Endangered Species Act – Section 7 Consultation

Biological Opinion

Action Agency:	National Marine Fisheries Service, Pacific Islands Region, Sustainable Fisheries Division
Activity:	Continued Authorization of Pelagic Troll and Handline Fisheries, as Managed under the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region
Consulting Agency:	National Marine Fisheries Service, Pacific Islands Region, Protected Resources Division
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Acronyms

BE	Biological Evaluation
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
CNMI	Commonwealth of the Northern Mariana Islands
DPS	Distinct population segment
EEZ	Exclusive Economic Zone
ESA	Endangered Species Act
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization of the United Nations
FFS	French Frigate Shoals
FMP	Fishery Management Plan
FR	Federal Register
GBR	Great Barrier Reef
HDAR	State of Hawaii Division of Aquatic Resources
ITS	Incidental Take Statement
MHI	Main Hawaiian Islands
MMAP	Marine Mammal Authorization Program
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service (also NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwestern Hawaiian Islands
PIFSC	Pacific Islands Fisheries Science Center
PRD	Protected Resources Division, NMFS Pacific Islands Regional Office
PRIA	Pacific Remote Islands Area
SFD	Sustainable Fisheries Division, NMFS Pacific Islands Regional Office
USFWS	U.S. Fish and Wildlife Service

1 Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (ESA; 16 U.S.C. 1539(a)(2)) requires each Federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. To "jeopardize the continued existence" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). A Federal agency is required to consult formally with the National Marine Fisheries Service (NMFS) for marine species or their designated critical habitat or with the U.S. Fish and Wildlife Service (USFWS) for terrestrial and freshwater species or their designated critical habitat when that agency's action "may affect" an ESA-listed species. Federal agencies are exempt from the requirement for formal consultation if they have concluded that an action "may affect, but is not likely to adversely affect" ESA-listed species or their designated critical habitat (see ESA Section 7 Implementing Regulations; 50 CFR 402).

This document represents NMFS' biological opinion (Opinion) of the effects on marine species protected under the ESA from the continued authorization of pelagic troll and handline fisheries, as managed under the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FMP). This Opinion is based on the review of the NMFS July 2008 Biological Evaluation (BE) for Effects of Continued Operation of Non-Longline Pelagic Fisheries of the Western Pacific on ESA-Listed Sea Turtles and Marine Mammals, recovery plans for U.S. Pacific populations of listed sea turtles and humpback whales, the most current marine mammal stock assessment reports, published and unpublished scientific information on the biology and ecology of threatened and endangered marine species in the action area, monitoring reports from prior fishing activity and research in the region, biological opinions on similar actions, and relevant scientific and gray literature (see Literature Cited).

2 Consultation History

Previous consultations for the troll and handline fisheries of the western Pacific region were completed as part of larger consultations done for the Pelagics FMP. The Pelagics FMP covers numerous pelagic fisheries, including: Hawaii-based deep-set and shallow-set longline fisheries, American Samoa-based longline fisheries, as well as the pole and line, troll, and handline fisheries of the western Pacific region. NMFS completed an Opinion in the 1980s that analyzed the potential effects on ESA-listed marine species from the implementation of the original Pelagics FMP. That Opinion determined that the pelagic fisheries of the western Pacific region were not likely to jeopardize any ESA-listed marine species. The most recent Opinion that covered the troll and handline fisheries of the western Pacific region (NMFS 2004) was signed on February 23, 2004 (Table 1). That Opinion addressed the impacts of proposed regulatory amendments to the Pelagics FMP, which focused almost exclusively on longline fisheries. The exceptions were the implementation of the Shark Finning Prohibition Act for all fisheries, and the implementation of Federal permitting and logbook requirements for troll and handline fisheries operating in the U.S. Exclusive Economic Zone (EEZ) around the Pacific Remote Islands Area (PRIA).

The 2004 Opinion determined that the continued operation of the pelagic fisheries, as managed under the amended FMP, was likely to adversely affect green, leatherback, loggerhead, and olive ridley sea turtles, but concluded that the proposed action would not jeopardize the continued existence of any of those species. The 2004 Opinion issued individual Incidental Take Statements (ITS) for the Hawaii-based deep-set and shallow-set longline fisheries. However, the Opinion issued a single ITS for the American Samoa longline fishery along with the troll, handline, and pole-and-line fisheries (a.k.a. non-longline pelagic fisheries) of the western Pacific region. The ITS allowed for six hardshell sea turtle interactions, including a single mortality, and one interaction with zero mortalities for leatherbacks. In 2006, the American Samoa longline fishery exceeded the combined ITS issued in the 2004 Opinion. In so doing, it triggered a requirement to reinitiate consultation for all of the fisheries covered by the ITS. Since that time, NMFS has been preparing for the reinitiation of consultation for the American Samoa longline fishery as well as for the non-longline fisheries of the western Pacific. On July 31, 2008, NMFS re-initiated separate formal consultations, under Section 7(a)(2) of the ESA, for the American Samoa longline fishery, and for the troll and handline fisheries of the western Pacific region. NMFS also initiated informal consultation for the pole and line fisheries of the western Pacific region that same day. Formal consultation for the American Samoa longline fishery is ongoing. Informal consultation for the pole-and-line fisheries of the western Pacific region was completed on August 21, 2008.

Table 1. ESA consultation history since 2004 for the six fisheries covered by the Pelagics FMP.

Date (Consultation Type)	Fishery	Reason for consultation
02/23/04 (Formal)	Hawaii deep-set longline Hawaii shallow-set longline American Samoa longline WestPac pole and line WestPac troll WestPac handline	Lawsuit response
10/04/05 (Formal)	Hawaii deep-set longline	2004 ITS exceeded
08/21/08 (Informal)	WestPac pole and line	2004 ITS exceeded
10/15/08 (Formal)	Hawaii shallow-set longline	Amendment 18 to Pelagics FMP
This Opinion (Formal)	WestPac troll and handline	2004 ITS exceeded
Forthcoming Opinion (Formal)	American Samoa longline	2004 ITS exceeded

Acronyms: FMP – Fishery Management Plan; WestPac – western Pacific region; and ITS – Incidental Take Statement;.

Attached to its consultation request, NMFS provided the BE (NMFS 2008b), which concluded that the troll and handline fisheries of the western Pacific region may affect, but are not likely to adversely affect 11 of the 12 species shown in Table 2, but are likely to adversely affect the green sea turtle. Thus, formal consultation was required. NMFS also concluded that the proposed action will not destroy or adversely modify any designated critical habitat under NMFS jurisdiction.

Table 2. ESA-listed marine species that may be affected by proposed action.				
Species	**Scientific Name**	**ESA Status**	**Listed**	**Federal Register**
Species not likely to be adversely affected by the proposed action.				
Hawaiian Monk Seal	*Monachus schauinslandi*	Endangered	11/23/1976	41 FR 51612
Blue Whale	*Balaenoptera musculus*	Endangered	12/02/1970	35 FR 18319
Fin Whale	*Balaenoptera physalus*	Endangered	12/02/1970	35 FR 18319
Humpback Whale	*Megaptera novaeangliae*	Endangered	12/02/1970	35 FR 18319
N. Pacific Right Whale	*Eubalaena japonica*	Endangered	12/27/2006	71 FR 77694
Sei Whale	*Balaenoptera borealis*	Endangered	12/02/1970	35 FR 18319
Sperm Whale	*Physeter macrocephalus*	Endangered	12/02/1970	35 FR 18319
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	07/28/1978	43 FR 32800
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	06/02/1970	35 FR 8491
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	07/28/1978	43 FR 32800
Olive Ridley Sea Turtle	*Lepidochelys olivacea*			
Nesting aggregations on west coast of Mexico		Endangered	07/28/1978	43 FR 32800
All other Olive Ridley Sea Turtles		Threatened	07/28/1978	43 FR 32800
Species likely to be adversely affected by the proposed action.				
Green Sea Turtle	*Chelonia mydas*			
Nesting aggregations in Florida and on west coast of Mexico		Endangered	07/28/1978	43 FR 32800
All other Green Sea Turtles		Threatened	07/28/1978	43 FR 32800

On December 15, 2008, PRD provided a draft of this Opinion to SFD, with a request for comments. Comments were received from SFD on January 15, 2009.

3 Description of the Action

The proposed action would authorize the continued operation of the non-longline pelagic fisheries of the western Pacific region (Proposed Action). This Opinion focuses specifically on the troll and handline fisheries that operate from or around American Samoa, Guam, Hawaii, the Northern Mariana Islands, and the PRIA, which are currently managed under the Pelagics FMP, implemented in 1987, as amended. These fisheries are described in detail in the BE (NMFS 2008b), and are summarized below.

Trolling is the most popular non-longline pelagic fishing method in the region and has a long tradition of use by small-boat recreational and commercial fishermen. The fishery is composed of several sectors, including commercial troll, charter, and recreational and expense fisheries (recreational/expense vessels sell all or a part of the landings to cover fishing trip costs). Trolling is conducted by towing lures or baited hooks from a moving vessel, using big-game type rods and reels or hydraulic haulers, outriggers, and other gear. Up to six lines rigged with artificial lures may be trolled when outrigger poles are used to keep gear from tangling. Trollers typically fish at speeds between 8 and 10 knots when pulling lures. When using live bait, trollers move at slower speeds to permit the bait to swim naturally. The lures typically used by trollers consist of metallic or hard resin “heads” to which brightly colored plastic or rubber skirts are tied. This lure is then treaded with a leader that terminates with one or two medium sized J-style hooks. The lure is typically rigged so that the lure is free to slide up and down the leader (NMFS 2008b). Trollers typically fish where water masses converge; where submarine cliffs, seamounts, and other underwater features dramatically change the bathymetry; near drifting logs and other

flotsam; beneath aggregations of sea birds; and near fish aggregating devices (FADs), which typically consist of a simple buoy moored in deep water (NMFS 2008b).

Hawaii's troll fisheries account for approximately 80 percent of the total U.S. commercial troll effort in the western Pacific region. The Hawaii small-boat fishing fleet includes vessels as large as 85 feet (ft), but most are trailered boats ranging from 15 to 25 ft in length, which are typically operated by a one- or two-person crew. Based on surveys in Hawaii, full-time pelagic trollers usually fish between 5 and 8 miles from shore, with the maximum distance from shore at about 29 miles. Part-time pelagic trollers tend to operate at greater distances from shore, with the average ranging between 5 to 29 miles, with a reported maximum distance from shore at about 54 miles. Based on data from the State of Hawaii's Division of Aquatic Resources (HDAR) commercial fish catch data and commercial marine dealer reports, 1,367 commercial trollers were active and fished 28,022 days in 2006 (NMFS 2008b).

The American Samoa troll fisheries consist primarily of subsistence and commercial fishing. Recreational fishing, purely for sport or pleasure, is uncommon. Few, if any, charter boats are in operation. American Samoa trolling activity has steadily decreased in recent years. Seven vessels were active in the troll fishery in 2006, reporting a total 1,035 hours spent trolling, which is down by about 23 percent from the 1,341 hours reported in 2002 (NMFS 2008b).

Guam's troll fisheries consist of primarily small boats that are either trailered or berthed in marinas. Most of the fishing boats are less than 33 ft in length and are usually owner-operated by fishermen who earn a living outside of fishing. Most fishermen sell portions of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. They fish within local waters, the EEZ around Guam, and occasionally in the adjacent EEZ waters around the Northern Mariana Islands. In 2006, approximately 386 vessels were active in the troll fishery, making approximately 6,414 trolling trips (NMFS 2008b).

Trolling is the primary fishing method utilized in the pelagic fishery of the Commonwealth of the Northern Mariana Islands (CNMI). Fishing occurs primarily around Saipan, but ranges from the island of Farallon de Medinilla south to the island of Rota. The pelagic fishing fleet consists primarily of vessels less than 24 ft in length that usually have a limited 20-mile travel radius from Saipan. It is estimated that 65 vessels were active in 2006 (NMFS 2008b).
Handline fishing is an ancient technique developed by Polynesians and Micronesians. Handline gear is used to catch and quickly land relatively small quantities of tuna. This fishery continues in isolated areas of the Pacific, and is the basis of an important commercial fishery in Hawaii. The Hawaii-based handline fishery has nearshore and offshore components. The nearshore fishery utilizes small boats to practice ika-shibi and palu-ahi techniques, as explained in the next two paragraphs, to target large yellowfin and bigeye tunas, typically above or near favored drop-offs such as the 600 and 1,000 fathom curves, around reef formations, or near FADs or other features. Trips are typically single-day events. In the offshore fishery, larger vessels (32 to over 45 ft in length) are used to target juvenile bigeye and yellowfin tuna near sea mounts and weather buoys that are 35 to 200 nautical miles (nm) from shore. Offshore trips typically average about five days (NMFS 2008b). As with the nearshore component, the offshore handline component uses both ika-shibi and palu-ahi techniques. However, offshore fishermen may use reels instead of strictly "handlining" lines.

Ika-shibi is a nighttime tuna fishery that developed from a squid (ika) jig fishery that switched to targeting the incidentally caught tuna (shibi). The captain and crew (typically one or two) deploy a parachute-type sea anchor to keep the vessel in a relatively stable and slow drift above a preferred area. 25- to 50-watt underwater lamps and 25-watt above-water lamps are used to attract baitfish and squid to the vessels. Live squid are preferred bait, and are often jig-caught at the start of fishing. However, frozen squid or mackerel scad may be used as bait until sufficient live squid are caught. Chum is also intermittently dispersed while fishing. Three or four long braided polypropylene or nylon lines with strong leaders, baited 14/0-16/0 circle hooks, and lead-filled tubular weights, and cleated around the boat at staggered depths for fishing between 50 and 115 feet. A breakaway line enables the fish to run with the bait before setting the hook. Once the hook is set, the fish is allowed to tire before it is hauled to the boat by hand. Lunar phase is considered important by many fishermen, with darker nights preferred. Summer months are typically most productive, though a winter bite is also occasionally targeted (NMFS 2008b).

The palu-ahi fishery is a daytime small-boat tuna fishery developed in the Pacific Islands. It is most typically conducted on the leeward Kona Coast of Hawaii Island, often around FADs or over reef formations where tuna or other species are known to congregate. In Hawaiian, “palu” refers to chopped and/or mashed bait, and “ahi” refers to yellowfin or bigeye tunas. Some captains use parachute sea anchors to slow their drift over their target area, while others do not. The terminal end of the fishing gear typically consists of a 13/0 to 16/0 circle hook baited with mackerel scad, chum, and a weight all wrapped within a cloth or canvas bag that is secured by slip knot. The gear is attached to braided polypropylene or nylon lines, often between 49 and 115 ft long, and lowered to the desired depth before it is released by jerking the slipknot loose. In the case of the “drop stone” technique, the baited hook and chunks of chum are wrapped with leader against a flat-sided stone that is unattached to the line. When the mainline is jerked at the desired depth, the slipknot securing the bag is released; spilling the chum, deploying the hook, and allowing the stone to fall away. The bag may be retained. The “make dog” technique is similar in nature to drop stone with the exception that a flat, ovoid lead weight is used instead of a stone, and it is tethered to the mainline for retention (NMFS 2008b). Based on data from the HDAR commercial fish catch data and commercial marine dealer reports, 409 commercial handliners were active and fished 3,502 days in 2006 (NMFS 2008b).

Information is limited for troll and handline fishing activity in the PRIA. Since permitting and reporting requirements were established for this fishery on October 4, 2002, only two permits have been issued, both to Hawaii-based operators. However, catch and effort data on those vessels are unavailable due to confidentiality rules. Currently, no troll or handline vessels are thought to be active in the PRIA (NMFS 2008b).

Although the troll and handline fisheries employ distinctly different methods, a high degree of overlap exists between the fisheries, in that nearly all handline fishermen also troll. Handline fishers often troll as part of a handline fishing trip, and they occasionally dedicate some trips exclusively to trolling. Because this overlap makes it impossible to individually quantify the effort or impact of either component with a reasonable degree of accuracy, the potential impacts of the two fisheries will be analyzed together.

Combined annual effort is estimated at 2,234 boats making 39,147 troll and handline trips throughout the EEZ, estimated as follows. Based on the information above, 1,776 boats annually make 31,524 commercial troll and handline fishing trips in the main Hawaiian Islands (MHI) (reported as 28,022 days for 1,367 trollers, and 3,502 days for 409 handliners: assume that each day equals one trip, and the number of fishermen equals the number of boats.). Annual American Samoa troll effort is 129 trips for 7 boats (reported as 1,035 hours: assume average trip lasts 8 hours). Annual Marianas troll effort (CNMI + Guam) is 7,494 trips for 451 boats. (reported as 65 CNMI boats, and 6,414 trips for 386 Guam boats: assume similar levels of effort per boat: Guam [6,414 trips / 386 boats] = CNMI [# trips / 65 boats]: 65 X 6,414 / 386 = 1,080 CNMI trips annually. 6,414 + 1,080 = 7,494). There is no expected effort in the PRIA. 1,776 + 7 + 451 = 2,234 boats. 31,524 + 129 + 7,494 = 39,147 trips.

Federal management of western Pacific troll and handline fisheries is limited to: 1) Sea turtle handling requirements, which apply to all vessels using hooks to target pelagic species in Federal waters; 2) Federal permit and reporting requirements for any vessel using troll or handline gear to catch pelagic species in the EEZ around the PRIA; and 3) Reporting requirements under the Marine Mammal Authorization Program (MMAP) to submit marine mammal mortality/injury reports. There are no other Federal management measures in place for the non-longline pelagic fisheries. These regulations can be found at 50 CFR Part 665. Given that Federal management exists, these fisheries are subject to Section 7 of the ESA, and any take resulting from these fisheries must be authorized accordingly.

4 Action Area

The proposed action applies to waters of the U.S. EEZ (Federal waters) of the western Pacific, and adjacent high seas areas (Figure 1). Federal waters include the waters from 3 to 200 nm offshore around American Samoa, Guam, and Hawaii. They also include the waters from the shoreline to 200 nm offshore around the Northern Mariana Islands and the PRIA (i.e., Wake, Howland, Baker, and Jarvis Islands; Johnson and Palmyra Atolls; and Kingman Reef). However, the proposed action requires the transit of troll and handline fishing vessels through State and Territorial waters, and that transit is considered an interrelated and interdependent action. Thus, those State and Territorial waters are included in the action area, and the impacts of the transits through those waters must be considered in this Opinion.

It is important to note here that the Hawaiian Archipelago is considered part of the western Pacific region for fisheries management purposes. However, Hawaii is considered part of the central Pacific region in resource management documents such as the 5-year status review for green sea turtles and in marine mammal stock assessment reports. Unless specifically referred to as part of the central Pacific for population delineation purposes, Hawaii is considered part of the western Pacific region throughout this Opinion.

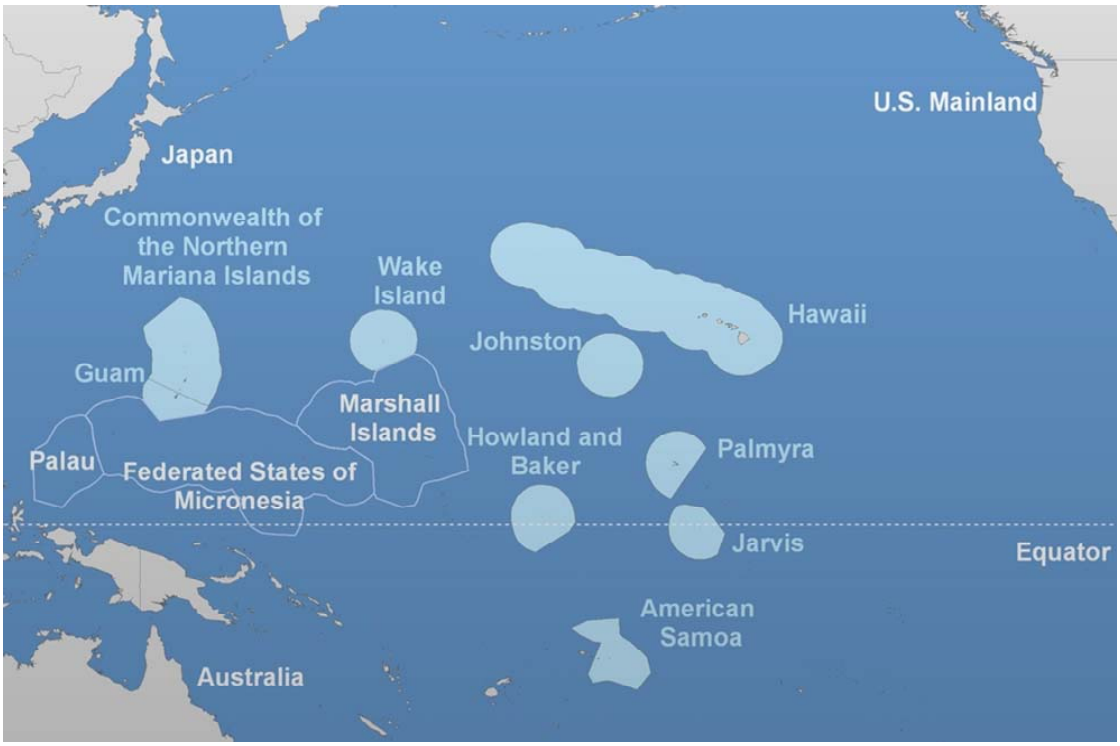

Figure 1. Map of the U.S. Economic Exclusion Zone in the central and western Pacific region, within which troll fisheries are likely to operate.

5 Species Not Likely to be Adversely Affected

Based on information in the BE, NMFS determined that the proposed action may affect, but is not likely to adversely affect blue, fin, humpback, North Pacific right, sei, and sperm whales; Hawaiian monk seals; as well as hawksbill, leatherback, loggerhead, and olive ridley sea turtles (Table 2). This section presents the biological and/or ecological information and analysis relevant to this determination. The BE also concluded that the proposed action is likely to adversely affect the green sea turtle through vessel collision only. Although green sea turtles will not be specifically mentioned further in this subsection, the analyses of the expected stressors and impacts, with the exception of vessel collision, will implicitly include green sea turtles. As such, vessel collision will be the only stressor addressed in the effects analysis for green sea turtles.

Critical habitat has been designated for the Hawaiian monk seal, but is limited to the Northwestern Hawaiian Islands (NWHI) (53 FR 18990, May 26, 1988), where trolling incidental to a small bottomfish fishery (a maximum of eight permitted vessels) persists. However, that fishery will be prohibited by June 2011 due to the establishment of the Papahanaumokuakea Marine National Monument in the NWHI (71 FR 51134, August 25, 2006). There is no other proposed or designated critical habitat for ESA-listed marine species within the action area. Given the small scale and restricted nature of the fishery within the NWHI, and on the light tackle involved, NMFS has determined that the potential for adverse effects on designated

critical habitat from the Proposed Action is negligible and critical habitat will be discussed no further in this consultation.

In order to determine that the 11 species mentioned above are not likely to be adversely affected, NMFS must find that the effects of the Proposed Action are expected to be insignificant, discountable, or beneficial, as defined in the joint USFWS-NMFS Endangered Species Consultation Handbook (USFWS & NMFS 1998). Insignificance relates to the level of the impact. Expected impacts must remain below the level of take to be considered insignificant. Discountable effects are those that are extremely unlikely to occur, and beneficial effects are positive effects without any adverse effects.

Our analysis considered the biological and/or ecological information for blue, fin, humpback, North Pacific right, sei, and sperm whales; Hawaiian monk seals; as well as hawksbill, leatherback, loggerhead, and olive ridley sea turtles. NMFS also considered the potential stressors and impacts as described in the BE, the most likely of which are:

1. Collision with fishing vessels;
2. Hooking or entanglement in fishing gear;
3. Disturbance from human activity and equipment operation;
4. Exposure to vessel wastes;
5. Direct and indirect competition for forage; or
6. Exposure to marine mammal deterrents.

1. Collision with fishing vessels: Although no collisions with protected species have been reported or observed between any of the troll or handline fishing fleets of the western Pacific region, the potential for collision exists. NMFS considers the potential for collision highest in the nearshore waters where the densities of ESA-listed marine species and vessel traffic are highest.

Hawksbill sea turtles and Hawaiian monk seals normally occur in the nearshore waters through which troll and handline fishing vessels must transit en route to and from their fishing areas. Based on turtle stranding data ("stranding" means coming ashore to die, or washing up on shore dead), two hawksbills stranded with evidence of boat strikes in the MHI between 1982 and 2008 (PIFSC 2008). This equates to 0.08 hawksbills stuck by vessels per year. NMFS estimates that reported stranded turtles with vessel strike injuries in Hawaii represent 20 to 40 percent of actual mortalities due to vessel strikes (NMFS 2008a). Thus, annual hawksbill mortality in Hawaii due to vessel strike likely ranges between 0.20 and 0.40 per year (NMFS 2009). Given that the troll and handline fisheries combined account for about 5.5 percent of the annual vessel trips around the MHI, between 0.01 and 0.02 hawksbills may be struck by troll or handline fishing vessels per year, or one hawksbill every 50 to 100 years (NMFS 2009).

There are no reports of vessel collisions with sea turtles in the other island groups considered here (i.e., American Samoa, the Marianas, and the PRIA), and detailed stranding and traffic data for those areas is sparse to completely lacking. However, in the interest of conservatism, NMFS has combined the total effort across the entire EEZ and based its determination using the probability of a vessel strike in Hawaiian waters, where both animal and vessel densities are highest. Given an expected annual total 39,147 troll and handline trips throughout the EEZ (i.e.,

Hawaii, American Samoa, the Marianas, and the PRIA), a maximum of 0.03 hawksbills may be struck by troll or handline fishing vessels per year, or one hawksbill every 33 years (NMFS 2009). Based on this, NMFS considers it discountable that hawksbill sea turtles will be struck by vessels involved in the proposed action.

Two Hawaiian monk seals with possible vessel collision injuries have ever been found in the MHI between 1986 and 2008 (NMFS 2007). This equates to 0.09 seals struck by vessels per year. In the interest of conservatism, assume that, as with sea turtles, this represents 20 to 40 percent of actual at-sea injuries due to vessel strikes (NMFS 2009). Vessel collision with seals could range between 0.23 and 0.45 per year. Given that the troll and handline fisheries combined annually account for about 5.5 percent of the vessel trips around the MHI, between 0.01 and 0.02 seals may be struck by troll or handline fishing vessels per year, or one seal struck by a troll or handline fishing boat every 50 to 100 years (NMFS 2009). Because these seals are endemic to the Hawaiian Islands, they are not expected to be exposed to the Proposed Action in the other island groups. Based on the information above, NMFS considers it discountable that Hawaiian monk seals will be struck by vessels involved in the proposed action.

In the offshore waters where they might interact, the density of leatherback, loggerhead, and olive ridley sea turtles; as well as blue, fin, humpback, North Pacific right, sei, and sperm whales, and of the troll and/or handline vessels is low (about 2,234 troll and handline vessels for the entire EEZ). Based on their respective low densities, NMFS considers collisions with these species to be less likely than those described immediately above for hawksbills and monk seals. In addition, the small size and maneuverability of the vessels involved, combined with the operators' active avoidance of objects in the water further reduces the likelihood of collisions. Based on this information, NMFS considers it discountable that leatherback, loggerhead, and olive ridley sea turtles; as well as blue, fin, humpback, North Pacific right, sei, and sperm whales will be struck by vessels involved with the troll and handline fisheries of the western Pacific region.

2. Hooking or entanglement in fishing gear: It is highly unlikely that sea turtles and marine mammals would be able to bite trolled lures or baits. Trolled lures and baits are pulled through the water faster than sea turtles are capable of swimming, and lures and baits do not represent potential prey for sea turtles or for the marine mammals likely to encounter them. A small potential exists that these animals could be incidentally snagged by trolled hooks. Once hooked, they could become entangled in the fishing line. There is anecdotal evidence of rare hookings in the troll fishery, and NMFS expects these interactions to remain rare in the future. There is no record of protected species hookings in the handline fisheries. In the extremely unlikely event of a hooking due to trolling, we expect that injuries will be insignificant and not reduce an animal's fitness in any measurable way. This is based on the small size of the hooks used, the external nature of potential hookings, and the expectation that, in most cases, all gear will be removed from turtles and seals, or that any trailing line will be short and of relatively light-test. In the case of whales, NMFS expects that the relatively small hooks and light test line will lead to a hooked animal unknowingly trailing fishing line until the hook rusts out or is expelled by the animal's skin.

In the extremely unlikely event of a hooking due to handline fishing, we expect that injuries will be insignificant and will not reduce an animal's fitness in any way. This is based on the small size of the hooks used, the simple and short configuration and relatively light-test of the lines, and on the expectation that all gear will be removed from turtles and seals. In the case of the whales considered here, it is unreasonable to expect any of them would bite or be snagged by a hook.

Thus, based on the information immediately above, NMFS considers it discountable that sea turtles or marine mammals will be hooked or entangled by troll or handline fishing gear, and that, in the extremely unlikely event of a hooking, the effects will be insignificant.

3. Disturbance from human activity and equipment operation: The most likely effect from this interaction will be infrequent, low to moderate level stress, with a moderate to high energy avoidance behavior, culminating with an animal rapidly leaving the area on its own without injury or reduction in fitness. Thus, this interaction is expected to have insignificant effects on listed marine species.

4. Exposure to vessel wastes: Local and Federal regulations prohibit intentional discharge, and the small size of the vessels involved is expected limit the size of potential discharges. Therefore, potential spills and discharges are expected to be infrequent, small, and quickly diluted or dispersed if they do occur. Based on this we have determined that exposure to vessel wastes and discharges that may result from this action will result in insignificant effects on listed marine species.

5. Direct and indirect competition for forage: The sperm whale is the only ESA-listed marine species in the action area that is capable of preying directly or indirectly upon the target and bycatch species of this fishery. However, sperm whales typically prey on large deepwater squid and other large demersal fish species near the bottom in deep water, whereas the target and bycatch species of the troll and handline fisheries inhabit relatively shallow near-surface waters. Thus, we expect that these whales are unlikely to prey directly on these species to any significant degree. The species taken by the troll and handline fisheries may contribute to the demersal trophic web when they die and sink to the bottom, but NMFS expects that the small biomass removed by these fisheries would have insignificant impacts on the demersal trophic web. Based on the information above, NMFS has determined that competition for forage with the troll and handline fisheries will have insignificant impacts on listed marine species.

6. Exposure to marine mammal deterrents: There is anecdotal evidence that some fishermen in the Hawaii-based handline fishery have used deterrents such as guns, seal bombs, and poison bait to reduce marine mammal interactions with handline gear. Although the Marine Mammal Protection Act (MMPA) allows the use of certain deterrent devices, the MMPA does not allow for the intentional shooting or poisoning of marine mammals, and the ESA overrides any MMPA permit or authorization when ESA-listed species are involved. Given that any use of deterrent devices that may adversely affect ESA-listed species is prohibited, their use is not considered part of the proposed action. As such, NMFS has determined that the potential for adverse effects on ESA-listed marine species from the use of marine mammal deterrents in conjunction with the proposed action is discountable.

Based on the analyses above, NMFS has determined that the proposed action is not likely to adversely affect Hawaiian monk seals; hawksbill, leatherback, loggerhead, and olive ridley sea turtles; as well as blue, fin, humpback, North Pacific right, sei, and sperm whales. However, as previously noted, the Proposed Action is likely to adversely affect green sea turtles through vessel collisions. That impact is the subject of the following Opinion.

6 Status of Listed Species

This section presents the biological or ecological information relevant to formulating the Opinion, including population characteristics (population structure, size, trends) for the green sea turtle populations affected by the proposed action, life history characteristics (especially those affecting vulnerability to the proposed action), threats to the species, major conservation efforts, and other relevant information (USFWS & NMFS 1998). Factors affecting the species within the action area are described in more detail in the Environmental Baseline section. Information in this section is summarized primarily from the 2004, 2005, 2006, and 2008 Opinions for pelagic fisheries of the western Pacific region (NMFS 2004, 2005, 2006, and 2008c); the most recent green turtle 5-year status review (NMFS & USFWS 2007); and the PIFSC draft green and hawksbill turtle research plan (Snover et al. 2007).

Although no collisions with green sea turtles have been reported or observed in the troll and/or handline fisheries of the western Pacific region, vessel strikes of green sea turtles appear to be quite common in Hawaiian waters (Chaloupka et al. 2008a), and NMFS considers it likely that some portion of vessel-struck green turtles is attributable to the proposed action. The nearshore areas where these vessel strikes are most likely to occur are outside of the action area. However, the proposed action involves about 2,234 vessels making about 39,147 fishing trips annually, with each trip resulting in a vessel passing through the shallow nearshore waters where green sea turtles are concentrated. The passage of these fishing vessels through the nearshore waters would not occur but for the proposed action, and thus is an interrelated and interdependent action to the proposed action.

6.1 Population Characteristics

The green sea turtle is globally distributed in tropical and sub-tropical oceans, and is listed globally at the species level (Table 2). Under the ESA, a sub-species or a "distinct population segment" (DPS) can also be listed (ESA Section 7 Implementing Regulations; 50 CFR 402), but no green turtle DPSs have been listed[1]. Critical habitat has been designated at one location in the Caribbean (Culebra Island, Puerto Rico; 63 FR 46693), but has not been proposed or designated in the Pacific.

In the absence of DPSs or other formally-recognized populations for these species, NMFS will defer to the regionally-based population structure described in the most recent green turtle 5-year status review to identify the affected populations. According to the review, green sea turtle populations occur in at least the western, central, and eastern Atlantic Ocean; the Mediterranean;

[1] Certain nesting aggregations of green turtles are listed as endangered while the species as a whole is listed as threatened (refer to Table 1). These nesting aggregations are treated as DPSs by NMFS and the USFWS.

the western, northern, and eastern Indian Ocean; Southeast Asia; and the western, central, and eastern Pacific Ocean (NMFS & USFWS 2007). In the 5-year review, the only area included in the central Pacific was Hawaii, where green turtles have increased since 1975. However, the central Pacific population also includes green turtles nesting in other areas, such as Federated States of Micronesia and the Marshall Islands, and at least some of these sub-populations appear to be declining (Snover et al. 2007). The eastern Pacific population includes turtles that nest on the west coast of Mexico, which are listed under the ESA as endangered. The western Atlantic population includes turtles that nest in Florida, which are also listed as endangered. All other green turtles (including those in the eastern Pacific population that nest outside of Mexico, and those in the western Atlantic population that nest outside of Florida) are listed as threatened (see Table 2 above).

As shown above in Figure 1, the action area is relatively small compared to the global distribution of the green sea turtle. Since the proposed action can only affect the populations that occur within the action area, the central and western Pacific populations, this Opinion will focus on those populations and then relate the effects on the affected populations to the listed species as a whole in the Conclusion Section.

For the central Pacific population, information is only available for the Hawaii component. The Hawaii component nests exclusively in the Hawaiian Archipelago, with over 90 percent of the nesting at French Frigate Shoals (FFS) in the NWHI. Since the initial nesting surveys at FFS in 1973, there has been a marked increase in annual green turtle nesting. The increase over the last 30+ years corresponds to an underlying near-linear increase of about 5.7 percent per year, and in-water abundance appears to be consistent with the increase in nesting. The number of juveniles residing in foraging areas of the MHI has increased. In addition, there has been a dramatic increase in the number of basking turtles in the MHI and throughout the NWHI. Long-term monitoring of the population indicates a strong degree of island fidelity within the rookery, and tagging studies have shown that turtles nesting at FFS come from numerous resident foraging areas throughout the Hawaiian Archipelago (Balazs 1976, 1980, 1983). This linkage has been firmly established through genetics, satellite telemetry, flipper tagging, and direct observation (Balazs 1983, 1994; Leroux et al. 2003). More information is available on green turtle population and trends in the 5-year review and in the PIFSC draft green and hawksbill turtle research plan (Snover et al. 2007).

Although the level of detail available for the central Pacific population is not available for the western Pacific population, western Pacific green turtles are known to nest on at least two sites along the Great Barrier Reef (GBR) of Australia, on Guam, and in the Ogasawara Islands of Japan. Over the past few years, an estimated 26,000 females have nested annually in the western Pacific. However, a single site, Raine Island on the northern GBR, accounts for 25,000 of those individuals (NMFS & USFWS 2007). Over the last 20 years or more, nesting has steadily increased at the GBR and Ogasawara Islands sites, and has held steady on Guam. The 5-year status review also states that nesting occurs at sites other than those covered in the report, but the nesting levels at those sites are too low to affect the overall status of the species.

6.2 Life History Characteristics Affecting Vulnerability to the Proposed Action

Green turtle life history is characterized by early development in the open ocean followed by later development in the coastal areas. Post-hatchling and juvenile green sea turtles are believed to drift along major current systems for several years, where they likely forage on invertebrates and fish eggs at, or near, the surface where currents converge. Upon reaching a carapace length of about 14 inches, juveniles recruit to shallow nearshore habitats and switch to a nearly exclusively herbivorous diet of seagrasses and marine algae. Upon maturation, adults undertake long migrations between resident foraging areas and their natal nesting areas, where they typically remain in shallow nearshore waters to mate or loiter between nesting events.

The proposed action will result annually in tens of thousands of vessel transits through the nearshore waters. Because the nearshore waters are where sub-adult and adult green sea turtles are most common, the green sea turtle life history aspects most vulnerable to troll and handline fishing appears to be foraging subadult and adults, as well as mating/nesting adults in nearshore habitats where they may be struck by transiting fishing vessels.

6.3 Threats to the Species

Global threats to green turtles are detailed in the 5-year review. The major threats to the species, according to this document, are destruction and alteration of nesting and foraging habitat, fishing bycatch, and direct harvest. Climate change also appears to be a growing threat to this species.

Destruction and alteration of green turtle nesting and foraging habitats are occurring throughout the species' global range, particularly through coastal development, shoreline hardening (e.g., seawalls and other erosion control structures), beachfront lighting, and vehicular/pedestrian traffic. While under natural conditions beaches can move landward or seaward with fluctuations in sea level, extensive shoreline hardening inhibits this natural process. Shoreline hardening is typically done to protect the coastal development from erosion during storms, but hardening can block turtle nesting and often leads to beach loss. Coastal development also increases artificial lighting, which may disorient emerging hatchlings, causing them to crawl inland towards the lights instead of seaward. Coastal development also improves beach access for humans, resulting in more vehicular and foot traffic on beaches, causing compaction of nests and thereby reducing emergence success. Adult green turtles are primarily herbivores that forage on seagrass and algae in shallow areas. Contamination from runoff degrades seagrass beds, and introduced algae species may reduce native algae species preferred by green turtles (NMFS & USFWS 2007).

Green sea turtles are susceptible to being taken as bycatch in certain fisheries, particularly in nearshore artisanal fisheries. These fisheries use a vast diversity of gears, including drift gillnets, longlines, setnets, poundnets, trawls, and others. While operating in the areas with greatest density of adult green turtles, nearshore artisanal fisheries are also typically the least regulated (NMFS & USFWS 2007). Industrial fisheries, like the longline fisheries based out of Hawaii and American Samoa, also interact with green turtles, particularly juveniles.

The intentional harvest of green turtles for their meat and shells, as well as the harvest of eggs from nests has been a major factor in the past green turtle declines, and continues to be a major factor in some areas. For example, a legal fishery operated out of Madagascar harvested about 10,000 green turtles annually in the mid-1990s. Over 70,000 green turtle eggs were harvested

nightly on the Pacific coast of Mexico in the mid-1970s. Globally, harvest of adults and eggs is reduced from previous levels, but still exists in some parts of the species' range. In Mexico, extensive illegal adult harvest still takes place. The curio trade in Southeast Asia harvests a large but unknown number of green turtles annually. Poaching of adults and eggs continues in U.S. waters around the Marianas and American Samoa (NMFS & USFWS 2007).
Anthropogenic climate change has most likely already affected green sea turtles. The global mean temperature has risen 0.76° C over the last 150 years, and the linear trend over the last 50 years is nearly twice that for the last 100 years (NMFS & USFWS 2007). As global temperatures continue to increase, so will sand temperatures, which in turn will alter the thermal regime of incubating nests and alter natural sex ratios within hatchling cohorts, presumably toward a heavier female bias. Sea level rose approximately 15 cm during the 20th century (Baker et al. 2006) and further increases are expected, resulting in inundation of nesting beaches. While under natural conditions beaches can move landward or seaward with fluctuations in sea level, extensive shoreline hardening inhibits this natural process (NMFS & USFWS 2007).

6.4 Conservation of the Species

Green turtles nesting in the U.S. have benefited from both State and Federal laws passed in the early 1970s banning the harvest of turtles and their eggs. Protection and management activities since 1974 throughout the Hawaiian Archipelago and habitat protection at the FFS rookery since the 1950s have resulted in increased population trends of both nesting and foraging turtles (Balazs and Chaloupka 2004). Elsewhere, the protection of nesting beaches from large-scale egg harvest appears to have reversed downward nesting trends in some cases. For example, nesting beach protection began at Colola, Mexico in 1979, and the number of nesting green turtles began to increase 17 years later in 1996 after reaching a low point in the late 1980s through the mid-1990s. Using long-term data sets, encouraging trends in green turtle nester or nest abundance over the past 25 years has become apparent in at least six locations including Hawaii, Australia, Japan, Costa Rica, and Florida (Chaloupka et al. 2007). Efforts to reduce fisheries bycatch of loggerheads, leatherbacks, and olive ridleys also benefit green turtles, such as the improvements made in the Hawaii-based longline fishery since the 1990s (NMFS & USFWS 2007).

The conservation and recovery of green turtles is facilitated by a number of regulatory mechanisms at international, regional, national and local levels, such as the Food and Agriculture Organization of the United Nations (FAO) Technical Consultation on Sea Turtle-Fishery Interactions, the Inter-American Convention for the Protection and Conservation of Sea Turtles, the Convention on International Trade in Endangered Species (CITES), and others. As a result of these designations and agreements, many of the intentional impacts on sea turtles have been reduced: harvest of eggs and adults have been slowed at several nesting areas through nesting beach conservation efforts and an increasing number of community-based initiatives are in place to slow the take of turtles in foraging areas (Gilman et al. 2007; NMFS & USFWS 2007).

7 Environmental Baseline

The environmental baseline for a biological opinion includes: past and present impacts of all State, Federal, or private actions and activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone Section 7 consultation; and the impact of State or private actions which are contemporaneous with the consultation in

process (50 CFR 402.02). The Consultation Handbook further clarifies that the environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area (USFWS & NMFS 1998). The purpose of describing the environmental baseline in this manner within a biological opinion is to provide the context for the effects of the proposed action on the listed species. The past and present impacts of human and natural factors leading to the status of green sea turtles within the action area include direct take, fishing interactions, vessel strikes, climate change, pollution, marine debris, and entanglement.

Information in this section is summarized from the 2004, 2005, 2006, and 2008 Opinions for pelagic fisheries of the western Pacific region (NMFS 2004, 2005, 2006, and 2008c); the most recent green turtle 5-year status review (NMFS & USFWS 2007); and from the other sources cited below. Fisheries interactions have been, and continue to be, the greatest human impact on green turtles. Within the action area, green turtles are affected by both pelagic and nearshore fishing. This is because juvenile green turtles initially inhabit open ocean habitats, where they are affected by pelagic fisheries. After recruiting to nearshore areas, juveniles and adults are affected by nearshore fishing.

It is likely that that several hundred juvenile green turtles are killed annually in pelagic habitats across the Pacific by U.S. and foreign longlining combined, split about equally between the Hawaiian and eastern Pacific populations (NMFS 2008c). Extensive nearshore fisheries in the region (e.g., gillnets, pound nets, hook-and-line, etc.) sometimes result in entanglement and drowning of green turtles. Of the many kinds of nets used in Hawaii, lay gillnets are the most problematic for turtles, because they are left untended, and entangled animals usually drown. Revised State of Hawaii regulation governing lay gillnets began in March 2007. Nonetheless, nets are often left illegally unattended, and the likelihood of turtle entanglement and drowning remains considerable. Hook-and-line fishing from shore or boats also hooks or entangles green turtles, but turtles caught in these fisheries are less likely to drown than those caught in gillnets. Because most turtles drowned in fishing gear, particularly those in nets, do not strand (wash ashore), there are no estimates for the total number of green turtles killed annually by nearshore fishing interactions (NMFS 2008a).

The green sea turtle recovery plan lists vessel strike as a major threat in the nearshore waters around Hawaii. Based on the number of stranded turtles determined to have been killed by boat collisions between 1998 and 2007 (Chaloupka et al. 2008a, Hawaii Sea Turtle Stranding Database 2007), NMFS (2008a) estimated that 10 stranded turtles per year in the MHI are killed by boat collisions. Assuming that these 10 turtles represent 20 to 40 percent of all green sea turtles killed annually by boat collisions in the MHI, between 25 and 50 turtles are killed annually (NMFS 2008a). As turtle and traffic densities increase, the incidence of collision is expected to rise.

Climate change may be affecting pelagic habitats through reduced ocean productivity. Lower breeding capacity in North Pacific loggerheads has been documented in years following higher sea surface temperatures, which may be an indirect effect of climate change (Chaloupka et al. 2008b). Although no direct link has been made between pollution and the often fatal tumor-forming disease, fibropapillomatosis, the incidence of this disease seems to be directly correlated

with enclosed bodies of water exposed to human impacts. Marine debris may be ingested by turtles, leading to injury or possible starvation. Derelict fishing gear may cause entanglement and possibly drowning. However, data are not available to estimate the number of green turtle mortalities in the action area resulting from climate change, pollution, and marine debris in the past few years.

8 Effects of the Action

In this section of a biological opinion, NMFS assesses the probable effects of the proposed action on threatened and endangered species. Effects of the Action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline. Indirect effects are those that are likely to occur later in time (50 CFR 402.02). The Effects of the Action are considered within the context of the Status of Listed Species and Environmental Baseline sections of this Opinion to determine if the proposed action can be expected to have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (50 CFR 402.02), otherwise known as the jeopardy determination.

Approach. NMFS determines the effects of the proposed action using a sequence of analyses. The first analysis identifies stressors (or benefits) associated with the proposed action with regard to listed species and designated critical habitat. The second analysis identifies the number, age (or life stage), and gender of the individuals that are likely to be exposed to the effects, and the populations or subpopulations those individuals represent. The third analysis describes how the exposed individuals are likely to respond to these stressors (e.g., the mortality rate of exposed individuals). The final analysis establishes the risks those responses pose to listed resources. As discussed above in Section 5.1, the proposed action has been determined to pose a negligible risk of adverse impact on designated critical habitat.

A jeopardy determination must be based on an action's effects on the continued existence of threatened or endangered species as those "species" have been listed, which can include true biological species, subspecies, or distinct population segments of vertebrate species. Because the continued existence of listed species depends on the fate of the populations that comprise them, the viability (probability of extinction or probability of persistence) of listed species depends on the viability of their populations. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them; populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so).

The risk analysis reflects these relationships between listed species and the populations that comprise them, and the individuals that comprise those populations. The risk analysis begins by identifying the probable risks actions pose to listed individuals that are likely to be exposed to an action's effects. The analysis then integrates those individuals' risks to identify consequences to the populations those individuals represent. The analysis concludes by determining the consequences of those population-level risks to the species those populations comprise.

Risks to listed individuals are measured using the individual's "fitness," as those risks are reflected in changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success. In particular, we examine the scientific and commercial data available to determine if an individual's probable responses to an action's effects on the environment (which we identify during our response analyses) are likely to have consequences for the individual's fitness.

When individual listed plants or animals are expected to experience reductions in fitness, we would expect those reductions to also reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent. Reductions in one or more of these variables (or one of the variables we derive from them) is a necessary condition for reductions in a population's viability, which is itself a necessary condition for reductions in a species' viability. On the other hand, when listed plants or animals exposed to an Action's effects are not expected to experience reductions in fitness, we would not expect the Action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise. If we conclude that listed plants or animals are not likely to experience reductions in their fitness, we would conclude our assessment.

If, however, we conclude that listed plants or animals are likely to experience reductions in their fitness, our assessment tries to determine if those fitness reductions are likely to be sufficient to reduce the viability of the populations those individuals represent (measured using changes in the populations' abundance, reproduction, spatial structure and connectivity, growth rates, or variance in these measures to make inferences about the population's extinction risks). In this step of our analyses, we use the population's base condition (established in the Status of Listed Species and Environmental Baseline sections of this Opinion) as our point of reference. Finally, our assessment tries to determine if changes in population viability are likely to be sufficient to reduce the viability of the species those populations comprise.

Stressors. Potential stressors that may occur due to the proposed action include: hooking or entanglement; vessel collision; disturbance by human activity, exposure to vessel wastes and marine mammal deterrents; and competition for forage. However, as explained above in Section 5, the only actual stressor associated with the Proposed Action is vessel collisions, which only affects green sea turtles.

The stressors, exposure, response, and risk steps of the effects analysis for green turtles with regard to implementation of the proposed action are described below. The following information was used to conduct these analyses of the proposed action: the 2004, 2005, and 2008 Opinions for pelagic fisheries of the western Pacific region (NMFS 2004, 2005, and 2008c), and other documents cited below.

The proposed action involves an estimated 2,234 boats making 39,147 troll and handline trips annually throughout the EEZ, which will potentially expose green sea turtles to collisions with fishing vessels, each time those vessels pass through nearshore waters where green sea turtle concentrations are highest.

Exposure and Response. The section below assesses the proposed action's collision risk for green sea turtles. The analysis is based on the analyses and references used to estimate turtle mortality due to vessel collisions in the 2008 Hawaii bottomfish Opinion, (NMFS 2008a), but adapted and modified here for application to the Proposed Action.

1: Estimate the annual number of all vessel trips in the MHI.
2: Estimate the annual number of commercial troll and handline fishing trips in the MHI.
3: Estimate annual green sea turtle mortality due to all vessel collisions in the MHI.
4: Estimate annual green sea turtle mortality due to collisions with vessel involved in MHI-based commercial troll and handline fishing.
5: Extrapolate annual green sea turtle mortality due to collisions with commercial handline vessels in American Samoa and the Marianas.
6: Estimate total annual green sea turtle mortality due to collisions with commercial troll and handline vessels across the western Pacific EEZ.

Base assumptions: All vessel trips have an equal likelihood of striking a turtle, and all of the collisions result in mortality.

1: Estimate the annual number of all vessel trips in the MHI.

A. Estimate the number of vessels in the following categories: Commercial Fishing; Non-Fishing Commercial (excludes cargo); and Non-commercial.

1) Total registered vessels: 15,338; includes commercial fishing, non-fishing commercial (excluding cargo), and non-commercial.
2) Commercial fishing vessels: about 2,300.
3) Non-fishing commercial use permits: 523.
4) Non-commercial vessels: (15,338 - 2300 - 523) = 12,515.

B. Estimate the annual number of trips per each of the following vessel categories: Commercial fishing; Non-fishing commercial; Non-commercial; Cargo; and Miscellaneous (includes Super Ferry, cruise ships, military vessels).

1) Commercial fishing: 2,300 vessels x (40 to 80 trips per year) = 92,000 to 184,000 trips per year (73 FR 6101; 40 to 80 trips per year for commercial bottomfishing boats, assumed to be best estimate available).
2) Non-fishing commercial: 523 vessels x (80 to 120 trips/yr) = 41,840 to 62,760 trips per year.
3) Non-commercial: 12,515 vessels x (10 to 50 trips/yr) = 125,150 to 625,750 trips per year (73 FR 6101; 10 to 50 trips/yr for non-commercial bottomfishing boats, assumed to be best estimate available for all non-commercial boats).
4) Cargo: 10,122 cargo vessel arrivals per year (average for 2004-2005, in State of Hawaii Data Book, 2006, Table 18.50, in NMFS 2008a).
5) Miscellaneous: 1,000 to 3,000 trips per year.

C. Sum the results to estimate the annual total for vessel trips in the MHI: 92,000 to 184,000 (commercial fishing) + 41,840 to 62,760 (non-fishing commercial) + 125,150 to 625,750 (non-commercial) + 10,122 (cargo) + 1,000 to 3,000 (misc) = 270,112 to 885,632 trips annually: annual average of 577,872 trips (Variable A).

2: Estimate the annual number of commercial troll and handline fishing trips in the MHI: Based on data presented in the EA (NMFS 2008a), as summarized above in Section 3, about 31,524 commercial troll and handline fishing trips are made annually in the MHI: 31,524 trips annually (Variable B).

3: Estimate annual green sea turtle mortality due to all vessel collisions in the MHI: Based on the Hawaii Sea Turtle Stranding Database for 1982 to 2007, the Pacific Island Fisheries Science Center (PIFSC) determined that 8 green sea turtles strand annually as a result of clearly obvious boat strikes in the MHI (Hawaii Sea Turtle Stranding Database 2007). NMFS expects that some boat strikes (such as with flat bottom boats) result in less obvious damage to the turtle. Thus NMFS estimates that an annual average of 10 stranded green turtles are the result of vessel strikes. However, several factors make it unlikely that all vessel-struck turtles will strand (NMFS 2008a). Consequently NMFS estimates that stranded turtles with vessel strike injuries in Hawaii represent 20 to 40 percent of at-sea mortalities due to vessel strikes. Based on the estimate that 10 represents 20 to 40 percent of all green sea turtles killed in the MHI annually by vessel strikes, we can estimate the annual green sea turtle mortality due to all vessel collisions in the MHI: 10 / 0.4 = 25; 10 / 0.2 = 50: 25 to 50 green turtle mortalities annually due to collision in MHI (Variable C).

4: Estimate annual green sea turtle mortality from vessel collisions due to the proposed action in the MHI:

1) Based on the assumption that all vessel trips in the MHI have an equal likelihood of striking a turtle, the ratio of troll and handline fishing trips (B) to total trips (A) is proportional to the ratio of turtles killed by troll and handline fishing vessel strikes (D) to total number of turtles killed by all vessel strikes (C): B/A = D/C.
2) Since B/A = D/C, BC/A = D. Applying the average value for variable A, and the range of turtle mortality C yields: (31,524)(25)/ 577,872 = 1.36, and (31,524)(50)/ 577,872 = 2.73, or a maximum of 3 green turtles mortalities annually in the MHI due to the Proposed Action.

5: Extrapolate annual green sea turtle mortality due to collisions with commercial troll vessels in American Samoa and the Marianas: Although detailed vessel traffic and turtle stranding data for these archipelagos are lacking, we know that turtle densities in those areas are low compared to that of the MHI, and we believe that collision rates are likely lower than that of the MHI. However, in the interest of conservatism our calculations assumed similar rates of collision per trip across the region, and used the annual number of expected collisions due to the troll and handline fisheries in the MHI (a maximum of 2.73) to estimate archipelagic collisions based on the relative proportion of annual trips between each archipelago and those of the MHI.

American Samoa Troll Fishery: Based on effort data presented in the BE (NMFS 2008b), as summarized above in Section 3, about 129 commercial troll fishing trips are made annually in

American Samoa. American Samoa (X collisions / 129 trips) = MHI (2.73 collisions / 31,524 trips): (129)(2.73) / 31,524 = a maximum of 0.01 collisions annually.

Marianas Troll Fishery: Based on effort data presented in the BE (NMFS 2008b), as summarized above in Section 3, about 7,494 commercial troll fishing trips are made annually in the Marianas. Marianas (X collisions / 7,494 trips) = MHI (2.73 collisions / 31,524 trips): (7,494)(2.73) / 31,524 = a maximum of 0.65 collisions annually.

6: Estimate total annual green sea turtle mortality due to collisions with commercial troll and handline vessels across the western Pacific EEZ: Summing the average expected annual collisions for the MHI (2.73), American Samoa (0.01), the Marianas (0.65), and the PRIA (0.0) yields: 2.73 + 0.01 + 0.65 + 0.0 = 3.39, or a maximum of 4 green turtle mortalities annually.

Thus, a maximum of four green sea turtle moralities are expected annually from collision with commercial troll and handline vessels across the U.S. EEZ of the western Pacific. Although EEZ waters are much larger than State and Territorial waters, little is known of the proportional distribution of the commercial troll and handline fisheries between Federal and non-Federal waters, and attributing proportional take is not possible at this time. Accordingly, for the purposes of this consultation, NMFS assumes that 100% of the turtle take described above is attributable to the proposed action, i.e., commercial troll and handline fishing in the EEZ.

Risk. As shown by the available data used in the exposure analysis above, we estimate a total of four green sea turtles will be killed annually by the proposed action; three likely coming from the central Pacific population, and one from the western Pacific population.

The proposed action is the continued authorization of an ongoing fishery with no proposed expansion or modification of methodology. Given that the proposed action is not expected to change effort in any way, it is unlikely to result in any change in green turtle interactions. Based on the knowledge that both affected populations are increasing despite this low level of ongoing mortality, the risk to both populations from the proposed action is considered negligible.

9 Cumulative Effects

"Cumulative effects," as defined in the ESA implementing regulations, are limited to the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. Because the action area is comprised of the Federal waters that surround the archipelagos of American Samoa, Hawaii, the Marianas, and the PRIA (see Figure 1), and cumulative effects, as defined in the ESA, do not include the continuation of actions described under the Environmental Baseline, few actions within the action area are expected to result in cumulative effects.

"Cumulative effects," as defined in the ESA implementing regulations, are limited to the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). Cumulative effects, as defined in the ESA, do

not include the continuation of actions described under the Environmental Baseline, and future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

However, the climate change, fisheries interactions, vessel traffic, and marine debris that are described in the Environmental Baseline section are not only expected to continue, they will likely intensify over time, causing cumulative effects on green sea turtles. In addition to the reduced ocean productivity due to climate change, sea level rise has been observed. As the sea level rises, inundation of low lying areas could result in the reduction or loss of important nesting habitats, which may adversely impact sea turtle reproductive success over time. Continued human population growth will likely result in increased coastal development, fishing pressure, vessel traffic, and pollution of the marine environment. Impacts may include increased and accelerated loss or degradation of forage, resting, and nesting habitats; increased take in both pelagic and nearshore fisheries; increased vessel strikes; and increased entanglement in, and ingestion of, marine debris. Although the extent of these increased stressors is unquantifiable, and the corresponding effects are also unquantifiable, it is clear that unless adequately addressed to reduce their impacts, these vectors of cumulative effect will present increasing challenges to the continued survival of green sea turtles.

10 Integration and Synthesis of Effects

The purpose of this Opinion is to determine if the proposed action is likely to have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (50 CFR 402.02), otherwise known as the jeopardy determination. This is done by considering the Effects of the Action within the context of the Status of Listed Species and Environmental Baseline, as described in the Approach section (beginning of Section 7 Effects of the Action): We determine if mortality of individuals of listed species resulting from the proposed action are sufficient to reduce the viability of the populations those individuals represent (measured using changes in the populations' abundance, reproduction, spatial structure and connectivity, growth rates, or variance in these measures to make inferences about the population's extinction risks). In order to make that determination, we use the population's base condition (established in the Status of Listed Species and Environmental Baseline sections of this Opinion) as the context for the overall effects of the action on the affected populations. Finally, our Opinion determines if changes in population viability are likely to be sufficient to reduce the viability of the species those populations comprise. The following discussion summarizes the probable risks the proposed action poses to the green sea turtle.

As described in the Effects of the Action, we expect that the proposed action will result in about 39,147 trips annually, and that, at that level of effort, 4 juvenile or adult green turtle mortalities will occur annually; with 3 likely coming from the Hawaii component of the central Pacific population, and 1 from the western Pacific population.

As discussed in the Status of Listed Species, nesting has increased over the last decade in both Hawaii component of the central Pacific population, and in the western Pacific population. As discussed in the Environmental Baseline, a few hundred green turtles are killed annually by

longlining across the Pacific. In addition, it is likely that between 25 and 50 green turtles from the Hawaii component of the central Pacific population are killed annually by boat collisions, and an unknown number are lost to nearshore fishing interactions. Viewed within the context of the Status of the Species and the Environmental Baseline, the continued annual mortality of four green turtles due to the proposed action, is insufficient to adversely affect the population dynamics of either central Pacific or western Pacific green sea turtles. That is, we do not expect the proposed action to reduce the reproduction, numbers, or distribution of either population.

To summarize, we do not expect the effects of the proposed action to reduce the reproduction, numbers, or distribution of the central Pacific or western Pacific green turtle populations. Thus, we do not expect the proposed action to reduce the reproduction, numbers, or distribution of the green sea turtle species, as listed under the ESA (Table 2).

11 Conclusion

The purpose of this Opinion is to determine if the Proposed Action is likely to jeopardize the continued existence of listed species (i.e., jeopardy determination). After reviewing the current status of ESA-listed green sea turtles, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' Opinion that the Proposed Action is not likely to jeopardize the continued existence of green sea turtles, nor is it likely to adversely affect blue, fin, humpback, North Pacific right, sei, and sperm whales; Hawaiian monk seals; as well as hawksbill, leatherback, loggerhead, and olive ridley sea turtles.

As described above in Section 5, critical habitat has been designated for the Hawaiian monk seal, but is limited to the NWHI, where trolling incidental to a very small-scale bottomfish fishery persists, but will be terminated by June 2011. Based on the small scale and restricted nature of the fishery, and on the light tackle used, NMFS has determined that the potential for adverse effects on designated critical habitat from the Proposed Action is negligible. No other critical habitat has been designated or proposed within the proposed action area. Thus, no critical habitat is expected to be destroyed or adversely modified by the Proposed Action.

12 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or develop information.

The following conservation recommendations are provided pursuant to Section 7(a)(1) of the ESA:

1. Vessel operators should reduce speed and be particularly vigilant for turtles while transiting nearshore waters where turtles are typically abundant.
2. Troll fishermen should remain vigilant for, and avoid protected species while trolling.
3. Handline fishermen should refrain from the use of marine mammal deterrents, and remove fishing gear from the water when protected species are in the vicinity.

4. NMFS should increase outreach efforts to improve the public's awareness of sea turtle vulnerability to vessel strikes in nearshore waters, and measures that can be taken to reduce the risk.

13 Reinitiation Notice

This concludes formal consultation on the continued authorization of troll and handline fisheries of the central and western Pacific region. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law, and if:

1. The amount or extent of anticipated incidental take is exceeded;
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion;
3. The agency action is subsequently modified in a manner that may affect listed species or critical habitat to an extent, or in a manner not considered in this Opinion; or
4. A new species is listed or critical habitat designated that may be affected by the action.

14 Incidental Take Statement

Section 9 of the ESA and protective regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of the Incidental Take Statement (ITS).

The measures described below are nondiscretionary, and must be undertaken by NMFS for the exemption in section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this ITS. If NMFS fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, NMFS must monitor the progress of the action and its impact on the species as specified in the ITS (50 CFR §402.14(I)(3)).

14.1 MMPA Authorization

A marine mammal species or population stock that is listed as threatened or endangered under the ESA is, by definition, also considered depleted under the MMPA. The ESA allows takings of threatened and endangered marine mammals only if authorized by section 101(a)(5) of the MMPA. The incidental taking of listed marine mammals must be authorized under section 101(a)(5)(E) of the MMPA before incidental take of listed marine mammals may be exempt from the taking prohibition of section 9(a), pursuant to section 7(o) of the ESA. However, because implementation of the proposed action is expected to result no take of marine mammals, no MMPA 101(a)(5)(e) authorization has been completed, and no incidental take of ESA-listed marine mammals is authorized for the proposed action at this time.

14.2 Amount or Extent of Take

Implementation of the proposed action is expected to result in up to four green sea turtle mortalities annually (Table 3). The number of expected mortalities, due to collision with troll and handline fishing vessels, has been estimated based on the Hawaiian Sea Turtle Stranding Database for 1982 to 2007, taking into account that stranded turtles with obvious boat strike injuries likely represent only a portion of the total number of mortalities, and that the vessels associated with the proposed action represent a fraction to the total vessel traffic responsible for collisions with turtles (see Section 8).

Table 3. The number of green sea turtles expected to be killed per year as a result of the continued authorization of troll and handline fisheries of the western Pacific region.

	Annual Mortality
Green sea turtles	4

14.3 Impact of the Take

In the accompanying biological opinion, NMFS determined that the level of incidental take anticipated from the proposed action is not likely to jeopardize the green sea turtle.

14.4 Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires that when an agency is found to comply with section 7(a)(2) of the ESA and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement specifying the impact of any incidental taking. It also states that reasonable and prudent measures necessary to minimize impacts, and terms and conditions to implement those measures be provided and must be followed to minimize those impacts. Only incidental taking by the Federal agency or applicant that complies with the specified terms and conditions is authorized.

NMFS has determined that the following reasonable and prudent measures, as implemented by the terms and conditions (identified in Section 14.5), are necessary and appropriate to minimize the impacts of the troll and handline fishery, as described in the proposed action, on green sea turtles, and to monitor the level and nature of any incidental takes. These measures are non-discretionary--they must be undertaken by NMFS for the exemption in ESA section 7(o)(2) to apply.

1. NMFS shall develop a system that will enable NMFS to collect data on the capture, injury, and mortality of ESA-listed marine species in the troll and handline fisheries, and shall also collect basic life-history information, as available.

2. NMFS shall require that sea turtles captured alive be released from fishing gear in a manner that minimizes injury and the likelihood of further gear entanglement or entrapment, as practicable and in consideration of best practices for safe vessel and fishing operations.

14.5 Terms and Conditions

NMFS shall undertake and comply with the following terms and conditions to implement the reasonable and prudent measures identified in Section 14.4 above. These terms and conditions are non-discretionary, and if NMFS fails to adhere to these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

1. The following terms and conditions implement Reasonable and Prudent Measure No. 1:

   1A. NMFS, in collaboration with the Western Pacific Fishery Management Council, shall develop a system to collect listed species interaction data, including but not limited to collisions and bycatch associated with the troll and handline fisheries within EEZ waters of the western Pacific region.

   1B. NMFS, in collaboration with the Western Pacific Fishery Management Council, shall develop a system to educate and train troll and handline fisheries participants to collect and report life history information on sea turtles, such as species identification, measurements, condition, skin biopsy samples, the presence or absence of tags, and the application of flipper tags if none are present.

2. The following terms and conditions implement Reasonable and Prudent Measure No. 2:

   2A. NMFS shall require and conduct protected species workshops for owners and operators of vessels associated with the troll and handline fisheries within EEZ waters of the western Pacific region, to educate vessel owners and operators in proper turtle handling techniques to minimize injury and promote survival of hooked or entangled sea turtles, as specified in 50 CFR 665. The workshops shall include information on sea turtle biology and ways to avoid and minimize sea turtle impacts to promote sea turtle protection and conservation.

   2B. NMFS shall require that troll and handline fishermen remove hooks from turtles as quickly and carefully as possible to avoid injuring or killing the turtle, as practicable and in consideration of best practices for safe vessel and fishing operations. NMFS shall require that troll and handline vessels carry a line clipper to cut the line as close to the hook as practicable and remove as much line as possible prior to releasing the turtle in the event a hook cannot be removed (e.g., the hook is deeply ingested or the animal is too large to bring aboard).

   2C. NMFS shall require that sea turtles captured in the troll and handline fishery, that are small enough to safely land to facilitate the removal of the hook, be eased onto the deck by grasping the carapace or flippers. Any sea turtle brought on board must not be dropped on to the deck. All requirements should consider practicality and best practices for safe vessel and fishing operations.

   2D. NMFS shall require each troll and handline vessel to carry and use, as appropriate, a wire or bolt cutter that is capable of cutting through a hook that may be imbedded externally, including the head/beak area of a turtle.

2E. NMFS shall require that dead sea turtles may not be consumed, sold, landed, offloaded, transshipped, or kept below deck, but must be returned to the ocean after identification, unless NMFS requests the turtle be kept for further study.

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