west coast of the Island of Hawaii. The pelagic zone surrounding the Hawaiian Islands is apparently regularly used as foraging habitat and migratory pathways for this species. Further to the north of the Hawaiian islands, a high seas aggregation of leatherback turtles is known to occur at 35° N. latitude, between 175° W. and 180° longitudes (NMFS, 1991).

The loggerhead turtle is listed as a threatened species throughout its range, primarily due to incidental mortality associated with commercial fishing operations and the alteration and destruction of its habitat. It is a cosmopolitan species found in temperate and subtropical waters and inhabiting continental shelves, bays, estuaries and lagoons. Major nesting grounds are generally located in warm temperate and subtropical regions, generally north of 25° N. or south of 25° S. latitude in the Pacific Ocean. For their first several years of life, loggerheads forage in open ocean pelagic habitats. Both juvenile and subadult loggerheads feed on pelagic crustaceans, mollusks, fish, and algae. As they age, loggerheads begin to move into shallower waters, where, as adults, they forage over a variety of benthic hard- and soft-bottom habitats (reviewed in Dodd, 1988). Satellite telemetry studies show that loggerhead turtles tend to follow 17° and 20° C sea surface isotherms north of the Hawaiian islands.

The olive ridley turtle is listed as threatened in the Pacific, except for the Mexican nesting population, which is listed as endangered, primarily because of over-harvesting of females and eggs. The olive ridley is one of the smallest living sea turtles (carapace length usually between 60 and 70 cm) and is regarded as the most abundant sea turtle in the world. Since the directed take of sea turtles was stopped in the early 1990s, the nesting populations in Mexico appear to be recovering, with females nesting in record numbers in recent years. In 1996, the primary nesting beach at La Escobilla in Oaxaca sustained over 800,000 nests. There is some discussion in Mexico that the species should be considered recovered. The olive ridley turtle is omnivorous and identified prey include a variety of benthic and pelagic items such as shrimp, jellyfish, crabs, snails, and fish, as well as algae and sea grass (Marquez, 1990).

Green turtles in Hawaii are genetically distinct and geographically isolated which is uncharacteristic of other regional sea turtle populations. Both the nesting population and foraging populations of green turtles in Hawaii appear to have increased over the last 17 years.

The hawksbill turtle is listed as endangered throughout its range. In the Pacific, this species is apparently declining due to the harvesting of the species for its meat, eggs and shell, as well as the destruction of nesting habitat by human occupation and disruption. There are no reports of interactions between this species and the Hawaii-based longline fishery, although the potential for interaction exists. Hawksbill turtles have a relatively unique diet of sponges.

It is estimated (with 95% Confidence Intervals, C.I.) that in 1999, the Hawaii longline fishery interacted with 132 (C.I. 76-193) leatherback turtles and 369 (C.I. 234-466) loggerhead turtles (McCracken 2000b). Both of these species are mainly taken by longline vessels fishing north of the Hawaiian Islands where the incidental catch of seabirds is the highest (Kleiber 1998ab). A NMFS BiOp on the effects of the Hawaii pelagic longline fishery on sea turtle populations (NMFS 1998) concluded that the continuing operation of the fishery was not likely to jeopardize the continual existence and recovery of any sea turtle species. However, NMFS is required to continue monitoring the incidental takes and mortality of sea turtles and seek ways to reduce them. Data for monitoring take levels and factors that affect takes are collected through a NMFS observer program operated by the Southwest Region and mandatory longline logbooks submitted to NMFS by longline vessel captains.

On June 7, 2000, new estimates generated for sea turtle takes in the Hawaii longline fishery resulted in NMFS reinitiating the ESA section 7 Consultation for sea turtles which resulted in the agency issuing a new BiOp on March 29, 2001. This BiOp concluded that the fisheries would likely jeopardize loggerhead, leatherback and green turtles, and adversely affect olive ridley turtles. To avoid the likelihood of jeopardy, the BiOp directed NMFS to: 1) prohibit longline fishing practices targeting swordfish north of the equator; 2) implement time and area closures to prohibit all longline fishing south of 15° N. latitude, north of the equator (0°), west of 145° W. and east of the 180 longitude between April 1 and May 31; 3) re-register a vessel to a Hawaii limited access permit only during the month of October; 4) direct research to focus on the

formation of innovative measures to diminish the impacts of commercial fishing operations on sea turtle species; and, 5) implement measures to reduce the harmful effects of fishing interactions on sea turtles.

10.1.3.4 Marine Mammals

All fisheries in the waters around Hawaii, including the longline fishery, are classified as Category III under section 118 of the Marine Mammal Protection Act of 1972 (62 FR 28657, May 27, 1997). Endangered cetaceans that have been observed in the region where Hawaii longline vessels operate are the humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter macrocephalus*), blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), sei whale (*B. Borealis*), and the North Pacific right whale (*Eubalaena japonica*). Other cetaceans not classified as endangered, but protected under the Marine Mammal Protection Act are occasionally encountered in the longline fishery. These species mainly consist of dolphins and the smaller beaked and toothed whales (NMFS Observer Program, unpub. data). Interactions between any species of cetaceans and the Hawaii longline fishery are rare. Between 1994 and 1999, NMFS observers recorded two entanglements involving a humpback whale and sperm whale (Hill *et al.*, 1997; Nitta and Henderson, 1993; Dollar, 1991). False killer whales occasionally strip the bait from longline hooks (NMFS Observer Program, unpub. data). To avoid this type of interaction Hawaii-based longline vessels that encounter false killer whales delay setting their lines until a sufficient distance between the vessel and the whale school has been achieved (NMFS Observer Program, unpub. data.

The Hawaiian monk seal (*Monachus schauinslandi*) is a tropical seal which was once widespread in the Hawaiian Islands. Today, between 1,200 and 1,450 seals are found mainly in the NWHI from Nihoa Island to Kure Atoll (Johanos and Ragen 1997). In 1976, the species was designated as depleted under the Marine Mammal Protection Act following a 50% decline in beach counts from the late 1950s to mid 1970s. The Hawaiian monk seal has also been listed as an endangered species under the ESA. In the late 1980s, the shoreline to a depth of 20 fathoms (37 m) around breeding areas in the NWHI and Maro Reef was designated as critical habitat for monk seals.

Evidence of interactions between monk seals and the Hawaii longline fishery began to accumulate in 1990, and included three hooked seals and 13 unusual wounds thought to have resulted from fishing interactions. In 1991, NMFS prohibited longline fishing within a Protected Species Zone which extends 50 nautical miles around the NWHI and includes the corridors between islands. Subsequent to the establishment of the Protected Species Zone there have been no reports of interactions between monk seals and the Hawaii longline fishery.

10.1.3.5 Targeted finfish and related stocks

The Hawaii-based longline fleet target pelagic fish that are capable of extensive movement and are also caught by foreign fleets and other types of domestic vessels operating in various EEZs and the high seas. The stocks of the principal species targeted or caught incidentally by these

fleets (bigeye and swordfish), are thought to be in good condition. However, inadequate information on bigeye tuna mortality and exploitation rates makes it difficult to authoritatively determine the status of bigeye stocks. Studies indicate that there is little, if any, separation between eastern and western bigeye tuna stocks. Further, bigeye catch per thousand hooks (CPUE) of longliners operating in the eastern Pacific has been decreasing since 1990, while that for the western Pacific has been stable (Lewis and Williams 1999). The swordfish CPUE of Hawaii-based longline vessels appears to be strongly influenced by the sub-tropical convergence zone north of the Hawaiian Islands (Seki *et al.* 1999), and catches show little relationship to fishing effort (Kleiber 1999).

There are no signs that pelagic fisheries across the Pacific have had a negative impact on catches of incidental species in the longline fishery such as skipjack tuna (*Katsuwonus pelamis*) or yellowfin tuna (*Thunnus albacares*) (Lewis and Williams 1999). Variability in the yellowfin catch rates of domestic purse seine vessels is likely due to environmental conditions associated with *El Niño*-Southern Oscillation (ENSO) events and changes in target species and fishing grounds as the CPUE of domestic and foreign longline boats targeting yellowfin show no decline when standardized for habitat and gear effects (Bigelow 1999). Pacific albacore tuna (*T. alalunga*) are thought to be separated into northern and southern stocks, with little or no mixing Murray 1992). The results of a 1997 assessment of the northern stock suggest that the current population size is greater than the stock size associated with the maximum sustainable yield (MSY).

While most studies suggest that billfish stocks are healthy, there is considerable uncertainty regarding the quality of the data and reliability of the methods used to evaluate fisheries trends. However, an assessment of the blue marlin (*Makaira mazara*) stock conducted by the Inter-American Tropical Tuna Commission suggest that the stock is healthy, with current levels of biomass and fishing effort near the levels required to maintain the MSY.

A comprehensive stock assessment of blue shark (*Prionace glauca*) in the north Pacific has not yet been completed, but an analysis of the blue shark CPUE of Japanese longliners from 1971 to 1993, revealed no evidence that the blue shark stock in the north Pacific is in a critical condition (Nakano and Seki in review). The blue shark CPUE of Hawaii-based longline vessels has also been stable over the past five years (Ito and Machado 1999).

10.1.4 Environmental impacts of alternatives

10.1.4.1 Impacts on seabirds

Section 10.1.4.1.1 summarizes the findings of assessments of the effectiveness of various mitigation methods analyzed by Garcia and Associates (McNamara *et al.* 1999), Boggs (2001) and NMFS, SWFSC Honolulu Laboratory. Section 10.1.4.1.2 examines the relative impacts on seabird populations of applying these mitigation measures to various management areas. Section

10.1.4.1.3 describes the overall environmental impacts of the five alternative management measures considered by the Council (Section 8.0), and the proposed action.

10.1.4.1.1 Effectiveness of mitigation measures

10.1.4.1.1.1 Offal discharge methods

10.1.4.1.1.1.1 Prohibit 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 10.3). 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.

Table 10.3. 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 discharge	-65	-15	26
	(25.5)	(1.3)	(0.4)
Blue-dyed bait	67	93	100
	(5.2)	(0.1)	(0)
Towed Deterrent - Tori line	92	93	57
	(1.2)	(0.1)	(0.2)
Towed Deterrent - Towed buoy	87	85	62
	(2.0)	(0.2)	(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.
[3]Defined as a seabird hooked but not necessarily killed.
Source: McNamara *et al.* 1999.

10.1.4.1.1.2 Discharge 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 10.4). 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.

10.1.4.1.1.2 Night setting

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 10.4). 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.

10.1.4.1.1.3 Blue-dyed and thawed bait

Both Garcia and Associates (McNamara *et al.* 1999) and Boggs (2001) reported that blue-dyed squid was the most effective measure tested in mitigating seabird interactions and mortalities during the longline set for vessels targeting swordfish (Table 10.4 and 10.5). Garcia and Associates (McNamara *et al.* 1999) noted that blue-dyed squid 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 10.3 and 10.4).

In the Garcia and Associates study (McNamara *et al.* 1999), both the control bait (undyed squid) and the treatment bait (blue-dyed squid) were completely thawed before use. Boggs (2001), however, found that blue-dyed squid is an effective mitigation measure even if the squid is used in a partially frozen condition (Table 10.5). However, squid 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. Further, 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).

10.1.4.1.1.4 Towed deterrent

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 10.3), but towed deterrents are less effective mitigation measures during the longline set (Table 10.4). Boggs (2001) also found that a tori line was less effective than blue-dyed bait or weighted branch lines during the setting operations (Table 10.5). 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). 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).

Table 10.4. 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 squid	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.

10.1.4.1.1.5 Weighted branch lines

Boggs (2001) reports that adding 60 g of weight to the branch lines reduced interactions by 92% (Table 10.5). 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 (2001). However, Brothers *et al.* (1995) report that the sink rate of frozen bait weighing 150 to 250 g is 20 cm/sec when a 10 g weight is attached and 40 cm/sec when a 50 g 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 g and level off as more weight is added.

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. According to Brothers *et al.* (1995), a frozen bait weighted with about 50 g of lead should sink to three meters depth approximately 30 m behind a longline vessel setting at eight knots.

Table 10.5. 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 squid	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 2001.

10.1.4.1.1.6 Line-setting machine with weighted branch lines

The NMFS, SWFSC Honolulu Laboratory assessed the mitigative effectiveness of a line-setting machine used in combination with weighted branch lines (Table 10.2). This assessment suggests that a line-setting machine would improve the effectiveness of weighted branch lines to deter seabirds from baited hooks. NMFS observer records from 1994 to 1998 show that Hawaii-based longline vessels targeting tuna (0.012 birds hooked/set) have substantially lower seabird interactions than those vessels targeting swordfish (0.615 birds hooked/set). Also, 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 weight 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, a rigorous comparative test will need to be performed before a conclusion about the effects of using a line-setting machine can be made.

10.1.4.1.1.7 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 10.6) were computed by averaging the impacts on seabird hooking found by Garcia and Associates (McNamara *et al.* 1999) (Tables 10.3 and 10.4), Boggs (2001) (Table 10.5), and by NMFS observers.

Studies of the effectiveness of an array of mitigation measures suggest that all of the measures presented in Table 10.6 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 squid). 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.

Table 10.6. 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 squid [1,2]	BF	95
	LA	90
Towed deterrent [1]	BF	86
	LA	71
Weighted branch lines [2]	BF	93
	LA	91
Line-setting machine with weighted branch lines [3]	BF	98
	LA	97

Source: McNamara *et al.* (1999)[1] ; Boggs 2001[2]; NMFS, SWFSC Honolulu Laboratory[3].

10.1.4.1.2 Impacts of applying mitigation measures to various geographic management areas

At the June 1999 meeting, the Council 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. Furthermore, the actual impact of mitigation measures on seabird populations depends on where the measures are used. The Council examined five management area options as follows: 1) north of 25° N. latitude; 2) north of 23° N.; 3) within the EEZ around the Hawaiian Islands; 4) within the EEZ around the Hawaiian Islands north of 23° N.; and 5) within the EEZ around the Hawaiian Islands north of 25° N. latitude. Figures 10.2 A-E show the five management area options, percentage of total seabird catches occurring in each area, and percentage of 1994-1998 annual average fishing effort (i.e., fishing sets) that occur in each geographical area.

These mitigation measures and management areas were combined to create four management alternatives which were analyzed under NEPA and published by NMFS in the Federal Register as part of the proposed rule (FR 65 41424, July 5, 2000). These analyses also served as the basis

for the USFWS Biological Opinion regarding the effects of the Hawaii longline fishery on the short-tailed albatross issued on November 28, 2000. The Hawaii longline fishery for the purposes of the USFWS BiOP was the fishery operating as it had prior to any closures or gear prohibitions implemented by NMFS to reduce the incidental interactions between the fishery and sea turtles. Therefore, the potential decreases in the incidental catches of seabirds presented here for each management area is based on the operation of the fishery prior to the emergency measures to protect sea turtles and seabirds published by NMFS on June 12, 2001.

If the management area was all waters north of 25° N. (Option 1), it would encompass 95% of the fleet's 1994-1998 average annual incidental seabird catch and 33% of average annual fleet effort (Figure 10.1A). If one measure is used in the prescribed manner north of 25° N., it is estimated that the incidental catch of seabirds in the Hawaii longline fishery would decrease by 58% to 91% (as compared to the 1994-1998 annual average), depending on which measure is used (Table 10.8.). A comparison of the impacts of Option 1 and Option 2 reveals that an additional 11% of fishing effort would be impacted to reduce the incidental catch of seabirds by an additional two percent. Although Option 2 would include the waters around a seabird colony at French Frigate Shoals, the birds at this colony are already partially protected by the NWHI 50 nautical mile longline vessel area closure (protected species zone) established in 1991. NMFS observer data show that seabird interaction rates are low outside the area closure between 23° N. and 25° N. (the area most directly surrounding French Frigate Shoals) as compared to north of 25° N., for each type of set (swordfish, mixed, tuna) (Table 10.7).

The proposed management area in Alternative 1 is the area north of 23° N. latitude (Option 2). This area would encompass 97% of the fleet's 1994-1998 average annual incidental seabird catch and 44% of average annual fleet effort (Figure 10.2B). If one measure is used in the prescribed manner north of 23° N., it is estimated that the incidental catch of seabirds in the Hawaii longline fishery would decrease by 59% to 93% (as compared to the 1994-1998 annual average), depending on which measure is used (Table 10.8.).

If the management area was all waters north of 25° N. within the EEZ around Hawaii (Option 5), it would encompass 60% of the fleet's 1994-1998 average annual incidental seabird catch and 17% of average annual fleet effort (Figure 10.2E). If one measure is used in the prescribed manner in this management area, it is estimated that the incidental catch of seabirds in the Hawaii longline fishery would decrease by 35% to 57%, depending on which measure is used (Table 10.8). Compared to Option 1, this management area would encompass an additional 26% of fleet effort but 35% less of the fleet's average annual incidental seabird catch.

Table 10.7. Incidental catch of albatrosses in the Hawaii longline fishery by area and set type based on NMFS observer records from 1994-1998.

	Bird Catch/Set	
	Black-footed Albatross	**Laysan Albatross**
North of 25° N.		
Swordfish	0.41	0.26
Mixed (Swordfish and Tuna)	0.35	0.32
Tuna	0.01	0.01
North of 23° N.		
Swordfish	0.38	0.24
Mixed (Swordfish and Tuna)	0.30	0.26
Tuna	0.01	0.01
EEZ between 23° N. and 25° N.		
Swordfish	0.05	0.00
Mixed (Swordfish and Tuna)	0.07	0.03
Tuna	0.00	0.00

Source: NMFS, SWFSC Honolulu Laboratory.

The impact on the incidental catch of seabirds of applying the mitigation measures in each management area was calculated by first estimating total annual mortalities by management area. This was done by multiplying observed seabird interaction rates by average annual effort, to get estimated seabird catch by area. Area interaction rates (mortalities/set) were calculated by bird species and vessel target, based on 1994-1998 observer data. Area average effort (sets/year) by vessel target were taken from 1994-1998 logbooks. Estimated target specific seabird mortalities were then summed by area to get total annual seabird mortalities per area, by bird species. These specific area seabird mortalities were then reduced by the application of the mitigation measures in Table 10.6. These numbers were further adjusted (reduced) for the number of vessels already employing a given measure, such as a line-shooter with weighted branch lines, as they would be unaffected by a requirement for this measure. The estimated percent reduction in incidental seabird catch presented in Table 10.8 is the effect of the application of a given measure to a given area, measured as a percentage decline in total (fleet wide) incidental seabird catch. To summarize the calculations in the form of an equation: Interaction Rate x Effort x Mitigation

Rate x Percent of Sets Affected = Percent Reduction in Total Incidental Bird Catch. The estimated impacts for each management area are presented in Table 10.8.

Figure 10.2. Maps A - E show the five potential geographic management areas (Options 1 to 5 in Section 8.0). On each map are two pie charts showing the percentage of total 1994-1998 average annual seabird catches and the percentage of total fishing effort (i.e., fishing sets) that occur in each management area. Also shown on each map is the boundary of the EEZ for the Hawaiian Archipelago. The Hawaii longline fishery is regulated by the Council which prohibits longlining within 50 nautical miles of the Northwestern Hawaiian Islands and within seasonally-adjusted areas 25 to 75 nautical miles around the Main Hawaiian Islands. These areas are indicated by an inner boundary immediately surrounding the Hawaiian Islands.

Figure 10.2 (a and b).

Figure 10.2 c and d).

Figure 10.2 (e).

Table 10.8. Potential decrease in the total incidental catch of black-footed albatrosses (BF) and Laysan albatrosses (LA) in the Hawaii longline fishery if various mitigation measures are used in alternative management areas.

		Percent Reduction in Total Incidental Catch				
Mitigation Measure		Option 1 Area (North of 25° N.)	Option 2 Area (North of 23° N.)	Option 3 Area (EEZ around the Hawaiian Islands)	Option 4 Area (EEZ around the Hawaiian Islands north of 23° N.)	Option 5 Area (EEZ around the Hawaiian Islands north of 25° N.)
A. Blue-dyed squid	BF	88	90	54	52	49
	LA	85	86	65	62	61
	All	86	88	58	56	54
B. Discharge offal strategically	BF	77	79	47	45	43
	LA	86	87	65	62	61
	All	81	83	55	53	51
C. Line-setting machine with weighted branch lines	BF	90	93	53	53	51
	LA	92	93	67	66	65
	All	91	93	59	59	57
D. Towed deterrent	BF	79	82	48	47	44
	LA	67	68	51	49	48
	All	74	76	50	48	46
E. Weighted branch lines	BF	86	88	51	50	48
	LA	86	87	63	62	61
	All	86	88	56	56	54
F. Night setting	BF	78	81	48	46	44
	LA	33	34	25	24	24
	All	58	59	38	36	35

Source: McNamara *et al.* (1999); Boggs 2001; NMFS, SWFSC Honolulu Laboratory.

10.1.4.1.3 Cumulative impacts

For NEPA purposes, "cumulative impacts" are the impacts on the environment resulting from the incremental impact of the action(s) analyzed when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal), or person takes such actions.

The proposed action is intended to implement via Council action the Terms and Conditions of the USFWS BiOp that are currently in place. Therefore the effect of the preferred alternative on the physical environment should be nearly identical to the effects of the current emergency interim rule (66 FR 31561, June 12, 2001 and 66 FR 63630, December 10, 2001). The only significant difference in effects might be an increase in post-interaction seabird survival due to the application of seabird handling requirements for all species of seabirds. As discussed in the December 10, 2001, Federal Register notice, impacts of the BiOp's amendment to allow the use of basket-style longline gear are expected to be neutral as this gear has been shown to have a sink rate comparable to that of monofilament line set with a line shooter. The best scientific information available to NMFS on the cumulative effects of exogenous activities on short-tailed albatrosses is provided in NMFS' Biological Assessment, the subsequent USFWS BiOp, and the FEIS from which this Environmental Assessment tiers.

In this section, the analysis of the impacts of each of the alternatives were prepared in light of cumulative impacts. For example, the impacts on short-tailed albatrosses caused by the Hawaii-based longline fishery alone would be insignificant from the perspective of Pacific-wide short-tailed albatross populations. Short-tailed albatrosses are listed under the Endangered Species Act and analyzed under Section 7 precisely because of the combination of many factors, of which a minor component is the Hawaii-based longline fishery. Although the USFWS determined that operation of the Hawaii-based longline fishery does not jeopardize the continued existence of short-tailed albatrosses, the BiOp contains several mandatory Terms and Conditions designed to reduce the potential for adverse impacts on this species In light of the combined adverse impacts to short-tailed species, the impetus of the proposed action is premised on consideration of the cumulative impacts on short-tailed albatrosses that are affected by the Hawaii-based longline fishery.

As described above, as well as in the FEIS, NMFS' Biological Assessment, and the USFWS BiOp, longline fisheries in the Pacific are conducted mainly by Japan, Taiwan, Spain, Korea, and, to a lesser extent, the United States. It is estimated that on average about 570 million longline hooks are set by all fleets in the Pacific each year. Primary threats to the species are marine and land-based pollution, oceanographic and anthropogenic changes affecting prey availability, nesting disturbance, and incidental mortalities resulting from coastal and high seas fishing.

10.1.4.1.4 Analysis of impacts of alternative management measures in light of cumulative impacts.

Five alternatives are presented in this document. These range from No Action (Alternative 4), to a prohibition on longline fishing within Hawaii's EEZ north of 23° N. (Alternative 5). Alternatives 2 and 3 both require that vessel operators utilize two or more mitigation measures when longline fishing north of 25° N. - the major difference between these two alternatives is that one allows the fishermen to select which measures they will utilize while the other leaves this decision to the Council. All alternatives are compared to the 1994-1999 FMP baseline which is the period examined in the USFWS BiOp. Alternative 1 (the proposed action) consists of the Terms and Conditions contained in the BiOp (as amended on October 18, 2001, to allow the use of basket-style longline gear) which requires the use of several specified mitigation measures when fishing north of 23° N. latitude. The mitigation measures included in the BiOp are largely identical to those identified in Alternatives 2 and 3, however there are some slight differences in the strategic offal discard process in that the BiOp noted that fishermen are to remove all hooks from any offal before it is discarded. In addition, the BiOp (Alternative 1) requires that vessel operators notify NMFS immediately if a hooked or entangled short-tailed albatross fails to recover satisfactorily after being brought onboard a vessel and to retain all dead short-tailed albatrosses for submission upon return to port. Two measures originally developed by the Council are retained in the proposed action as they are considered to be more conservative than similar measures in the BiOp. Under Alternative 1, **vessel owners** (as well as vessel operators) will be required to attend annual protected species workshops, and vessel operators will be required to handle **all seabirds** (not just short-tailed albatrosses) in a manner that ensures their long-term survival.

10.1.4.1.4.1 Alternative 1 (Proposed Action - Implementation of the Terms and Conditions of the USFWS BiOp): The operators of all vessels registered for use under a Hawaii longline limited access permit operating with longline gear north of 23° N., must ensure the use of thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longlines. This offal discard must be made from the opposite side of the vessel from which the longline is being set or hauled (no fish, fish parts, or bait may be discarded from the side of the vessel where the longline is being set or hauled), and all hooks must be removed from discarded fish, fish parts or bait prior to its discard. When making deep sets (targeting tuna) north of 23° N., Hawaii longline limited access vessel operators must employ a line-setting machine with weighted branch lines (minimum weight = 45 g), or employ basket-style longline gear. Other mitigation measures such as towed deterrents, use of weighted branch lines without a line-setting machine, (in the case of swordfish or mixed sets) are optional. If a short-tailed albatross is brought onboard alive, vessel operators and crew must ensure that the albatross displays four traits before

release, and they must notify NMFS immediately. Included in this Alternative is a requirement that all seabirds brought onboard alive must be handled in a manner that maximizes the probability of their long-term survival once released (See Appendix I). Finally, vessel captains, as well as vessel owners, must annually complete a protected species workshop conducted by NMFS. The setting of shallow sets to target swordfish is prohibited under NMFS' March 29, 2001 Biological Opinion to mitigate interactions between the fishery and sea turtles. However, if the setting of shallow sets is allowed in the future, vessel operators must begin setting the longline at least one hour after local sunset and complete the setting process by local sunrise, using only the minimum vessel lights necessary.

The proposed action reflects the Terms and Conditions outlined in the Biological Opinion (BiOp) for short-tail albatrosses published by USFWS in November 2000 (USFWS 2000). The proposed management area is north of 23° N. latitude as this reflects the lower limit of observations of short-tail albatrosses in the NWHI, as well as the concentration of black-footed and Laysan albatross interactions by the Hawaii longline fishery north of 25° N. latitude.

Any one measure employed north of 23° N. would reduce the catch of black-footed and Laysan albatrosses in the Hawaii fishery by 59% to 93% as compared to the 1994-1998 average. As no short-tail albatrosses have been reported captured in the Hawaii fishery the potential reduction rate is unknown. Further, the mitigation measures described in this document were only tested on black-footed and Laysan albatrosses, and no observations were made of short-tail albatrosses. However, is assumed that the measures prescribed by the BiOp will be as effective in ensuring the short-tail albatrosses are not captured by Hawaii longline vessels.

The Terms and Conditions of the BiOp acknowledge that the Hawaii longline fishery is not homogenous and comprises vessels that make longline sets deeper than 100 m to target principally bigeye tuna, and vessels that set the longlines shallower that 100 m to catch swordfish or a mix of swordfish and tuna. For the most part, the measures required for these methods of longline fishing are part of normal practice, and which in themselves have strong mitigation effects. Night setting is a normal procedure when making swordfish sets. However, the timing of set deployment is usually based on the rising of the moon, and thus longlines may be deployed during dusk and hauled in the dawn hours. These are periods when albatross are feeding and hence particularly vulnerable. The mitigation action of night setting is reinforced by specifying that sets must begin after dark and be completed by sunrise.

Since the conclusion of the consultation under ESA, however, emergency regulations have been imposed on the Hawaii-based longline fleet to mitigate interactions with sea turtles. These new regulations include a ban on making shallow longline sets targeting swordfish north of the equator. The new regulations also include an area closure to the south of Hawaii during April and

May, aimed primarily at mitigating interactions between sea turtles and tuna targeting longliners. The prohibition on shallow set longline fishing for swordfish north of the equator, also extends to a ban on the possession of light sticks. It is therefore very unlikely that longline vessels will opt to set at night. Longline fishing under the new regulations would not appear to pose any increased threat to the short-tailed albatross. Indeed, targeting swordfish in such a manner was greatly constrained from late August 2000, to the outright ban on shallow setting north of the equator in the NMFS emergency rule published June 12, 2001. The impacts of these constraints on albatross takes after August 2000, led to a significant decline in the take of albatrosses by Hawaii-based longline vessels.(Figure 10.1). Further, between July and September 2001, there were no observed interactions with seabirds by the Hawaii longline fishery (with over 20% coverage of the fleet) following the complete ban on shallow set longline fishing for swordfish north of the equator.

Tuna targeting vessels in the Hawaii-based longline fleet use line-setting machines and weighted branch lines as part of their standard operating procedures. Tuna vessels, however, are likely to have less opportunity to accumulate quantities of offal in the same manner as swordfish/mixed targeting vessels, which dressed the swordfish carcasses, removing bill, fins tails, gill and guts before storing the trunk in the hold. The heads of swordfish when frozen and split make ideal offal discards for seabirds, since it is a sizeable oily morsel which floats and around which the albatrosses can flock and feed. Longline fishermen targeting tuna store their fish whole apart from removing fins, so these fishermen may need to store some of the their normal discards, such as unmarketable species or shark damaged fish to be able to conduct strategic offal discards.

All vessels fishing north of 23° N. latitude will have to employ thawed blue-dyed bait. The squid bait employed by swordfish/mixed targeting vessels readily takes up blue vegetable food dye. As reported by both NMFS and the Council mitigation research projects, the squid remains blue in color even after several hours immersion during the set. Sanma or saury bait (*Cololabis saira*) used as bait by the tuna targeting vessels has a bluish dorsal and silver ventral counter shading typical of many pelagic species. Sanma will readily absorb blue dye, but tends to lose the colored dye more readily than squid, and so this measure may not be as effective on the haul back.

All vessels fishing north of 23° N. will have to carry sufficient quantities of approved blue dye. This may be verified during inspection at sea by the USCG, and could be followed up at dockside inspection of dying containers by vessels known to have fished north of 23° N. latitude. Similarly, at-sea and dockside inspections might be used to ascertain where offal will, or is being stored for later discarding, while vessels observed deploying or retrieving longlines north of 23° N. may be monitored to determine if they are periodically discarding offal to distract birds.

An additional benefit from the mandatory use of blue-dyed bait may be mitigation of sea turtle interactions. While the use of blue dye as an effective sea turtle mitigation measure is still speculative, there are initial indications from preliminary investigations by the NMFS Honolulu Laboratory that green turtles will not initially consume blue-dyed squid, in preference for undyed squid. Repeated presentations of blue-dyed squid are required for a change in this behavioral

response and for the turtles to readily consume the colored squid (R. Brill and Y. Simmer, pers. comm.).

It should be noted that the measures in Alternatives 2 and 3 require vessel operators to annually attend protected species workshops conducted by NMFS, and to handle all seabirds, regardless of their conservation status, in a manner to ensure their long-term survival. Alternative 1 differs from Alternatives 2 and 3 in that it requires vessel operators to retain and contact the NMFS if a short-tailed albatross fails to recover satisfactorily (see Section 11.3). As discussed in the December 10, 2001, Federal Register notice, impacts of the BiOp's amendment to allow the use of basket-style longline gear are expected to be neutral as this gear has been shown to have a sink rate comparable to that of monofilament line set with a line-shooter.

10.1.4.1.4.2 Alternative 2: The operators of all vessels registered for use under a Hawaii longline limited access permit operating with longline gear must: 1) select and employ two or more of the mitigation measures in Table 8.1 when fishing north of 25° N. and; 2) handle and release hooked or entangled seabirds in a manner that maximizes the probability of their survival (See Appendix I). In addition, both vessel owners and vessel captains must annually complete a protected species workshop conducted by NMFS.

It is estimated that the use of any one mitigation method will reduce the incidental catch of seabirds in the Hawaii longline fishery by 58% to 91%, as compared to the 1994-1998 average depending on which measure is selected (Table 10.8). The reduction in the incidental catch of seabirds that results from combining two or more measures is uncertain, but it is believed would likely have a greater cumulative effect in reducing seabird catches, than the use of only one measure.

This alternative could have a positive impact because it allows longline fishermen to experiment with different measures and select the most appropriate and practical combination of measures for their vessel size, fishing operations and sea conditions. In addition, if fishermen switch frequently among mitigation measures the likelihood that seabird are becoming habituated to specific measures is decreased.

The impact of applying mitigation measures on seabird populations in a certain geographic management area ultimately depends on the extent to which fishermen use the measures in a consistent and conscientious manner. By encouraging fishermen to experiment with different measures and share the results of these experiments with other fishermen this alternative could be expected to promote an interest in implementing mitigation measures, leading to greater compliance. Requiring all vessel operators to annually attend a protected species educational workshop should reinforce greater compliance and reduction of seabird catch by disseminating information to vessel operators on the extent of the problem and measures that can be taken to resolve it.

The U.S. Coast Guard (USGC) expressed concern that fishermen might select those mitigation measures that are the most difficult to monitor and enforce. Dockside inspections can determine whether fishing vessels are carrying the necessary gear to employ towed deterrents, strategic offal discharge or blue-dyed bait. However, because the USCG prefers not to board vessels while they are engaged in fishing operations, it may be difficult to determine whether these mitigation measures are being used by fishermen as specified in the regulations. Monitoring the employment of these measures requires the use of aerial surveillance and/or at-sea observation with binoculars and cameras equipped with telephoto lenses.

To the extent that the difficulty of enforcing regulations leads to non-compliance, it could be problematic for NMFS to compare data from NMFS observer reports and the NMFS Western Pacific Daily Longline Fishing Log to estimate reductions in the annual incidental catch of seabirds in the Hawaii longline fishery. In order to extrapolate the number of fleet-wide reductions in seabird catch from average observed interactions, it must be assumed that the same level of compliance occurs when an observer is absent as when an observer is present. This assumption would not be feasible if the difficulty of enforcement with these regulations leads to a high level of non-compliance. However, it could be possible to determine whether fishermen select those mitigation measures which are the most difficult to enforce by checking fishermen's logbook records.

However, this alternative does not meet the Terms and Conditions of the Biological Opinion issued by the U.S. Fish and Wildlife Service as it does not uniformly require the use of specific mitigation measures when fishing north of 23° N. latitude.

10.1.4.1.4.3 Alternative 3: The operators of all vessels registered for use under a Hawaii longline limited access permit must: 1) employ two mitigation measures listed in Table 8.1 (decision as to which specific measures are required would be made by the Council) when fishing north of 25° N. and; 2) handle and release hooked or entangled seabirds in a manner that maximizes the probability of their survival (See Appendix I). In addition, both vessel owners and vessel captains must annually complete a protected species workshop conducted by NMFS.

Under this alternative the Council could select those mitigation measures which are the most effective in reducing the incidental catch of seabirds. In addition, the Council could select those mitigation measures which are the most easily monitored and enforced such as night setting, line-setting machines, and the use of weighted branch lines. Night setting may be enforced by means of the vessel monitoring system (VMS) currently required on Hawaii-based longline vessels which transmits a fishing "signature" to enforcement authorities. Measures requiring the use of weighted branch lines and line-setting machines can be effectively monitored through dockside inspections, as it is unlikely that fishermen would equip their vessels with this gear and not use it at sea. However, the Council believes that the positive effects of allowing fishermen to vary their measures according to their vessel operations and at-sea conditions, subject to continual

monitoring and review of the effectiveness of this allowance, is preferable to specifying a combination of measures to be used by fishermen under all circumstances.

This alternative, however, does not meet the Terms and Conditions of the Biological Opinion issued by the U.S. Fish and Wildlife Service as it does not uniformly require the use of specific mitigation measures when fishing north of 23° N. latitude.

10.1.4.1.4.4 Alternative 4 (No Action): Under this alternative, the Terms and Conditions of the USFWS BiOp would not be implemented, and the western Pacific pelagic fisheries would continue to be regulated by the measures currently contained in the Pelagics FMP, as well as those measures implemented by NMFS for sea turtles on March 28, 2000. Under this alternative, it is likely that NMFS would either implement the Terms and Conditions of the BiOp via a unilateral Secretarial amendment to the FMP's regulations, or would close one or more fisheries until it reached a decision on how to proceed.

The NMFS, SWFSC Honolulu Laboratory estimates that between 1994 and 1998, an average of 1,175 Laysan albatrosses and 1,388 black-footed albatrosses were killed in the Hawaii longline fishery each year. These average annual incidental catches represent about 0.46% and 0.05% of the estimated black-footed and Laysan albatross populations, respectively. Besides the direct mortality to juvenile or adult birds, fishing-related deaths may also have a negative influence on chick survival if one or both parent birds are killed. However, under the no action alternative the incidental catch of seabirds in the Hawaii longline fishery would not be expected to continue at the same rate because of the implementation of measures to reduce sea turtle takes in the fishery have also reduced seabird interactions.

In particular, the constraints imposed on shallow set longline fishing for swordfish by the Hawaii-based vessels has greatly reduced seabird interactions in the latter part of the year 2000 (Figure 10.1). Moreover, since the complete ban on shallow set longline fishing for swordfish north of the equator since June 12, 2001, there have been no reported seabird interactions for the fleet by NMFS observers between July and September 2001, despite an elevated observer coverage of over 20%.

This alternative, however, does not meet the Terms and Conditions of the Biological Opinion issued by the U.S. Fish and Wildlife Service as it does not uniformly require the use of specific mitigation measures when fishing north of 23° N. latitude. Furthermore, it is inconsistent with the Council's actions to implement measures to reduce seabird interactions in the Hawaii longline fishery, and it is also inconsistent with the requirements under the NPOA-seabirds.

10.1.4.1.4.5 Alternative 5: Fishing with longline gear is prohibited within the EEZ around the Hawaiian Islands north of 23° N. latitude.

It is estimated that the incidental catch of seabirds would be reduced by about 62% (as compared to the 1994-1998 average), if the EEZ around the Hawaiian Islands north of 23° N. latitude was closed to longline fishing. However, it is uncertain if such an area closure would be effective in maintaining the same level of fishery-albatross mitigation over time. Albatrosses may eventually learn that they can intercept fishing vessels by foraging outside the area closure. Many seabirds already forage far north of the EEZ around the Hawaiian Islands. The Council rejected this alternative because of its relatively low level of effectiveness in reducing the incidental catch of seabirds.

This alternative would facilitate enforcement, as compliance can be monitored with the existing vessel monitoring system. However, this alternative does not meet the Terms and Conditions of the Biological Opinion issued by the U.S. Fish and Wildlife Service as it does not uniformly require the use of specific mitigation measures when fishing anywhere north of 23° N. latitude.

10.1.4.2 Impacts on sea turtles and marine mammals

It is unlikely that any of the alternative management measures considered would have a significant negative impact on the species of sea turtles that occur in the Western Pacific region. For instance, the results of a study by Fontaine *et al.* (1985) suggest that the use of blue-dyed bait by Hawaii-based longline vessels may reduce the incidental take of turtles. The researchers reported that the Atlantic Kemp's Ridley may have a preference for certain colors of food. Under experimental conditions turtles were given the choice of red-, yellow-, blue- and green-dyed food items. The test animals invariably chose the red-dyed food. Although it is possible that the sea turtles were reacting to a chemical stimulus created by the food coloring dye, Fontaine *et al.* (1985) concluded that it is more likely that the turtles' food preferences were based on visual factors. If sea turtles are less attracted to blue colored bait, some mitigation of turtle catch may already be taking place in the Hawaii longline fishery occurring in waters south of Hawaii. The vessels fishing in these waters bait their hooks with "sanma" (saury mackerel *Cololabis saira*) which are naturally colored blue. Furthermore, the Hawaii longline fleet has been using blue-dyed bait since the publication of the emergency rule on June 12, 2001. But, because the measures have been in place for a limited time, there is no available information on the effectiveness of this specific measures to deter sea turtles from the longline gear.

The deployment of towed deterrents by longline vessels is unlikely to have any effect on sea turtles. Furthermore, there is no evidence that the frequency of turtle interactions with longline gear is related to the time of day (Kleiber 1998ab). Therefore, a possible increase in the number of night sets being made as a result of fishermen choosing night setting as a mitigation measure should not have an impact on turtle populations.

An unpublished analysis of NMFS observer records collected from 1994 to 1998, indicates that there may be an inverse relationship between the depth of a longline and the sea turtle take rate (P. Kleiber, pers. comm.). The sea turtle take rate of hooks attached close to the float is about twice that of hooks farther away from the float perhaps because the latter hooks hang at a greater depth. It is also possible, however, that sea turtles might be initially attracted to the floats and then find the hooks. Nevertheless, this finding suggests that the use of a line-shooter with weighted branch lines may reduce turtle interactions by increasing the rate of speed the gear takes to reach depth, and that lines set deep tend to catch fewer turtles.

The diet of adult loggerheads typically consists of benthic invertebrates from hard bottom habitats and pelagic crustaceans, molluscs and jellyfish (NMFS-USFWS 1998a). Leatherback turtles feed primarily on jellyfish and tunicates (NMFS-USFWS 1998b). Consequently, the discharge of offal is unlikely to have an impact on sea turtles.

It is unlikely that any of the alternative management measures considered would have a significant negative impact on the Hawaiian monk seal, whales or other marine mammals that occur in the Western Pacific region. Interactions between marine mammals and the Hawaii longline fishery are rare. The use of line-setting machines and weighted branch lines, discharge of offal and night setting are all current practices in the Hawaii longline fishery. The likelihood of towed deterrents causing injury to marine mammals is small. The use of blue-dyed bait is not expected to adversely impact marine mammals, as toothed whales and dolphins are already adept at removing bait from hooks without being snagged (C. Boggs, pers. comm.).

10.1.4.3 Impacts on targeted and non-target finfish and related stocks

To the extent that mitigation measures that reduce the incidental catch of seabirds also reduce bait loss caused by seabird predation, catch of target and non-target species, would be expected to increase. In addition, Garcia and Associates report that dyeing bait blue may result in an increase in the catch rate of tuna and swordfish (McNamara *et al.* 1999). However, the Hawaii-based longline fleet exploits only small fractions of fish stocks that are capable of extensive movement and are also harvested by foreign fleets and other types of domestic vessels operating in various EEZs and the high seas. Thus, any increases in fish catch attributable to reduced bait loss or use of blue-dyed bait will not jeopardize the productive capability of the target and non-target species or result in cumulative adverse impacts that could have a substantial effect the sustainability of these species.

For further discussion, please refer to the FEIS for the Fishery Management Plan of the Pelagics Fisheries of the Western Pacific Region, which is available from the NMFS Southwest regional office (501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802-4213; http://www.nmfs.noaa.gov/).

10.1.4.4 Impacts on essential fish habitat

The proposed action (Alternative 1) to implement the Terms and Conditions of the USFWS November 28, 2000 BiOp (see Section 8 for a description of these measures) via a regulatory amendment under the FMP for the Pelagics Fisheries of the Western Pacific Region is not expected to have adverse impacts on essential fish habitat (EFH) or habitat areas of particular concern (HAPC) for species managed under the Pelagics, Bottomfish and Seamount Groundfish, Precious Corals, or Crustaceans Western Pacific Fishery Management Plans. EFH and HAPC for these species groups has been defined as presented in Table 10.9. The objective of the proposed action is to mitigate the harmful effects of fishing by Hawaii-permitted longline vessels on the short-tailed albatross. The proposed action will not adversely affect EFH or HAPC for any managed species as the measures are not likely to lead to substantial physical, chemical, or biological alterations to the habitat, or result in loss of, or injury to, these species or their prey. For the same reason, the proposed action is not anticipated to cause substantial damage to the ocean and coastal habitats.

Table 10.9. Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) for species managed under the Pelagics, Crustaceans, Bottomfish and Seamount Groundfish, Precious Corals Western Pacific Fishery Management Plans. All areas are bounded by the shoreline, and the outward boundary of the EEZ, unless otherwise indicated.

SPECIES GROUP (FMP)	EFH (juveniles and adults)	EFH (eggs and larvae)	HAPC
Pelagics	water column down to 1,000 m	water column down to 200 m	water column down to 1,000 m that lies above seamounts and banks.
Bottomfish and Seamount Groundfish	water column and bottom habitat down to 400 m	water column down to 400 m	all escarpments and slopes between 40-280 m, and three known areas of juvenile opakapaka habitat
Precious Corals	Keahole, Makapu'u, Kaena, Wespac, Brooks, and 180 Fathom gold/red coral beds, and Miloli'i, S. Kauai and Au'au Channel black coral beds	not applicable	Makapu'u, Wespac, and Brooks Bank beds, and the Au'au Channel
Crustaceans	bottom habitat from shoreline to a depth of 100 m	water column down to 150 m	all banks within the Northwestern Hawaiian Islands with summits less than 30 m

10.1.4.5 Impacts on biodiversity and ecosystem functions

Because none of the alternatives are expected to lead to substantial changes in current effort or catch levels, or to lead to changes in fishing operations that would alter significantly harvests or bycatch composition, they are not anticipated to have a substantial impact on biodiversity or ecosystem functions within the affected area.

10.1.4.6 Impacts on public health and safety

All alternatives limit regulation to fishery participants, with no foreseeable impacts on the health and safety of the public at large. Vessel operators and crew that would be affected are not anticipated to be negatively impacted as the changes considered under all alternatives consist of relatively minor changes in day to day fishing operations. For this reason, none of the alternatives are anticipated to have substantial adverse impacts on public health or safety.

10.1.5 Conclusions and determination (Finding of No Significant Impact)

a. The proposed action is not expected to jeopardize the sustainability of any target species that may be affected by the action, based on historical and predicted fishing effort and the condition of target stocks (section 10.1.4.3).

b. The proposed action is not expected to jeopardize the sustainability of any non-target species that may be affected by the action, based on historical and predicted fishing effort and the condition of non-target stocks (section 10.1.4.3).

c. The proposed action is not expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs, because the action is not likely to lead to substantial physical, chemical, or biological alterations of these habitats (section 10.1.4.4).

d. The proposed action is not expected to have a substantial adverse impact on public health or safety, because the action will only cause minor changes in day to day fishing operations (section 10.1.4.6).

e. The proposed action is not expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species. This action is intended to significantly reduce the potential for fishery interactions with short-tailed albatrosses by requiring the use of fishing and mitigation techniques designed to reduce the attraction and access of baited fishing hooks. These techniques are not anticipated to lead to any increases in fishery interactions or adverse impacts on other endangered or threatened species, or marine mammals (section 10.1.4.2).

f. The proposed action is not expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species, based on historical and predicted fishing effort and the condition of these stocks (section 10.1.4.3).

g. The proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g. benthic productivity, predator-prey relationships etc.), because the action is not expected to lead to substantial changes in current effort or catch levels, or lead to changes in fishing operations that would alter significantly harvests or the composition of fish bycatch (section 10.1.4.5).

h. The proposed action is not expected to have significant social or economic impacts which are interrelated with adverse natural or physical environmental effects. Although this action will increase costs for vessel operators fishing north of 23° N. latitude, it is preferred as it provides increased protection for short-tailed albatrosses while allowing the fishery to continue operating within its historical grounds (section 10.2).

i. The proposed action is controversial because no interactions with short-tailed albatrosses have been observed or reported during the history of the fishery (section 10.1.3.1).

Based on the information contained in the environmental assessment, and other sections of this document, I have determined that the proposed action, which would require the operators of all vessels registered for use under a Hawaii longline limited access permit operating with longline gear north of 23° N. latitude to ensure the use of thawed blue-dyed bait and strategic offal discards during setting and hauling of longlines: require vessel operators making deep sets north of 23° N. latitude to employ a line-setting machine with weighted branch lines (minimum weight = 45 g) or employ basket-style longline gear: require vessel operators making shallow sets north of 23° N. latitude (currently prohibited) to begin setting the longline at least one hour after local sunset with the setting process completed by local sunrise and using only the minimum vessel lights necessary: require vessel operators and crew to handle all seabirds brought onboard alive in a manner that ensures their long-term survival once released: if a short-tailed albatross is brought onboard alive, vessel operators and crew must notify NMFS immediately and ensure that the albatross displays four traits before release: and require vessel owners as well as vessel operators to annually complete a protected species educational workshop conducted by NMFS, is consistent with existing national environmental policies and objectives set forth in sections 101 (a) and 101 (b) of the National Environmental Policy Act and will not have a significant impact on the quality of the human environment. As described in section 5.03.c of NOAA Administrative Order 216-6, a Finding of No Significant Impact is supported and appropriate for the proposed action. Therefore, preparation of an environmental impact statement for the proposed action is not required by Section 102 (c) of the National Environmental Policy Act or its implementing regulations.

_____ _____

William T. Hogarth Date
NOAA Assistant Administrator for Fisheries

10.2 Regulatory Flexibility Act

The Regulatory Flexibility Act, 5 U.S.C. 601 et seq. (RFA) requires government agencies to assess the impact of their regulatory actions on small businesses and other small organizations via the preparation of Regulatory Flexibility Analyses. A summary of an Initial Regulatory Flexibility Analysis was published with a proposed rule in the Federal Register (FR 65 41424), July 5, 2000). No comments were received on that Initial Regulatory Flexibility Analysis or its economic analysis, however a subsequent consultation on the action under section 7 of the ESA resulted in the issuance of a BiOp on November 28, 2000, by the USFWS which has management authority for seabirds. That BiOp contains a series of non-discretionary Terms and Conditions which are intended to afford additional protection to short-tailed albatrosses. Those measures were implemented by NMFS as an emergency rule (66 FR 31561, June 12, 2001) and extended through June 8, 2002 (66 FR 63630, December 10, 2001). The primary purpose of this action is to codify those emergency measures as a final rule via Council action. Also included in this rule are further Council recommendations that vessel owners (as well as operators) be required to annually attend protected species workshops, and that all seabirds (not just short-tailed albatrosses) be handled in a manner that maximizes the probability of their long-term survival. A Final Regulatory Flexibility Analysis that examines the alternatives presented in this document is provided in Appendix II. In summary, economic impacts to the fishery are driven by both the geographic area in which the rule would apply, and the specific techniques mandated within that area. These costs can be categorized as direct (increased fixed or variable costs) or indirect (revenue changes). Because mitigation techniques generally vary by target across all alternatives, economic impacts follow this same pattern. Compared to the historic baseline (1994-1999, the period examined in the BiOp) the proposed action would be anticipated to increase annual direct costs to operators of swordfish and mixed target vessels by approximately $500 for blue dye and $400 for containers in which to store offal between sets. The impact to these vessels' revenue would be expected to be a gain of $335 per swordfish set (a 9% increase as compared to the 1998 fleet wide average of $3,724 per set) due to increased catch rates, but a loss of $598 per mixed target set (16% decrease) due to decreases in catch rates. These differential impacts are believed to exist due to spatial and temporal differences in the catchability of target species. The actual impact on these vessel operators is uncertain as recent fishery regulations intended to protect sea turtles prohibit these vessels from utilizing their typical shallow sets north of the equator. Anticipated impacts to vessels targeting tuna (utilizing deep sets) include annual direct costs of $120 for blue dye, and $400 for containers in which to store offal between sets, and $1,500 for the one time purchase of a line setting machine. The revenue impact to these vessels of using line shooters is expected to be a gain of $432 per set (12% increase). The impacts of other aspects of this alternative (seabird handling procedures and attendance at a protected species educational workshop) have not been quantified but are expected to be minimal.

10.3 Executive Order 12866

In order to meet the requirements of Executive Order 12866 (E.O. 12866) the National Marine Fisheries Service requires that a Regulatory Impact Review (RIR) be prepared for all regulatory actions that are of public interest. This review provides an overview of the problem, policy objectives, and anticipated impacts of the proposed action, and ensures that management alternatives are systematically and comprehensively evaluated such that the public welfare can be enhanced in the most efficient and cost effective way. In accordance with E.O. 12866, the following is set forth: (1) This rule is not likely to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) This rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency; (3) This rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) This rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order. An analysis of this rule is provided in Appendix II to this document. In summary, a lack of information on the long term effects of each alternative on fish or seabird stocks prevents a quantitative analysis of their net national benefits. However, given that the Endangered Species Act directs Federal agencies to protect endangered species, it is clear that cost-efficient strategies will maximize net benefits, even if those benefits cannot be quantified. The most significant differences between the alternatives considered are trade-offs between the level of protection offered to short-tailed albatrosses (reductions in takes) and the amount of fishing effort subjected to increased costs (or decreased revenues). These variations occur as a result of differences in the geographic areas covered between alternatives. More subtle differences exist between alternatives which provide flexibility by allowing vessel operators within a given area to employ a range of mitigation techniques, versus those which require specific techniques to be employed. Given that there have been no reported or observed interactions between this fishery and short-tailed albatrosses, comparisons of the potential benefits of each alternative can only be made based on reductions in fishery takes of other seabirds (black-footed and Laysan albatrosses). Whether these potential benefits translate into real or significant benefits to short-tailed albatrosses is unknown.

10.4 Coastal Zone Management Act

The CZMA requires a determination that a proposed management measure has no effect on the land, water uses or natural resources of the coast zone, or is consistent to the maximum extent practicable with an affected state's approved coastal zone management program. A copy of this document has been submitted to the appropriate state government agency in Hawaii for review and concurrence with a determination made by the Council that the recommended measure is consistent, to the maximum extent practicable, with the state's coastal zone management program.

10.5 Endangered Species Act

Species listed as endangered or threatened under the Endangered Species Act (ESA) (Public Law 93-205; 87 Stat. 884) that have been observed in the area where Hawaii-based longline vessels operate are as follows:

Species listed as endangered

Short-tailed albatross (*Phoebastria albatrus*)
Hawaiian monk seal *(Monachus schauinslandi)*
Pacific olive ridley turtle (*Lepidochelys olivacea*)
Leatherback turtle (*Dermochelys coriacea*)
Hawksbill turtle (*Eretmochelys imbricata*)
Green turtle (*Chelonia mydas*) - Florida and Pacific coast of Mexico breeding populations only
Humpback whale (*Megaptera novaeangliae*)
North Pacific Right Whale (*Eubalaena japonica*)
Sperm whale (*Physeter macrocephalus*)
Blue whale (*Balaenoptera musculus*)
Fin whale (*B. Physalus*)
Sei whale (*B. Borealis*)

Species listed as threatened

Loggerhead turtle (*Caretta caretta*)
Asian stocks of Pacific olive ridley and green turtles

The only listed or candidate species of seabirds that may interact with the Hawaii-based longline fishery is the short-tailed albatross, however, no interactions have been observed for the fishery. Other listed species known to interact with the Hawaii longline fishery are the leatherback turtle, loggerhead turtle, green turtle and olive ridley turtles. There have been no reported interactions between the fishery and the hawksbill turtle. The fishery has had interactions with the humpback whale and the sperm whale, and prior to 1991, the Hawaiian monk seal. The implementation of the 50 nm closed area around the NWHI to longline fishing essentially eliminated interactions between the Hawaii longline fishery and the Hawaiian monk seal.

Short-tailed Albatross

The world breeding population of the short-tailed albatross is estimated to be about 1,362 birds (USFWS 2001) and the two primary breeding colonies for the species are located on Torishima and Minami-Kojima Islands in the western Pacific. However, one short-tailed albatross was discovered incubating an egg on Yomejima Island of the Ogasawara Islands (southernmost island among the Mukojima Islands) on December 14, 2000 . This was an important sighting because the greatest threat to the endangered seabird is from volcanic eruption on Torishima, where the

largest breeding population exists. Since 1938, up to 15 short-tailed albatrosses are known to have visited the NWHI, and since 1991, one female has laid four unfertilized eggs. There are no confirmed reports of a successful breeding, however, the USFWS believe that it is critical to establish a colony at Midway Atoll because of the threat of volcanic eruption and land slides to the bird at Torishima.

There are no observed reports of a short-tailed albatross interacting with a Hawaii-based longline vessel. In 1997, one short-tailed albatross was seen flying near the stern of the NOAA vessel *Townsend Cromwell* during longline gear haulback research operations 593 nautical miles north of the island of Hawaii at 30° 28′ N., 153° 37′ W. In January 2000, a NMFS observer saw a juvenile short-tailed albatross flying near a Hawaii longline fishing vessel at 33° 09′ N., 147° 49′ W. The USFWS have asserted in their BiOp that the disappearance of a short-tailed albatross (identified as white 000) in 1994, was related to mortality in the Hawaii longline fishery. However, there is no evidence to support this assertion.

Prior to 2000, the short-tailed albatross was listed as an endangered species under the ESA throughout its range except in certain states (50 CFR 117.11). The incomplete protection in the U.S. was a consequence of the former practice of the USFWS of preparing a "native" list versus a "foreign" list under the Endangered Species Conservation Act of 1969 (Public Law 91-135; 83 Stat. 275). When the ESA was enacted in 1973, it supplanted the Endangered Species Conservation Act of 1969, and the "native" and "foreign" lists were combined to create one list of endangered and threatened species. However, notice of the action was not given to the governors of the affected states (Alaska, California, Hawaii, Oregon and Washington) as required by the 1973 Act. In 1980, the USFWS published a proposed rule (45 FR 49844, July 25,1980) to list the short-tailed albatross as endangered in the U.S., but that rule was never finalized. Consequently, the USFWS published a second proposed rule to list the short-tailed albatross as endangered in the U.S. (63 FR 58694, November 2, 1998). This was followed by publication of a final rule (65 FR 46643, July 31, 2000) such that effective August 30, 2000, the short-tailed albatross is listed as an endangered species throughout the U.S.

A formal biological consultation under section 7 of the Endangered Species Act to determine the effects of the Hawaii-based longline fleet on the short-tailed albatross was conducted in association with the seabird mitigation measures proposed by the Council. A Biological Assessment (BA) prepared by the Pacific Islands Area Office in association with the Council's action concluded that the chance of an interaction between a Hawaii-based longline vessel and a short-tailed albatross was extremely low, but would be reduced further if mitigation measures were employed by longline vessels (NMFS 1999). This consultation concluded with the issuance of a BiOp by the consulting agency (the U.S. Fish and Wildlife Service), on November 28, 2000.

The USFWS BiOp was based on the operations of the Hawaii longline fishery prior to the year December 1999. From December 1999 onwards, the Hawaii longline fishery has been subject to a range of measures arising from litigation brought by conservation advocacy organizations against the National Marine Fisheries Service, concerning turtle bycatch in this fishery. These

measures include time-area closures, fishing effort limits, and a ban on the use of shallow longline sets and were designed to minimize interactions between the longline fishery and sea turtles. The USFWS anticipated that in its pre-December 1999 state, the Hawaii longline fishery would take 15 short-tailed albatrosses during the seven year period addressed in the consultation (2000-2006). This was based on an annual estimate in the BiOp of 2.2 short-tailed albatrosses taken by the longline fishery. The BiOp considered a "take" to include not only injury or mortality to a short-tail albatross, caused by longline gear, but also any short-tail albatross striking at the baited hooks or mainline gear during longline setting or haul back.

The USFWS BiOp Terms and Conditions were implemented along with measures to reduce sea turtle takes in the Hawaii longline fishery by emergency rule on June 12, 2001 (FR 66, No. 113, 31561-31565). That emergency rule expired on December 10 2001, and has been extended for another 180 days terminating on June 8, 2002 (FR 66, No. 237, 63630-63632, December 10, 2001). The measures implemented by the emergency rule are largely similar to the measures in this document, with the exception of certain additional and more conservative measures, and the inclusion of basket-style gear as an alternative to monofilament gear set with a line-setting machine and weighted branch lines (see Section 8.0).

However, due to the ban on shallow setting the incidental take of seabirds by the fishery has significantly declined (Figure 10.1). Consequently, the NMFS has reinitiated the formal section 7 consultation under ESA which is still ongoing.

Sea Turtles

The populations of several species of sea turtles have declined in the Pacific as the result of nesting habitat loss and excessive and widespread harvesting for commercial and subsistence purposes (Eckert 1993). Leatherback and loggerhead turtles are the species of principal concern with regard to incidental take in Pacific pelagic longline fisheries. These fisheries are conducted mainly by Japan, Taiwan, Korea and the U.S. There are only two populations of loggerhead turtles in the Pacific, one originating in Australia where serious declines are occurring, and the other in southern Japan (Eckert 1993). Leatherback turtles inhabiting the Pacific mainly originate from nesting beaches in Mexico and Costa Rica where significant declines have been documented; from Indonesia where their status is uncertain but possibly stable; and from Malaysia where the nesting colony is nearly extinct despite 30 years of conservation measures (Eckert 1993). It is estimated that in 1999, the Hawaii longline fishery interacted with 132 leatherback turtles and 369 loggerhead turtles (McCracken 2000). Both of these species are mainly taken by longline vessels fishing north of the Hawaiian Islands where the incidental catch of seabirds is the highest (Kleiber 1998ab).

The proposed management measure in this document is not expected to have a significant negative effect on any of the species of sea turtles that occur in the Western Pacific region (see Section 10.1.4.2).

Marine Mammals

Interactions between any species of cetaceans and the Hawaii longline fishery are rare. Moreover, since the establishment of the Protected Species Zone in 1991, there have been no reports of interactions between monk seals and the Hawaii longline fishery. It is unlikely that the proposed management measure in this document would have an effect on the endangered species of whales that occur in the Western Pacific region. The use of line-setting machines and weighted branch lines, discharge of offal and night setting are all current practices in the Hawaii longline fishery. The likelihood of towed deterrents causing injury to whales is small. The use of blue-dyed bait is not expected to adversely impact marine mammals, as toothed whales and dolphins are already adept at removing bait from hooks without being snagged (C. Boggs, pers. comm.). Further, the preferred management measure in this document is not expected to have a significant effect on monk seals, as the Protected Species Zone will remain closed to longline fishing.

10.6 Marine Mammal Protection Act

All fisheries in the waters around Hawaii, including the longline fishery, are classified as Category III under section 118 of the Marine Mammal Protection Act of 1972 (62 FR 28657, May 27, 1997). Marine mammals not listed as endangered or threatened under the Endangered Species Act that have been observed in the area where Hawaii-based longline vessels operate are as follows:

Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)
Rough-toothed dolphin (*Steno bredanensis*)
Risso's dolphin (*Grampus griseus*)
Bottlenose dolphin (*Tursiops truncatus*)
Pantropical spotted dolphin (*Stenella attenuata*)
Spinner dolphin (*Stenella longirostris*)
Striped dolphin (*Stenella coeruleoalba*)
Melon-headed whale (*Peponocephala electra*)
Pygmy killer whale (*Feresa attenuata*)
False killer whale (*Pseudorca crassidens*)
Killer whale (*Orcinus orca*)
Pilot whale, short-finned (*Globicephala melas*)
Blainville's beaked whale (*Mesoplodon densirostris*)
Cuvier's beached whale (*Ziphius cavirostris*)
Pygmy sperm whale (*Kogia breviceps*)
Dwarf sperm whale (*Kogia simus*)
Bryde's whale (*Balaenoptera edeni*)

As noted in Section 10.1.4.2, it is unlikely that the proposed management measure in this document would have an impact on any species of marine mammals that occur in the Western Pacific region. Interactions between marine mammals and the Hawaii longline fishery are rare.

The use of line-setting machines and weighted branch lines, discharge of offal and night setting are all current practices in the Hawaii longline fishery. The likelihood of towed deterrents causing injury to marine mammals is small. The use of blue-dyed bait is not expected to adversely impact marine mammals, as toothed whales and dolphins are already adept at removing bait from hooks without being snagged (C. Boggs, pers. comm.).

10.7 Paperwork Reduction Act

The Paperwork Reduction Act requires federal agencies to minimize reporting burdens whenever collecting information from the public. This regulatory amendment contains a collection-of-information requirement associated with the notification and reporting of a hooked or entangled short-tailed albatross. Although there is a low probability of an interaction with a short-tailed albatross, the public burden for this collection is estimated to average between one and three hours per response.

10.8 Other Applicable Laws

The Migratory Bird Treat Act (MBTA) of 1918 (16 U.S.C. 703-712; Ch. 128, July 13, 1918) implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Both the black-footed and Laysan albatrosses are listed as migratory birds under the MBTA. The U.S. is now Party to five international treaties that deal with the conservation and management of migratory birds: 1) the 1916 "Convention for the Protection of Migratory Birds" between the U.S. and the United Kingdom (on behalf of Canada); 2) the 1936 "Convention for the Protection of Migratory Birds and Game Mammals" between the U.S. and the United Mexican States; 3) the 1972 "Convention for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment" between the U.S. and Japan; 4) the 1976 "Convention Concerning Conservation of Migratory Birds and their Environment" between the U.S. and the Union of Soviet Socialist Republics; and, 5) the 1940 "Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere" in which the U.S. and 18 other western Hemisphere nations are party.

Further, the Secretary of Commerce has given guidance to the Fishery Management Councils to note the existence of the MBTA and directs the Councils to "consider the impact of conservation and management measures on living marine resources other than fish" (i.e., marine mammals and birds) (50 CFR 600.354e). However, under the current interpretation of the MBTA, the authority of the act is limited to the boundary of the "territorial land," which extends from the land to 3-12 miles offshore. Because of a Council action in 1991, Hawaii-based longline vessels are currently prohibited from operating within 50 nautical miles of the NWHI. As the incidental catches of black-footed and Laysan albatrosses occur outside the U.S. territorial land, these incidental catches also occur outside the jurisdiction of the MBTA.

However, the Department of the Interior (DOI) has recently asserted that the authority of the MBTA extends beyond the territorial land and to the outer most boundary of the 200 nm EEZ. Comments relating to the DOI MBTA assertion are pending.

10.9 Traditional Indigenous Fishing Practices

The Magnuson-Stevens Act requires the Western Pacific Council to take into account traditional fishing practices in preparing any FMP or amendment. The recommended measures are not expected to have an impact on traditional indigenous fishing practices.

11.0 Appendix I: Specifications for Selected Mitigation Measures

11.1 Preparation of blue-dyed bait

Squid was the only bait type that was dyed and tested for its effectiveness to deter birds from longline gear during at sea trials (McNamara *et al.,* 1999; Boggs 2001). Squid tends to absorb and retain dye better than fish baits. In general, baits can be dyed blue by soaking it in a mixture of triphenylethane dye and sea water. Triphenylethane dye is a non-toxic, odorless, blue powder. Because the dye powder is finely-grained and easily blown about by the wind, fishermen are encouraged to wear safety goggles and gloves during mixing in order to prevent staining. For convenience fishermen may want to prepare a concentrated dye solution by dissolving between 4-6 tablespoons of dye in one quart of fresh water in a protected area. Fishermen could also prepare these concentrated solutions prior to departing from port. This concentrated dye solution can then be mixed with approximately 15 gallons of sea water in a large container. Thawed or partially thawed bait placed in a mesh basket should be submerged in the dye solution and allowed to soak. If the baits are entirely thawed before dyeing, the dyeing process can be completed in 15 to 20 minutes. Bait made from fish, such as sanma, may require a longer soak time. Before the dyed bait is used the color should be tested against a color quality control card issued by NMFS. To increase the effectiveness of this mitigation measure, fishermen are encouraged to throw the baited hooks outside the white water of the propeller wash.

11.2 Design and deployment of towed deterrents (Optional)

11.2.1 Tori line

The tori line should comply with the Tori Line Construction Protocols described in Appendix C of *Final Report: Hawaii Longline Seabird Mortality Mitigation Project* prepared by McNamara *et al.* (1999). These protocols have been established by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR 1993). The tori line should be positioned directly above the area where the baited hooks are being deployed. This position can be best achieved by securing the tori line to a sturdy fiberglass pole (tori pole) inserted in a swiveling steel base mounted near the stern of the vessel. Prior to deployment of the tori line, fishermen should determine the wind direction relative to the vessel's desired setting course. Immediately after the first radio buoy is released overboard, the tori line should be trailed from behind the vessel. No baited hooks should be set until after the tori line is fully deployed. The tori pole should be positioned so that the aerial portion of the tori line covers the area where baited hooks enter the water while ensuring that the terminal end does not cross the longline or become entangled in suspender floats. Fishermen should throw the baited hooks outside the propeller wash and under the protection of the aerial streamers. The captain and crew should continually monitor the position of the tori line and make adjustments for course changes such that the aerial streamers effectively cover the area that baited hooks enter the water.

11.2.2 Towed buoy system

The design of the towed buoy system is similar to that of a tori line except a buoy is attached to the terminal end of the towed line and plastic strapping is used as streamers. The strips of plastic strapping should be woven through the towing line at 1 meter intervals. A second buoy can be added to the towing line to increase the distance that the aerial portion of the line remains aloft behind the vessel and to provide an additional splashing visible deterrent closer to the vessel. The towed buoy system should be deployed in the same manner as a tori line.

11.3 Handling and release of live birds other than the short-tailed albatross

All fishing vessels should have on board bolt cutters, pliers and a knife to remove fishing gear from entangled or hooked seabirds. All fishing vessels should also have on board clean towels or blankets to cover and protect the seabird's feathers from oil and damage during handling procedures. Besides protecting the bird's feathers, covering the seabird's head with a clean towel so it cannot see will also calm the bird. When a seabird is hooked or entangled, the vessel should be stopped to reduce the tension on the line and the bird carefully lifted on board the vessel with a long-handled dip net. It is recommended that fishermen work in pairs to remove line or hooks from the seabird, with one person holding the back of the seabird's head and the other removing the entanglement or hook.

Hooks can be easily removed from wings, legs or bill tips by first cutting the line as close to the hook as possible and then the remove the hook tip using the bolt cutters. The hook or entangled line should be carefully removed piece by piece until the line or hook is completely removed from the bird. Fishermen are encouraged to envision a hook in their own hand, leg or lip and remove the hook from the seabird in the same way they would remove a hook from themselves.

A hook which has been swallowed by a seabird is more difficult to remove, and in some instances, the bird may not survive long unless the hook is carefully removed. It is important that a hook never be extracted backwards, as it will cause considerable damage to the seabird. To remove an ingested hook, CCAMLR advocates that one fisherman should hold the seabird's bill closed and straddle the bird so that the wings are held close to the body by the fisherman's legs. Next, the fisherman should gently open the bird's bill. The second fisherman then reaches down the bird's throat to grasp the hook while using his other hand to feel along the outside of the neck to determine the embedded hook position. The hook should be gently moved until it bulges under the skin of the bird's neck. At this point, a small cut, only large enough to expose the hook, can be made. The hook is then pushed out point first through the knife cut. Using the bolt cutters, the hook tip is removed before the hook is removed.

At this time, however, the International Bird Rescue Research Center (IBRRC), Pacific Region, does not advocate that fishermen remove deeply ingested hooks from seabirds. Instead, IBRRC recommends that fishermen try their best to remove as much visible gear as possible and leave an ingested hook in place. For all seabirds with hooks visible, fishermen should use bolt cutters to

remove the hook tip before removing the hook. Above all, fishermen are instructed not to attempt to save the hook at the expense of the bird.

After removing entangled line or the hook from a seabird, the bird should be left to recover for a short period before being released. There may be instances when an ingested hook is in the stomach and cannot be removed. In these instances, the line should be cut as close as possible to the hook and the bird released.

11.4 Handling and release of live short-tailed albatrosses

The USFWS Biological Opinion (BiOp) does not describe detailed handling procedures for the short-tailed albatross, but does require vessel operators and crew to make every reasonable effort to save injured short-tailed albatross. If a short-tailed albatross is recovered alive, it must be retained unless it exhibits all of the following traits:

1. head is held erect and the bird responds to noise and motion stimuli;
2. bird breathes without noise;
3. both wings can flap and retract to normal folded position on back; and
4. bird can stand on both feet with toes pointed in the proper direction (forward).

If a short-tailed albatross is brought on board alive, the vessel operator must contact NMFS immediately. The USCG may be contacted to facilitate communication between the vessel operator and NMFS. Any short-tailed albatrosses recovered dead must be frozen and surrendered as soon as possible to NMFS or the USFWS.

At the Protected Species Workshops conducted by NMFS in the fall of 2001, the USFWS presented to fishermen *Handling & Release Guidelines for Short-tailed Albatross Hooked or Entangled in the Hawaiian Longline Fishery.* These guidelines were presented to the Council at their 111th meeting where members endorsed the guidelines. The guidelines are as follows:

I. SAFETY ISSUES:

A. ***Personal Protective Equipment***

1. Gloves
2. Safety Glasses (if available)
3. Long Sleeves

B. ***Safe Handling Techniques***

1. Prior to handling bird, set up a cardboard box in a quiet, well-ventilated area. Place one beach towel on inside bottom of box for cushioning.
2. Working in teams of two, put on gloves and use a clean towel or blanket to cover the bird to protect its feathers from fish oil and handling damage. For maximum safety for the bird (and you), always hold the head with one hand and tuck the bird under your other arm. When holding the head, never wrap your hand completely around the neck (you could suffocate the

bird). Rather, the back of the bird's head should be against the palm of your hand and your fingers should have a firm grasp at the base of the skull or bill.

3. Keep the bird's bill away from you and your partner's face and bare skin (try to hold the bird at hip-level or below for handler's safety).

C. Safety Concerns

1. Bills - sharp tips and edges can cause scratches, cuts, and crushing bites. Keep the bill away from the face and bare skin.
   a. Maintain control of head, hold back of head and not the bill, do not block the nares (nasal openings).
   b. Cover the bird's eyes to calm it down.
   c. Wear gloves
   d. Keep the bill away from face and exposed skin
2. Wings - can cause painful bruising
   a. Fold naturally and gently to body to avoid injury to bird's bones, muscles, and tendons
   b. Cover and restrain with a sheet or towel, do not hold too tightly as the bird needs to naturally move breast to breathe
3. Feet - nails can cause scratches and cuts
   a. Wear gloves and long sleeves
   b. Cover bird's feet with sheet or towel to control movement.

II. CAPTURE AND HANDLING:

A. Albatross Sighting and Vessel Control

1. Fishers scan main line as far ahead as possible in order to sight albatross in advance. This scanning reduces the possibility of the albatross being jerked out of the water.
2. Do not get ahead of the main line while picking up gear to reduce the chance of fouling or running over gear and albatross.
3. Upon sighting the albatross: STOP VESSEL and PUT IN NEUTRAL.
4. Retrieve leader with albatross slowly, keeping a gentle, consistent tension on the line. Avoid tugging or yanking line quickly.
5. Ensure that enough slack or play is left in the line to keep the albatross near the vessel yet in the water until it can be determined when you can safely bring the bird on board.
6. If the bird is flying, gently pull bird on board and try not to further entangle bird in line.

B. Retrieval of Albatross from Water

1. If vessel is equipped with "cut-out doors," use this area to bring albatross aboard to minimize the distance from the water.
2. Lift bird on board using a long handled dip net. DO NOT USE LEADER LINE, GAFFS, OR SHARP OBJECTS to retrieve the albatross.

3. Support the bird's body weight when removing from water, do not pull on bird's neck.

C. Handling Guidelines

1. Review Safety Issues
2. Upon retrieval of bird onto vessel, cover bird with a towel or sheet to calm bird and reduce risk of injury to handler and bird.
3. Gain control of head.
   a. Hold head and not bill.
   b. Do not block the nares (nasal openings)
4. Gently remove bird from net
   a. One person untangles bird's wings, bill, and feet from net while second person keeps bird covered and controls bird's head.
5. Restrain bird with a clean towel.
   a. Ensure wings and legs are folded to body naturally.
   b. Do not hold too tightly to prevent injury and to ensure movement of breast necessary for proper breathing.
   c. Do NOT hold by soft tissue, such as neck.
6. Cover bird's eyes to calm bird.
7. Try to hold bird no higher than hip-level for handler's safety.
8. Prevent bird's feathers from becoming dirty with oils or other products as this affects bird's waterproofing, body temperature control, and ability to fly.

III. ASSESS BIRD'S CONDITION:

A. Assess bird's condition

1. After retrieving bird from water and removing from dip net, place bird on deck in a safe area and observe bird prior to handling further.
2. Determine if bird is dead or alive. A dead bird will be unresponsive to surroundings, unable to stand, have no blink reflex, and will not be breathing.

B. Dead Albatross Procedures

1. Record relevant information on data sheet and bird figures (e.g., band numbers, date, time, location, wounds, hooks, etc.)
2. Attach identification tag directly to the carcass, and attach a duplicate identification tag to the bag or container holding the carcass. Tags should be filled out in pencil or waterproof ink. Immediately place carcass in freezer. Identification tags should include the following information: species, date of mortality, location (latitude and longitude) of mortality, trip number, sample number, and any band numbers if the bird has a leg band. Leg bands, hooks, and line must remain attached to the bird.
3. Immediately contact one of the following National Marine Fisheries Service (NMFS) personnel at the following numbers (by availability, in the order listed). The U.S. Coast Guard or the U.S. Fish and Wildlife

Service's (USFWS) French Frigate Shoals station may be contacted to facilitate communication between the vessel and the NMFS if unable to contact NMFS directly.

4. Dead birds must be surrendered, as soon as possible following return to port, to a NMFS or USFWS office. Birds can be returned to ports on the following islands: Midway, Kauai, Oahu, Maui, and Hawaii.

C. Living Albatross Procedures

1. Observation Checklist - complete the following observations and record information on data sheet prior to handling bird further:
   a. Can the bird stand and hold head upright?
   b. Is the bird alert, responsive, aware of surroundings (i.e., does it snap at you or otherwise react to you when approached)?
   c. Are the eyes open?
   d. Does the bird breathe with its bill closed (i.e., no open bill breathing)?
   e. Does the bird breathe quietly (i.e., no sounds)?
   f. Is the bird holding its wings in a normal position up and against the body (i.e., not drooping)?
   g. Can the bird flap its wings?
   h. Is the bird free from visible damage? (If damaged, the wounds should be noted on bird figures)
   i. Is the bird free of hooks and fishing line? (If bird is hooked or entangled in line, note location on bird figures)
   j. Is the bird banded? If yes, record the band number on the data sheet.
2. Immediately contact appropriate personnel at the following numbers (by availability, in the order listed). The U.S. Coast Guard or the USFWS French Frigate Shoals station may be contacted to facilitate communication between the vessel and the NMFS. The NMFS will arrange for a qualified veterinarian or seabird expert to contact the vessel and provide treatment, recovery, and release guidance.
3. If all observation checklist questions can be answered "yes", the bird can be released. However, it is strongly recommended that the NMFS be contacted prior to release so a qualified veterinarian or seabird expert can be consulted. All Release Guidelines should be followed.

IV. TREATMENT

A. General Treatment Guidelines:

1. If the bird does not meet the release criteria, it should be held on board for a minimum of 24 hours while the captain/observer repeatedly attempts to contact NMFS personnel.

2. Following contact by the vessel, the NMFS will arrange for a qualified veterinarian/seabird expert to contact the vessel and relay care and treatment procedures.
3. With the exception of removing entangled lines, do NOT treat, release, or euthanize bird unless directed to do so by a qualified seabird expert or veterinarian.
4. If you have any doubts about removing objects, wait until able to discuss with a veterinarian or seabird expert.
5. If the captain/observer is unable to contact NMFS personnel within 24 hours, then follow guidelines for hook removal under the Recovery Section.

B. Entanglement in Lines

1. Hold bird following Handling Guidelines.
2. Do NOT tug on line.
3. Using bandage scissors, cut line as close as possible to hook.

C. Assess Hooking

1. Note location of hook on bird figures.
2. Determine degree of hooking (light, medium, or deep - see figure of hooking)
   a. Light Hooking: hook is clearly visible and caught in bill, leg, webbing of feet, or wing.
   b. Medium Hooking: hook is located in mouth or throat.
   c. Deep Hooking: hook has been swallowed and is located inside the body below the neck.

V. RECOVERY

A. Recovery Area

1. Place a cardboard box with ventilation holes in a quiet, well-ventilated area. Place one beach towel on inside bottom of box for cushioning.
2. Do NOT place bird in a hot or exposed area such as the engine room, near an exhaust stack, or in an exposed area on deck
3. Following assessment of condition and treatment, gently place bird in box and cover open top of box with a beach towel to calm the bird.
4. Do NOT provide food or water.

B. Observation Period

1. Observe bird, being careful not to place face within striking distance of bill, at 30 minutes, 1 hour, and periodically thereafter. Note condition on data sheet. Observations should be minimized to prevent disturbance to the bird.
2. Follow veterinarian/seabird expert instructions for care and treatment of bird.

C. Hook Removal

1. Light Hooking:

a. Make repeated attempts to contact NMFS for a minimum of 24 hours. If contacted, follow veterinarian/seabird expert instructions.

b. If unable to contact NMFS after repeated attempts within a 24 hour period, then follow these procedures:

1) Remove hook by using bolt cutters to pare the hook barb and then thread the hook out backwards.

2) Allow the bird to dry, drying may take anywhere from 1 to 4 hours.

3) Release bird ONLY if it meets all release criteria. Follow release guidelines.

4) If bird does not meet release criteria, continue to hold bird and contact NMFS.

2. Medium Hooking:

a. Make repeated attempts to contact NMFS for a minimum of 48 hours. If contacted, follow veterinarian/seabird expert instructions.

b. If unable to contact NMFS after repeated attempts within a 48 hour period, then follow these procedures:

1) Remove hook - If possible, remove hook by using bolt cutters to pare the hook barb and then thread the hook out backwards. If the hook is located in such a way that prevents paring the barb, cut the line as close to the eye of hook as possible and push the hook out barb first. Observe wound sight for bleeding. Allow the bird to dry, drying may take anywhere from 1 to 4 hours. Release bird only if it meets all release criteria. Follow release guidelines. If the bird does not meet release criteria, continue to hold bird and contact NMFS.

2) Release bird ONLY if it meets all release criteria. Follow release guidelines.

3) If bird does not meet release criteria, continue to hold bird and contact NMFS.

3. Deep Hooking:

a. Deeply hooked birds will not survive at sea and must be brought in for veterinary care. If a bird is deeply hooked, contact NMFS immediately and return to port (Midway, Kauai, Oahu, Maui, or Hawaii) as directed by a veterinarian for transfer to NMFS or USFWS personnel or their authorized representative.

VI. RELEASE GUIDELINES:

A. Release Criteria

1. Do NOT release dead birds. These birds should be frozen and transferred to a NMFS, USFWS, or other authorized representative.

2. Every effort should be made to contact the NMFS prior to releasing a live bird.
3. Birds must meet all of the following criteria prior to release:
    a. Head is held erect and bird responds to noise and motion stimuli;
    b. Bird breathes without noise;
    c. Both wings can flap and retract to a normal folded position on back;
    d. Bird can stand on both feet with toes pointed in the proper direction (forward); and
    e. No evidence of hooks, lines, or wounds on birds with the exception of those areas where hooks or lines have been removed prior to release (hooks and line entanglement should be noted on the short-tailed albatross figures).
4. Bird's feathers must be dry prior to release. Drying time may take from ½ to 4 hours.
5. Data sheets should be completed prior to release.
6. Photographs of the bird prior to and during release are recommended.

B. Release Method

1. STOP VESSEL and place in neutral.
2. Ease albatross gently onto the water, through cut-out door if so equipped.
3. Observe that the albatross is safely away from the vessel before engaging the propeller and continuing operations.
4. Note date, time, location, and behavior of albatross on data forms.

VII. TOOLBOX:

It is recommended that each vessel have the following items on board for handling hooked or entangled albatross:

1. Cardboard Box (open top measuring approximately 4'x4'x4' [minimum size 3'x3'x3'] with ventilation holes on all sides)
2. Bandage Scissors for removing fishing line
3. Large Plastic Bags
4. Beach Towels (4)
5. Tags
6. Record-keeping forms
7. Gloves
8. Bolt Cutters
9. Knife
10. Safety Glasses (optional)
11. Camera (optional)
12. Pencils
13. Waterproof pen (optional)

12.0 Appendix II

Regulatory Impact Review/Final Regulatory Flexibility Analysis for a
Framework Adjustment to the Western Pacific Pelagic
Fisheries Management Plan
Implementing the Terms and Conditions contained in the
November 28, 2000, Biological Opinion
of the U.S. Fish and Wildlife Service for the
Effects of the Hawaii-based Domestic Longline Fleet
on the Short-Tailed Albatross

INTRODUCTION

In order to meet the requirements of Executive Order 12866 (E.O. 12866) the National Marine Fisheries Service (NMFS) requires that a Regulatory Impact Review (RIR) be prepared for all regulatory actions that are of public interest. This review provides an overview of the problem, policy objectives, and anticipated impacts of the action, and ensures that management alternatives are systematically and comprehensively evaluated such that the public welfare can be enhanced in the most efficient and cost effective way. In accordance with E.O. 12866, the following is set forth: (1) This rule is not likely to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) This rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency; (3) This rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) This rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order. In addition, the Regulatory Flexibility Act, 5 U.S.C. 601 et seq. (RFA) requires government agencies to assess the impact of their regulatory actions on small businesses and other small organizations via the preparation of Regulatory Flexibility Analyses. This document contains results of these analyses for the proposed action and a range of alternatives. A summary of an Initial Regulatory Flexibility Analysis for this action was published with a proposed rule in the Federal Register on July 5, 2000 (65 FR 41424). No comments were received on that Initial Regulatory Flexibility Analysis or its economic analysis, however a subsequent consultation on the action under section 7 of the Endangered Species Act (ESA) resulted in the issuance of a Biological Opinion (BiOp) on November 28, 2000, by the U.S. Fish and Wildlife Service (USFWS) which has management authority for seabirds. That BiOp contains a series of non-discretionary terms and conditions which are intended to afford additional protection to short-tailed albatrosses. These measures were implemented by NMFS as a part of an emergency rule effective June 12, 2001 (66 FR 31561) and extended on December 10, 2001 (66 FR 63630).

The primary purpose of this recommendation is to codify those emergency measures which pertain to seabirds (the Terms and Conditions of the USFWS BiOp). Also included are further recommendations by the Western Pacific Fishery Management Council (Council) that vessel owners (as well as operators) be required to annually attend protected species workshops, and that all seabirds (not just short-tailed albatrosses) brought onboard alive be handled in a manner that maximizes the probability of their long-term survival.

PROBLEM STATEMENT AND NEED FOR ACTION

Hawaii-based pelagic longline fishing vessels inadvertently hook and kill black-footed albatrosses (*Phoebastria nigripes*) and Laysan albatrosses (*Phoebastria immutabilis*) that nest in the Northwestern Hawaiian Islands (NWHI). On rare occasions Wedge-tailed and sooty shearwaters are also incidentally caught by these vessels. However, there are no reports of interactions between the fishery and the endangered short-tailed albatross (*Phoebastria albatrus*). Please see the main body of this document for a detailed discussion of these species and their interactions with the fishery.

In October 1999, the Council recommended three measures to mitigate the harmful effects of fishing by vessels registered under Hawaii longline limited access permits (Hawaii-based longline vessels) on seabirds. On July 5, 2000 NMFS published a proposed rule for the Hawaii-based longline fishery based on the Council's recommended measures. However, the agency did not proceed with the publication of a final rule, as the USFWS had indicated it was developing a BiOp for the fishery under section 7 of the Endangered Species Act (ESA) for the short-tail albatross. This endangered species has been documented in small numbers (2-3 birds) in the Northwestern Hawaiian Islands and the BiOp concluded that the Hawaii-based longline fishery (as proposed including cumulative effects) was not likely to jeopardize the continued existence of the short-tailed albatross.

The BiOp is based on the operations of the Hawaii-based longline fishery prior to December 1999 and anticipates that the fishery will take 15 short-tailed albatrosses during the seven year period addressed in the consultation (2.2 short-tailed albatrosses annually from 2000-2006). The BiOp consideres a "take" to include not only injury or mortality to a short-tailed albatross caused by longline gear, but also any short-tailed albatross striking at the baited hooks or mainline gear during longline setting or haulback.

The BiOp includes several non-discretionary measures (Terms and Conditions) to be employed by the Hawaii-based longline fishery and implemented by NMFS as follows: All Hawaii-based vessels operating with longline gear north of 23° N., must use thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longline gear; when making deep sets (targeting tuna) north of 23° N., vessel operators must employ a line setting machine with weighted branch lines (minimum weight = 45 g); vessel operators and crew must follow certain handling techniques to ensure that short-tailed albatrosses brought onboard alive are released in a manner that maximize the probability of their long-term survival; and vessel

operators must annually complete a protected species educational workshop conducted by NMFS. Other mitigation measures such as towed deterrents, or the use of weighted branch lines without a line-setting machine (in the case of swordfish or mixed target sets), are optional. Although currently prohibited under aspects of the June 12, 2001, emergency rule implemented to protect sea turtles, the BiOp requires vessel operators making shallow sets above 23° N. to begin setting the longline at least one hour after local sunset and complete the setting process by local sunrise, using only the minimum vessel lights necessary.

Under the Council's original seabird mitigation measures, vessel owners and operators were both required to annually attend a protected species workshop conducted by NMFS. Further, the Council measures required that all seabirds (not just short-tailed albatrosses) brought onboard alive were to be handled and released in a manner that maximizes the probability of their long-term survival. As these two components of the Council's measures are more conservative than those in the BiOp, this regulatory amendment combines the terms and conditions of the BiOp, with the Council's workshop and seabird handling requirements.

As noted above, the measures in the BiOp were developed for the operational profile of the Hawaii-based longline fishery prior to 1999. Since then, NMFS has implemented a prohibition on shallow set pelagic longline fishing north of the equator by Hawaii-based longline vessels. That measure, intended to afford protection to sea turtles, was also a part of the June 12, 2001, emergency rule and will also terminate on June 8, 2002. Those emergency regulations also include a large area closure for Hawaii-based longline vessels between the equator and 15° N. during April and May. Fishing under these regulations would not appear to pose any increased threat to the short-tailed albatross. Indeed, the elimination of shallow set longline fishing has caused a significant reduction in the incidental take of seabirds by the fishery during 2001. This was a factor in NMFS' decision to reinitiate consultation concerning impacts on seabirds under the ESA with the USFWS on August 15, 2001. That consultation is ongoing.

MANAGEMENT OBJECTIVE

This action is mandated by the terms and conditions contained in a Biological Opinion issued by the U.S. Fish and Wildlife Service on November 28, 2000. The objective of this action is to reduce the potential for adverse impacts on short-tailed albatrosses and other seabirds resulting from interactions with Hawaii-based longline vessels.

MANAGEMENT ALTERNATIVES

This document examines a combination of mitigation measures and management areas comprising five management alternatives, including those examined in the IRFA prepared for the July 5, 2000, proposed rule. These range from a No Action Alternative (Alternative 4), to a prohibition on longline fishing within those waters of the exclusive economic zone (EEZ) around Hawaii which lie north of 23° N. (Alternative 5). Alternatives 2 and 3 both require that vessel operators utilize two or more mitigation measures when longline fishing north of 25° N. - the major difference between these two alternatives is that one allows the fishermen to select which measures they will utilize while the other leaves this decision to the Council. All alternatives are

compared to the 1994-1998 FMP baseline which is the period examined in the BiOp. Alternative 1 (the proposed action) consists of the terms and conditions contained in the BiOp (as amended on October 18, 2001, to allow the use of basket-style longline gear as an alternative to line setting machines with weighted branch lines) which requires the use of several specified mitigation measures when fishing north of 23° N. latitude. The two additional measures discussed above are included in the proposed action as these measures are considered to be more conservative than the measures in the BiOp. Therefore, under Alternative 1 (the proposed action), vessel owners (as well as vessel operators) will be required to attend annual protected species workshops, and vessel operators will be required to handle all seabirds (not just short-tailed albatrosses) in a manner that maximizes the probability of their long-term survival.

Alternative 1 (Proposed Action - implementation of the Terms and Conditions of the FWS BiOp): The operators of all vessels registered for use under a Hawaii longline limited access permit (Hawaii-based longline vessels) operating with longline gear north of 23° N., must ensure the use of thawed blue-dyed bait and strategic offal discards to distract birds during setting and hauling of longlines. This offal discard must be made from the opposite side of the vessel from which the longline is being set or hauled (no fish, fish parts, or bait may be discarded from the side of the vessel where the longline is being set or hauled), and all hooks must be removed from discarded fish, fish parts or bait prior to its discard. When making deep sets (targeting tuna) north of 23° N., Hawaii longline limited access vessel operators must employ a line-setting machine with weighted branch lines (minimum weight = 45 g), or employ basket-style longline gear. When making shallow sets (now prohibited under those aspects of the June 12, 2001, emergency rule intended to mitigate interactions between the fishery and sea turtles) north of 23° N., vessel operators must begin setting the longline at least one hour after local sunset and complete the setting process by local sunrise, using only the minimum vessel lights necessary. Other mitigation measures such as towed deterrents, use of weighted branch lines without a line-setting machine, (in the case of swordfish or mixed sets) are optional. If a short-tailed albatross is brought onboard alive, vessel operators must notify NMFS immediately and ensure that the albatross displays four traits before release. Included in this alternative is a requirement that all seabirds brought onboard alive must be handled in a manner that maximizes the probability of their long-term survival (See Appendix I). Finally, vessel owners as well as captains, must annually complete a protected species workshop conducted by NMFS.

Alternative 2: The operators of all Hawaii-based longline vessels must: 1) select and employ two or more of the mitigation measures in Table 8.1 when fishing north of 25° N. and; 2) handle all seabirds brought onboard alive in a manner that maximizes the probability of their long-term survival. In addition, both vessel owners and captains must annually complete a protected species workshop conducted by NMFS.

Alternative 3: The operators of all Hawaii-based longline vessels must: 1) employ two mitigation measures listed in Table 8.1 (decision as to which specific measures are required would be made by the Council) when fishing north of 25° N. and; 2) handle all seabirds brought onboard alive in

a manner that maximizes the probability of their long-term survival. In addition, both vessel owners and captains must annually complete a protected species workshop conducted by NMFS.

Alternative 4 (No Action): The no-action alternative would leave in place current regulations for the Hawaii-based longline fishery as follow:

1. Fishing for pelagic species in the western Pacific EEZs with drift gillnets is prohibited.
2. Each vessel using longline gear to fish for pelagic species in the EEZs around American Samoa, Guam, the Commonwealth of Northern Mariana Islands (CNMI), or other U.S. islands of the western Pacific, and vessels used to transport or land longline-harvested pelagic species shoreward of the outer boundary of these same EEZs, must be registered for use with a general longline permit and must keep daily logbooks detailing species harvested, area of harvest, time of sets, and other information. Also, longline gear used in the western Pacific EEZs must be marked with the official number of the permitted vessel that deploys the gear.
3. Longline vessels must carry a NMFS observer if requested to do so.
4. Each vessel that uses longline gear to fish for pelagic species in the EEZ around Hawaii, or is used to transport or land longline-harvested pelagic species shoreward of the outer boundary of the EEZ around Hawaii, must be registered for use with one of 164 Hawaii-based longline limited entry permits.
5. As requested by NMFS, all vessels registered for use with a Hawaii-based longline limited access permit must carry a NMFS-owned "vessel monitoring system" transmitter.
6. Longline fishing for pelagic species is prohibited in circular areas (known as "protected species zones") 50 nm around the center points of each of the Northwestern Hawaiian Islands (NWHI), plus a 100 nm wide corridor connecting those circular closed areas that are non-contiguous. To avoid gear conflicts with troll and handline fisheries near the Main Hawaiian Islands (MHI), longline fishing is prohibited in areas approximately 75 nm around the islands of Kauai, Niihau, Kaula, and Oahu, and approximately 50 nm off the islands of Hawaii, Maui, Kahoolawe, Lanai, and Molokai. This prohibition is lessened from October 1 through January 30, when the longline closed areas decrease on the windward sides to approximately 25 nm off Hawaii, Maui, Kahoolawe, Lanai, Molokai, Kauai, Niihau, and Kaula, and approximately 50 nm off Oahu[3]. Longline fishing is also prohibited in an area approximately 50 nm off Guam.

In addition, on March 28, 2000, NMFS published a final rule which requires operators of Hawaii-based longline vessels to carry and use dip nets and line-clippers which meet NMFS

---

[3]A few longline vessel owners qualify for exemptions to fish in portions of longline closed areas around the MHI where they can document historical longline fishing activity prior to 1970.

design standards to disengage sea turtles hooked or entangled by longline fishing gear. This rule also includes requirements concerning the handling, resuscitation, and release of sea turtles. Specifically, all incidentally taken sea turtles brought aboard for dehooking and/or disentanglement must be handled in a manner to minimize injury and promote post-hooking survival. If a sea turtle is too large or hooked in such a manner to preclude safe boarding without causing further damage/injury to the turtle, line-clippers must be used to clip the line and remove as much line as possible prior to releasing the turtle. When practicable, comatose sea turtles must be brought on board immediately, with a minimum of injury, and handled as follows: if the sea turtle brought aboard appears dead or comatose, the sea turtle must be placed on its belly (on the bottom shell or "plastron") so that the turtle is right side up and its hindquarters elevated at least six inches (15.24 cm) for a period of no less than four hours and no more than 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. A reflex test, performed by gently touching the eye and pinching the tail of a sea turtle, must be administered by a vessel operator, at least every three hours, to determine if the turtle is responsive. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstances may be placed into a container holding water. A water-soaked towel placed over the eyes, carapace, and flippers is the most effective method in keeping a turtle moist. Those that revive and become active, as well as those that do not revive within 24 hours must be returned to the sea by first putting the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped. The turtle must then be released away from any deployed gear and, if alive, observed to be safely away from the vessel before the propeller is engaged and fishing operations are continued. This rule was initiated and implemented by NMFS and has no expiration date.

On June 12, 2001, (66 FR 31561) NMFS promulgated an emergency interim rule implementing those aspects of the FEIS' preferred alternative which are designed to reduce interactions between sea turtles and the Hawaii-based longline fleet. Also included in that emergency rule were measures to reduce interactions between the Hawaii-based longline fleet and seabirds. That emergency rule was also initiated, and subsequently extended (66 FR 63630, December 10, 2001), by NMFS, and remains effective through June 8, 2002. The turtle mitigation components of this emergency rule: (a) prohibit Hawaii-based longline vessels from using longline gear to target swordfish north of the equator; (b) require Hawaii-based longline vessels to deploy longline gear such that the "sag" (deepest point) between any two floats is at least 100 m (328.1 ft) below the sea surface and the float line suspending the mainline beneath a float is at least 20 m (65.6 ft) long, with a minimum of 15 branch lines deployed between any two floats; (c) prohibit possession of light sticks on board a Hawaii-based longline vessel during fishing trips; (d) prohibit Hawaii-based longline vessels from fishing with longline gear during the months of April and May in the area bounded on the south by the equator, on the west by 180° longitude, on the east by 145° W. longitude, on the north by 15° N. latitude; (e) prohibit the transhipment of pelagic fish caught by longline gear within the closed area during April and May to any vessel registered for use under a Western Pacific receiving vessel permit; (f) allow the re-registration of a Hawaii-based longline vessel that has been de-registered from a Hawaii longline limited access permit after March 29, 2001, only during the month of October; (g) require Hawaii-based longline vessel operators to annually attend a protected species workshop conducted by NMFS;

(h) require Hawaii-based longline vessel operators to cease gear retrieval if a sea turtle is discovered hooked or entangled on a longline until the turtle has been removed from the gear or brought onto the vessel's deck; (i) require that hooks be removed from sea turtles as quickly and carefully as possible; however, if a hook cannot be removed, that the line be cut as close to the hook as possible; (j) require that wire or bolt cutters capable of cutting through a longline hook be on board Hawaii-based longline vessels to facilitate cutting of hooks imbedded in sea turtles; (k) require that the additional resuscitation technique of placing the turtle on its back and pumping its breastplate (or "plastron") with hand or foot be used as appropriate and; (l) require that no turtle taken incidentally during the course of fishing or scientific research activities be consumed, sold, landed, offloaded, transshipped, or kept below unless requested by NMFS.

The second aspect of this emergency rule implemented the Terms and Conditions of the USFWS BiOp and requires all Hawaii-based longline vessels fishing north of 23° N. latitude to either use line setting machines to set their mainline, or to set at night in order to reduce interactions with seabirds. In addition, vessel operators must use blue dyed bait, and strategic offal discards when fishing north of 23° N. latitude. Included in the December 10, 2001, extension of this emergency rule is the amendment of the USFWS BiOp to allow the use of basket-style longline gear as an alternative to monofilament longline deployed with a line setting machine.

Alternative 5: Fishing with longline gear is prohibited within the EEZ around the Hawaiian Islands north of 23° N. latitude.

Description of mitigation techniques included in one or more alternatives

A. Blue-dyed and thawed bait: An adequate quantity of blue dye that conforms to NMFS standards must be maintained on board, and only bait dyed a color that conforms to NMFS standards may be used. 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, thereby reducing the time that baited hooks are accessible to seabirds.

B. Strategic offal discards: If a swordfish is landed, the liver should be removed and the head should be 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 to where 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 measure requires the preparation and storage of offal for use during the longline set, especially when catches are low. All hooks and gear must be removed from all fish, fish parts, or bait prior to discharge. The intent of this measure is to divert seabirds from baited hooks to other food sources.

C. Line-setting machine with weighted branch lines or basket-style gear: The longline must be set with a line-setting machine (line shooter) so that the main line is set faster than the vessel's speed. In addition, weights equal to or greater than 45 grams must be attached to branch lines

within one meter of each baited hook. Alternatively, vessel operators may deploy basket-style gear. This gear must be deployed slack to further increase its sink rate. 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.

D. Night setting: The longline setting process must begin at least one hour after local sunset and the setting process must 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 of baited hooks at the water's surface.

E. Towed deterrent: A line with suspended streamers (tori line) or a buoy that conforms to NMFS standards must be deployed according to NMFS standards when the longline is being set and hauled. These devices scare seabirds away 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.

F. Weighted branch lines: Weights equal to or greater than 45 grams 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.

Economic impacts of mitigation measures on vessel operators

Alternatives 1, 2, and 3 require the use of specified mitigation measures which could result in direct costs due to the purchase of mitigation devices, as well as indirect costs due to changes in revenues resulting from changes in catch rates.

Table12.1 presents a summary of the annual direct costs (both variable and fixed) per vessel, as well as average revenue impacts (both per set, and annually), as estimated for each of the proposed mitigation measures when applied to longline fishing operations north of 23° N. (Alternative 1), while Table 12.2 presents similar information concerning per vessel impacts for alternatives which would affect longline fishing operations north of 25° N. (Alternatives 2 and 3).

Alternative 4 is the No Action Alternative and Alternative 5 does not require the use of mitigation measures but rather prohibits longline fishing within Hawaii's EEZ north of 23° N. latitude.

Throughout this analysis, affected effort levels are based on the long term average (1994-1998) of fleet wide operations reported in NMFS logbooks, as this was the basis for the BiOp's Terms and Conditions. With the exception of weighted branch lines, the percentage of 1998 sets which would be affected by each mitigation measure is based on 1998 observer data concerning the percent of sets not utilizing each measure. Lacking vessel specific data, it was assumed that the percentage of vessels affected would be equal to the percent of sets affected. Because data on the use of weighted branch lines did not differentiate whether the weight was placed within the

required one meter of the hook, the percentages of sets not currently using weighted branch lines was assumed to be equal to those not currently using line setting machines, which are commonly employed in conjunction with correctly weighted branch lines. Catch rates north of 25° N. with and without each measure were recorded by NMFS observers (1994-1998), and are specific to the set target. Details of this analyses are presented in Tables 12.3 - 12.6. Data on changes in catch rates for vessels fishing north of 23° N. are unavailable, but are not expected to differ substantially from those illustrated in Tables 12.3-12.6. In some cases, there were insufficient or no observer data concerning the catch per set effects of a given measure, or vessel target. In those cases, available data concerning fleet effort are presented in Tables 12.1 and 12.2, along with any direct costs or qualitative information available. A complete lack of data is indicated by a question mark, and parentheses are used to indicate negative values where appropriate. With the exception of Alternative 4 (no action), all alternatives have potential economic impacts comprised of both direct and indirect costs. As used here, direct costs are those costs associated with the purchase of new gear or other fishing supplies. These costs may categorized as variable (e.g. blue dye used to dye bait) or fixed (e.g. the cost of a line shooter) costs. Indirect costs are those costs associated with revenue changes due to changes in catch rates. Cost figures are based on a combination of sources, including NMFS, Garcia and Associates, and local fishing supply dealers.

Precise comparison of actual impacts between alternatives is difficult, as it would require predicting the responses of vessel operators. However, estimates can be made using available data. Based on historical averages (the 1994-1998 baseline which was used as a basis for the BiOp), Alternative 1 would potentially affect 4,899 sets by requiring operators of swordfish and mixed target vessels, which typically utilize shallow sets, to set their gear at night, use blue dyed bait, and utilize strategic offal discards when fishing above 23° N. Compared to historical data on vessels not utilizing these measures, the impact to vessel revenue would be expected to be a gain of $335 per swordfish set (a 9% increase as compared to the 1998 average of $3,724 per set) due to increased catch rates, but a loss of $598 per mixed target set (16% decrease) due to anticipated decreases in catch rates. These differential impacts are believed to exist due to spatial and temporal differences in the catchability of target species. In both cases, potential direct costs consist of $12 per set for blue dye, and an annual cost of $400 to purchase containers in which to store offal between sets. Under this alternative, operators of tuna targeting vessels, which typically utilize deep sets, will be required to use line shooters, blue dyed bait, and strategic offal discards when fishing above 23° N. The potential revenue impact to these vessels of using line shooters to target tuna species (as compared to vessels not using line shooters) is expected to be a gain of $432 per set (12% increase), while the costs of blue bait and containers to store offal remain as above ($12 per set for blue dye, and $4,800 annually for offal containers). The impacts of other aspects of this alternative (seabird handling procedures, and annual attendance at a protected species educational workshop) have not been quantified but are expected to be minimal.

The impacts of Alternatives 2 and 3 would vary depending on which two specific mitigation measures are chosen (Alternative 2) or required (Alternative 3) when fishing above 25° N. As

Table 12.2 illustrates, these alternatives would potentially affect 3,681 sets. Night setting would have uneven revenue impacts depending on vessel target, while the other mitigation measures have unpredictable revenue impacts due to a lack of data. Direct costs for the range of mitigation measures considered vary from zero (night setting) to $4,800 per year for the purchase and maintenance of towed deterrents. The impacts of other aspects of these alternatives (seabird handling procedures and annual attendance at a protected species educational workshop) have not been quantified but would be expected to be minimal. These alternatives do not meet the Terms and Conditions of the BiOp as they does not require the uniform use of specific mitigation measures when fishing north of 23° N. latitude.

Alternative 4 (No Action) would not result in any additional costs, or changes in ex-vessel revenues due to changes in catch rates, however, it would also fail to meet the Terms and Conditions of the BiOp as it does not require the uniform use of specific mitigation measures when fishing north of 23° N. latitude.

The economic impact of Alternative 5 would at maximum be the ex-vessel revenue forgone resulting from the prohibition on longline fishing in the closed area, this is estimated to average $6.4 million annually (1994-1998). It is likely that some of this lost revenue would be made up by a displacement of longline effort to other areas, however the result of such changes is difficult to predict or quantify. The impacts of other aspects of this alternative (seabird handling procedures and annual attendance at a protected species educational workshop) have not been quantified but are expected to be minimal. However, like Alternatives 2, 3 and 4, this alternative would fail to meet the Terms and Conditions of the BiOp as it does not require the uniform use of specific mitigation measures for all fishing north of 23° N. latitude.

Description of small businesses to which the rule will apply:
This rule could affect all 164 Hawaii limited entry permit holders (114 of which were active in 1998). The degree to which individual permit holders are actually affected will be a function of how vessel operators respond to the new regulations. Lacking other information, this analysis assumes that vessel operators will fish according to their long term (1994-1998) operating patterns, with the obvious exception of Alternative 5 which calls for a prohibition on longline fishing in certain areas. Determination of precisely how many small business entities will be affected is problematic as most vessels are capable of switching between targets over the course of a year. For this reason, the numbers of vessels targeting each species (presented in Tables 12.1 and 12.2) are not directly additive.

This fleet's 1998 fleet landings totaled approximately 28 million pounds (245,600 pounds per vessel) and fleet ex-vessel revenue was $46.7 million ($410,000 per vessel). A total of 1,140 trips were made by the fleet in 1998, with an average of 10 trips per vessel. Eighty-four of these trips targeted swordfish, 296 had mixed targets, and 760 targeted tunas. Fleet landings consisted of 7,190,000 pounds ($12 million) of swordfish, 11,190,000 pounds ($28 million) of tunas, and 9,600,000 pounds ($6.7 million) of other billfish (marlins), mahimahi, wahoo, moonfish and

sharks. An average of 11 sets were made per trip in 1998, with a mean of 1,390 hooks set per vessel per fishing day.

Each vessel carries 4-5 crew members in addition to the captain, and the mean investment per vessel was estimated to be $373,000 in 1993. The maximum permitted vessel length overall is 101 feet, and the average vessel is approximately 70 feet in length.

Table 12.1. Economic effects of mitigation measures applied to all vessels fishing north of 23°N.

Target:	All	Swordfish	Mixed	Tuna
1994-1998 average number of sets	4,899	1,764	2,304	831
1994-1998 average number of vessels	96	42	47	59
1994-1998 average number of sets/vessel	51	42	49	14
STRATEGIC OFFAL DISCHARGE				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Annual fixed cost per affected vessel	$ 400	$ 400	$ 400	$ 400
NIGHT SETTING				
Percent of 1998 sets and vessels affected	92%	97%	82%	97%
Revenue change per affected set	($121)	$ 335	($598)	$ 74
Annual revenue change per affected vessel	($12,100)	$ 14,070	($29,302)	$1,036
BLUE DYED AND THAWED BAIT				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Variable cost per affected set	$ 12	$ 12	$ 12	$ 12
Annual variable cost per affected vessel	$ 1,164	$ 492	$ 456	$ 120
TOWED DETERRENT				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Annual fixed cost per affected vessel	$ 4,800	$ 4,800	$ 4,800	$4,800
WEIGHTED BRANCH LINES				
Percent of 1998 sets and vessels affected	71%	100%	100%	13%
Revenue change per affected set	?	?	?	?
Annual revenue change per affected vessel	?	?	?	?
Annual fixed cost per affected vessel	$ 1,200	$ 1,200	$ 1,200	$1,200
LINE SETTING MACHINE				
Percent of 1998 sets and vessels affected	71%	100%	100%	13%
Revenue change per affected set	?	?	?	$ 432
Annual revenue change per affected vessel	?	?	?	$6,048
Annual fixed cost per affected vessel	$ 1,500	$ 1,500	$ 1,500	$1,500

Table 12.2. Economic effects of mitigation measures applied to all vessels fishing north of 25°N.

Target:	All	Swordfish	Mixed	Tuna
1994-1998 average number of sets	3,681	1,674	1,721	286
1994-1998 average number of vessels	73	41	45	29
1994-1998 average number of sets/vessel	50	41	38	10
STRATEGIC OFFAL DISCHARGE				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Annual fixed cost per affected vessel	$ 400	$ 400	$ 400	$ 400
NIGHT SETTING				
Percent of 1998 sets and vessels affected	92%	97%	82%	97%
Revenue change per affected set	($121)	$ 335	($598)	$ 74
Annual revenue change per affected vessel	($11,737)	$ 13,735	($22,724)	$ 740
BLUE DYED AND THAWED BAIT				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Variable cost per affected set	$ 12	$ 12	$ 12	$ 12
Annual variable cost per affected vessel	$ 1,164	$ 492	$ 456	$ 120
TOWED DETERRENT				
Percent of 1998 sets and vessels affected	100%	100%	100%	100%
Revenue change per affected vessel	low	low	low	low
Annual fixed cost per affected vessel	$ 4,800	$ 4,800	$ 4,800	$4,800
WEIGHTED BRANCH LINES				
Percent of 1998 sets and vessels affected	71%	100%	100%	13%
Revenue change per affected set	?	?	?	?
Annual revenue change per affected vessel	?	?	?	?
Annual fixed cost per affected vessel	$ 1,200	$ 1,200	$ 1,200	$1,200
LINE SETTING MACHINE				
Percent of 1998 sets and vessels affected	71%	100%	100%	13%
Revenue change per affected set	?	?	?	$ 432
Annual revenue change per affected vessel	?	?	?	$4,320
Annual fixed cost per affected vessel	$ 1,500	$ 1,500	$ 1,500	$1,500

PUBLIC COMMENTS RECEIVED

No comments on the initial regulatory flexibility analysis or the economic effects of this action were received.

MEASURES TAKEN TO MINIMIZE ECONOMIC IMPACTS ON SMALL BUSINESSES

Impacts to small businesses were identified in an Initial Regulatory Flexibility Analysis and summarized in a Federal Register notice published on July 5, 2000 (65 FR 41424). The October, 2001, amendment of the BiOp to allow the use of basket-style longline gear is intended to provide mitigation from the negative economic impacts of this rule as one or more vessels that currently utilize this gear to make deep sets will not be required to refit their vessels to accommodate line shooters. As a result, NMFS believes that the proposed management measures offer the most cost-effective means for meeting the goals and objectives of the Endangered Species Act.

COST/BENEFIT ANALYSIS OF ALTERNATIVES

Due to a lack of information concerning the specific long term effects of each alternative on fish or seabird stocks, a detailed quantitative analysis of the costs and benefits of alternative management measures is not possible. However given that the Endangered Species Act directs Federal agencies to protect endangered species, it is clear that cost-efficient strategies will maximize net benefits, even if those benefits cannot be quantified. The most significant differences between the alternatives considered are trade-offs between the level of protection offered to short-tailed albatrosses and other seabirds (reductions in takes) and the amount of fishing effort subjected to increased costs (or decreased revenues). These variations occur as a result of differences in the geographic areas covered between alternatives. More subtle differences exist between alternatives which provide flexibility by allowing vessel operators within a given area to employ a range of mitigation techniques, versus those which require specific techniques to be employed. Given that there have been no reported or observed interactions between this fishery and short-tailed albatrosses, comparisons of the potential benefits of each alternative can only be made based on reductions in fishery takes of other seabirds (black-footed and Laysan albatrosses). Whether these potential benefits translate into real or significant benefits to short-tailed albatrosses is unknown. Based on analyses provided above and in the main body of this document, it appears that Alternative 2 (vessel operators must employ at least two of six mitigation techniques when fishing above 25° N.) would provide significant protection to seabirds (reductions in black-footed and Laysan albatross fishery interaction rates of between 58% and 91% for each technique used), while minimizing economic costs. However this alternative would not meet the mandates of the Endangered Species Act as represented by the Terms and Conditions contained in the November 28, 2000, Biological Opinion.

Further analysis of this fishery is ongoing and may lead to simulation models capable of precisely quantifying the long term biological and economic effects of each alternative. At this time, such data is unavailable. From a theoretical perspective, it is clear that public policy favors a reduction in incidental interactions with both endangered and non-endangered seabirds and this implies a positive consumer surplus for reduced mortality. Unfortunately, although the economic concept of welfare measurement for the preservation of threatened and endangered species is well established (cf. Pearce and Turner, 1990), actually calculating that welfare measurement in monetized units for any individual species, or habitat, is not so common. Even should such studies have been conducted elsewhere, the "transfer" of estimated benefit values from one ecological and social setting to another is at best fraught with problems.

This leaves only a heuristic approach to identifying the sources of economic value for seabirds that inhabit the central North Pacific Ocean near Hawaii. The absence of most seabirds from inhabited areas suggests that use values are probably small (although the recent presence of the Midway Phoenix ecotourism operation suggests that some, relatively small, direct use value through wildlife viewing does exist). The idea that these species provide "ecological services" of a broader nature is appealing, if not established, but given their relatively low numbers, the extent of these services and their subsequent economic value is also probably low, particularly when discounted for future values. The same is true of potential use values, including consumption and research benefits, given present value discounting.

Thus the potential economic value of protected, threatened and endangered seabirds, would seem to devolve to existence value, the idea that members of the public would be willing to pay to insure the preservation of these species despite their absence of direct use values. Non-use values, also referred to as passive-use or existence values, do not involve personal consumption of derived products nor *in situ* contact. (Bishop, 1987). Non-use values may, nevertheless, be the most important benefit derived from some endangered species, simply because such species are [so] few in number that many people are unlikely to have seen them or to have had very much tangible experience regarding them. The most visible manifestation of existence values is the donation of funds to private organizations that support activities to preserve endangered species. However, whether people enjoy existence values of resources is not contingent upon whether they donate money to support a cause. Any impact of non-use values would be a hedonic (non-market) effect.

Particularly in the United States and western Europe, there are those who consider that certain species represent a special group of animals that should not be killed, deliberately or incidentally, under any circumstances. Certain marine animals are viewed symbolically as unique or majestic creatures – "charismatic megafauna" – similar to African big game. From this perspective, every incidental catch of such a species would be a severe problem. The perceived need for conservation of such species may be independent of any impact caused by fishing or of its stock status. This perception may also influence the response of resource managers to bycatch management issues. For example, the case of three ice-entrapped gray whales in Alaska might be seen as an example of where the ecological impact is minimal but where public perception and

political attractiveness may lead to disproportionate effort. Such views are strongly culture-dependent (Hall, 1998).

Metrick and Weitzman (1996) were unable toidentify a satisfactory measure of charisma in the context of endangered species but they note that eye-size or eye-body ratio have been suggested. Another possible component of existence value is the degree to which a species is considered to be a higher form of life and possibly possess (anthropomorphic) capabilities for feeling, thought and pain (Metrick and Weitzman, 1996; Kellert, 1986). There may also be existence value for the contribution of particular species to biodiversity (Metrick and Weitzman, 1996). However, no valuation studies have been conducted specifically for seabirds in the western Pacific region and for other species of interest in Pelagics FMP-managed fisheries. In addition, given the poor specification of their eventual population recoveries, it is not clear how the valuation question would be phrased. As a result, new research would be needed to understand the non-use value of these species and how such values would be affected by the alternatives.

Due to their ultimately restrictive natures, all alternatives can be expected to have some adverse social impacts on fishery participants and Hawaii fishing communities in terms of employment, enjoyment of the fishery, social or cultural activity in the fishery, or other social factors.

Table 12.3 Revenue impacts per set of night setting for swordfish north of 25°N.

	1994-1998 Observer data			
	CPUE With	**CPUE Without**	**Change**	**Change in Revenue**
	Catch per set			
Blue shark	15.78	25.93	(10.15)	($228)
Swordfish	12.89	12.16	0.73	$213
Bigeye	1.87	0.91	0.96	$210
Yellowfin	0.64	0.53	0.11	$21
Skipjack	0.05	0.05	0.00	$0
Albacore	8.90	6.97	1.93	$132
Mahimahi	0.94	0.68	0.27	$7
Striped marlin	0.24	0.32	(0.08)	($6)
Blue marlin	0.04	0.09	(0.06)	($12)
Ono	0.09	0.13	(0.04)	($2)
Spearfish	0.05	0.03	0.02	$0
Opah	0.02	0.02	0.00	$0
		Total revenue change per set:		$335

Table 12.4 Revenue impacts per set of night setting for mixed targets north of 25°N.

	1994-1998 Observer data			
	CPUE With	**CPUE Without**	**Change**	**Change in Revenue**
	Catch per set			
Blue shark	20.48	16.76	3.72	$84
Swordfish	8.79	10.62	(1.83)	($535)
Bigeye	1.92	2.81	(0.89)	($194)
Yellowfin	0.96	1.18	(0.23)	($43)
Skipjack	0.10	0.09	0.01	$0
Albacore	4.91	2.81	2.10	$144
Mahimahi	0.74	0.85	(0.11)	($3)
Striped marlin	0.48	0.94	(0.46)	($33)
Blue marlin	0.19	0.25	(0.06)	($13)
Ono	0.10	0.19	(0.09)	($5)
Spearfish	0.15	0.15	(0.01)	$0
Opah	0.00	0.00	0.00	$0
		Total revenue change per set:		($598)

Table 12.5 Revenue impacts per set of night setting for tuna north of 25°N.

	1994-1998 Observer data			
	CPUE With	**CPUE Without**	**Change**	**Change in Revenue**
	Catch per set			
Blue shark	6.69	6.18	0.51	$12
Swordfish	0.96	2.06	(1.10)	($322)
Bigeye	8.96	5.41	3.54	$775
Yellowfin	1.07	2.41	(1.35)	($255)
Skipjack	0.18	0.04	0.13	$2
Albacore	3.53	2.16	1.37	$94
Mahimahi	0.69	0.71	(0.02)	$0
Striped marlin	1.40	2.00	(0.60)	($43)
Blue marlin	0.93	1.78	(0.85)	($175)
Ono	0.18	0.40	(0.22)	($13)
Spearfish	0.40	0.37	0.03	$1
Opah	0.42	0.44	(0.02)	($2)
		Total revenue change per set:		$74

Table 12.6 Revenue impacts per set of using a line setter for tuna north of 25°N.

	1994-1998 Observer data			
	CPUE With	**CPUE Without**	**Change**	**Change in Revenue**
	Catch per set			
Blue shark	5.52	7.36	(1.84)	($41)
Swordfish	0.35	3.06	(2.71)	($789)
Bigeye	8.70	4.70	4.00	$875
Yellowfin	0.95	2.92	(1.97)	($375)
Skipjack	0.10	0.09	0.01	$0
Albacore	4.25	0.96	3.29	$225
Mahimahi	0.67	0.74	(0.07)	($2)
Striped marlin	2.33	1.11	1.22	$88
Blue marlin	2.22	0.57	1.65	$342
Ono	0.43	0.17	0.26	$16
Spearfish	0.57	0.17	0.40	$7
Opah	0.82	0.00	0.82	$86
			Total revenue change per set:	$432

Appendix III:

13.0 Future seabird mitigation research and monitoring seabirds at sea

13.1 Possible future seabird mitigation methods and research

The array of seabird mitigation methods used at present in longline fisheries worldwide reflects current knowledge of the most effective methods available to reduce interactions. As such it should be clearly understood that technological innovation may make redundant certain methods currently recommended in this amendment and by organizations elsewhere such as the Food and Agricultural Organization of the United Nations (FAO).

13.1.1 Underwater setting funnels, chutes and capsules

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, 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 (O'Toole and Molloy in review).

13.1.2 Setting-curtains

Another method which has shown some promise or is thought to be worthy of consideration to reduce seabird bycatch include setting-curtains. Setting curtains are large trains of material deployed behind the longline vessel over the sea surface. The longline mainline and branch lines are set under this curtain immediately behind the longline vessel giving the baited hook time to sink under the curtain at a depth beyond the range of the albatrosses.

13.1.3 Hook modifications

Hook modifications might be made such as magnesium caps that cover the barbed portion of the hook but which will dissolve rapidly in seawater leaving the hook with the point and barb exposed in the bait. Also, hooks could be designed with a guard that only opens under pressure (C. Boggs, pers. comm.). Such modifications to hooks could minimize injury and mortality to seabirds which seized or swallowed the baited hooks. Boggs (2001) has shown that longline baits attached to branch lines using net pins (large safety pins) were easily regurgitated by birds, following seizure and swallowing.

13.1.4 Negatively buoyant light sticks

Other approaches to reducing the incidental catch of seabirds in longline fisheries is to increase the sink rate of the baited hooks. Hawaii-based longline vessels targeting swordfish use buoyant luminescent light sticks that are attached to the branch lines with elastic bands approximately two to three meters from the baited hook. Often the elastic bands break and the light sticks are lost.

Once the light sticks are lost from the branch lines, they float on the ocean surface currents and are mistaken as food by albatrosses. Albatrosses have also been seen attempting to dive and swallow light sticks behind longline vessels as the longline is set (B. McNamara pers. comm.). Both the black-footed and Laysan albatrosses are known to ingest large volumes, as well as large pieces of plastic. Some of the plastic items found in the remains of black-footed and Laysan albatross chicks in the NWHI are light sticks and small line floats. There are several sources of the light sticks, including the U.S. Navy, the U.S. Coast Guard, foreign fishing fleets, and U.S. fishing fleets. At this time, it is unknown how many of the light sticks ingested by the albatrosses originate from the Hawaii-based longline fishery. Plastic fed to the chicks can cause them to suffer from dehydration and starvation, can inflict mechanical injury to the lining of the gut wall, or can block the entrance of food into the intestine (Kenyon and Kridler 1969; Sievert and Sileo 1993). The toxic effects of the ingested plastic have also been well documented for both black-footed and Laysan albatrosses, with greater concentrations of PCBs (polychlorinated biphenyls) and DDE dichlorodiphenyldichloroethylene) found in the black-footed albatrosses (Auman *et al.* 1998).

A light stick manufacturer, Lindgren-Pitman, Inc., has just completed the tooling for a battery-driven luminescent light stick. This new light stick is negatively buoyant so it will sink if it is lost. Still, these battery-driven light sticks are not disposable and are rather expensive, so to reduce loss, the light sticks are designed to be attached to the branch lines with a durable snap. As the light stick is negatively buoyant, 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. However, it should be noted that vessels that target swordfish primarily use light sticks, and the emergency rule published on June 12, 2001, prohibits the targeting of swordfish and the use of light sticks in the Hawaii longline fishery.

13.1.5 Hook sink rates

Currently, the hook sink rates for the 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. Taking into account that albatrosses are surface feeders and rarely dive deeper than two meters, fishing gear configurations and vessel operations could be modified to achieve a hook sink rate that would essentially remove the opportunity that an albatross could reach a baited hook as the longline is being set.

For example, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has adopted mitigation measures to reduce the incidental catch of seabirds in commercial fisheries in the Southern Ocean and under these measures, longline vessels are not permitted to fish in the daylight unless they can prove that they can sink their baited hooks by at least 0.3 m/sec. Two New Zealand longline vessels fishing in Antarctic waters set their longline at about 5 knots and have configured their gear to sink at the minimum requirement of 0.3 m/sec. These vessels are required to carry two observers and temperature/depth recorders (TDRs) are used to ensure the vessel complies with the minimum sink rate. This is a new approach to solving the seabird bycatch problem and is still under investigation.

13.1.6 Other possible methods

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.

13.2 Monitoring seabirds at sea

13.2.1 Fishery Data Collection

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 (Biological Assessment, NMFS, Southwest Region, December 1996).

The Observer Program administered by NMFS was implemented in February 1994 to collect data on protected species interactions which include: all sea turtles; Hawaiian monk seals; selected

whale and dolphin species; and seabirds, including the albatross species and the brown booby (*Sula leucogaster*).

Although data collection on protected species is the primary purpose of the NMFS 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.

Prior to fishermen being required to use seabird mitigation measures by emergency rule, NMFS observers were trained to collect more detailed information about the frequency of use of the measures during a fishing trip and specific characteristics of the use of the measures. For instance, observers will note if a tori line was deployed in a manner to ensure its effectiveness, or whether the bait was sufficiently dyed and thawed before use. In addition, since May 2000, observers have recorded the number of seabirds around the vessel during fishing operations. Clearly, if no birds are near the vessel while a seabird measure is in use, then this could introduce a bias in the reported effectiveness of the measure. Further, the abundance of seabirds around Hawaii longline vessels will also contribute to our understanding of the distribution of seabirds while at sea.

13.2.2 Satellite telemetry studies

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.

Currently, satellite telemetry data exists for breeding black-footed and Laysan albatrosses nesting in the NWHI. This information shows black-footed albatrosses primarily migrating to the west coast of North America to forage while Laysan albatrosses migrate north to Alaska. No satellite telemetry information exists for juvenile albatrosses or for the endangered short-tailed albatross.

It is suspected that juvenile albatrosses may return to the breeding colonies each year because juvenile black-footed albatrosses (young-of-the-year) were sighted at sea near the NWHI during the breeding season (K. Cousins, pers. comm.). However, no satellite tag studies of juvenile albatrosses are planned for the immediate future, and only recently has the USFWS considered placing satellite tags on short-tailed albatrosses nesting on Torishima.

13.3.3 Bird-banding Data

For over the past 60 years the USFWS and several other private seabird researchers have been banding black-footed and Laysan albatrosses in the NWHI, and since April 1962, Japanese researchers have been banding short-tailed albatrosses. Analysis of bird-banding data collected from black-footed albatrosses encountered at sea shows that juvenile birds are caught on longlines more often than adult birds (Cousins 2001; WPRFMC 2000). How this mortality affects the age structure and composition of the albatross populations is unknown; however, analysis of bird-banding capture and recapture records might yield information on the age structure and composition of the NWHI albatross populations.

As reported at the Black-footed Albatross Population Biology Workshop (WPRFMC 2000), it is possible that the analysis of three existing bird-banding data sets may likely produce accurate estimates of survival of fledged chicks to recruitment to the breeding population. The first is the cohort of 1,000 color-banded chicks fledged at Eastern Island, Midway Atoll, in 1957. The second data set is the cohort of 2,000 chicks banded on Sand Island and 90 chicks on Eastern Island, Midway Atoll in 1979. The third data set is a cohort of 2,090 chicks banded on Midway Atoll in 1995. From the first data set a survival of 273 birds to age five years equates to a mean annual survival of 0.771. The remaining two data sets require further analysis, although preliminary analysis shows that survival of chicks banded in 1979 and the 1990s was somewhat lower than for birds banded in the late 1950s.

Currently, the only information collected while banding birds is dictated by the bird-banding laboratory manual. While all of the information collected by the National Bird-banding Laboratory (NBBL) is critical, and there is great consistency in its collection, other vital sources of information are often ignored and not collected. For instance, current NBBL schedules or USFWS data collection methods do not allow for the reporting of mate pairing data. Undoubtedly, researchers and bird-banders have observed mated pairs while banding chicks; however, the NBBL does not require this information, so this information is not collected. Periodically, an effort to collect mated pair information was undertaken by the USFWS and other researchers, but this data is rarely utilized as the researchers often lacked the banding history of the birds. This particular data source could be invaluable. For instance, if one of the mated pairs is taken in a fishery, what happens to the surviving mate? Will the surviving mate find another mate? Do chicks survive with only a one parent providing? These questions could be addressed if the band numbers of known mated pairs were to be collected and entered into a relational database. In addition, the band numbers of offspring could also be recorded and entered in to a relational database.

Further, banding birds and then monitoring these banded birds could yield information on the post-hooking survival of longline caught albatrosses. USFWS report an unknown number of birds have returned to the colonies with hooks or entanglements. A medical doctor on Midway Atoll is sometimes called upon by refuge staff to remove a hook from a bird. Detailed records and banding records certainly would assist efforts to understand post-hooking survival rates and to determine if the incidence of ingested hooks was on the increase or decrease after implementation of seabird mitigation measures.

A follow up meeting to the Black-footed Albatross Population Biology Workshop, sponsored by the Council and NMFS, was held in May 2000. At this meeting, participants recommended that a group be formed to encourage further data collection, exchange and review (K. Cousins, pers. comm.). Subsequently, the USFWS formed the North Pacific Albatross Working Group, whose mission is to improve albatross conservation and protection in the North Pacific through enhanced communication and coordination of conservation, management, monitoring, outreach and research activities. One of the first challenges for the working group is the completion of bird-banding databases for black-footed and Laysan albatrosses.