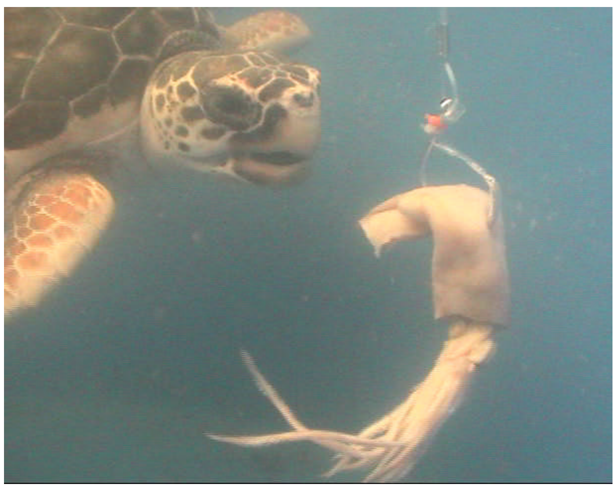
National Marine Fisheries Service

ADVANCED TECHNIQUES AND CONSERVATION BENEFITS OF SHALLOW-SET LONGLINE FISHING[1]:

Background on an Exempted Fishing Permit to Explore the Feasibility of Using Selective Fishing Techniques within the U.S. West Coast Exclusive Economic Zone

Heidi Hermsmeyer
NMFS Southwest Region



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INTRODUCTION

Exempted fishing permits (EFPs) are issued by NOAA's National Marine Fisheries Service (NMFS) to allow for limited fishing activities that are otherwise prohibited by Federal law. At the April 2008 Pacific Fishery Management Council (Council) meeting, the Council recommended that NMFS approve a proposed EFP that would allow a single vessel to explore whether tightly controlled shallow-set longline fishing, using innovative gear and operational procedures, is a cost-effective alternative for harvesting swordfish (*Xiphias gladius*) and reducing bycatch[2] in California and Oregon. The permit would allow fishing in the U.S. Exclusive Economic Zone (EEZ) between 50 to 200 nautical miles (nm) offshore (see Figure 1). The permit was requested because no information currently exists on whether this gear, specifically designed to reduce sea turtle bycatch while maintaining a commercially viable catch of target swordfish, would be effective in the California Current ecosystem. The effectiveness and commercial viability of a turtle avoidance strategy may be fishery-specific, depending on the size, abundance and species of turtles and target fish, and differences between fleets in fishing gear and methods (Gilman, *et al*. 2006). Thus an exploratory fishery would be a first step in assessing if these gear modifications would be effective and commercially viable in a west-coast-based fishery. There is also interest in NMFS in examining whether this modified gear can serve as an alternative to drift gillnet (DGN) gear, which is the primary gear type being used to harvest swordfish on the West Coast.

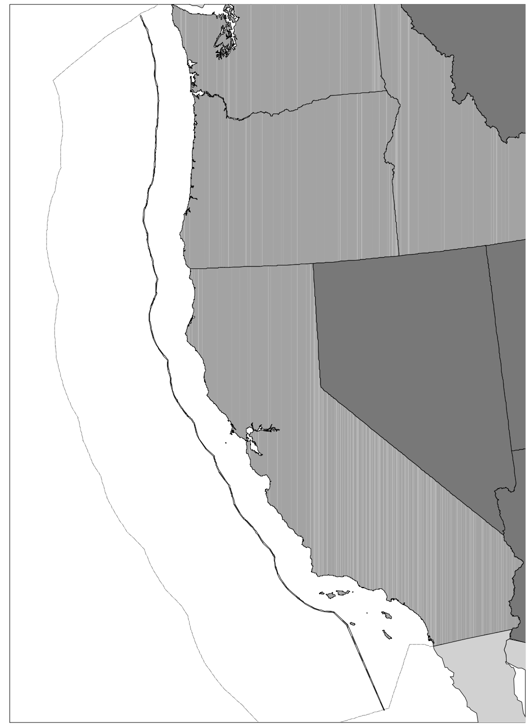


Figure 1. Coastwide view of originally proposed 30 nm buffer zone and applicant proposed 50 nm buffer zone; the Southern California Bight boundary is also shown.

PELAGIC LONGLINE GEAR

Background

Pelagic longline fishing has been used worldwide since the 19^{th} century; however, it has dramatically increased since the 1950s and ranges from small-scale domestic artisanal fisheries to modern mechanized industrialized fleets from distant water-fishing nations. Pelagic longline fishing gear consists of a main line strung horizontally across 15 to 150 km of ocean, supported at regular intervals by vertical float lines connected to surface floats (Beverly and Chapman 2007). Descending from the main line are branch lines, each ending in a single, baited hook. The main line droops in a curve from one float line to the next and usually bears some 2–25 branch lines between floats (see Figure 2). To target swordfish, longline gear is set at a shallower depth (less than 100 meters) than its counterpart "deep-set" longling gear (which is usually set between 300 and 400 meters to target tuna). The mainline is deployed from 3–7 hours and left to drift (unattached) for 7–12 hours with radio buoys attached to facilitate gear recovery. Retrieval typically requires 7–10 hours depending on length of mainline and number of hooks deployed. Fishing occurs primarily during the night, setting the line and hooks around the time of a full moon, and fishing near thermal fronts (temperature breaks) or eddies when more swordfish are available in surface waters. A typical longline vessel carries a crew of six, including the captain, although some of the smaller vessels

[2] Bycatch refers to incidentally caught species which are not marketable and are therefore discarded.

operate with a four-man crew. Fishing trips can last about three weeks depending on the amount of ice the vessel can carry to keep the fish cold. Most vessels do not have a built-in refrigeration system, which limits their trip length. The fish are iced and sold as "fresh." More detailed background information on longline fishing can be found in Beverly and Chapman (2007).

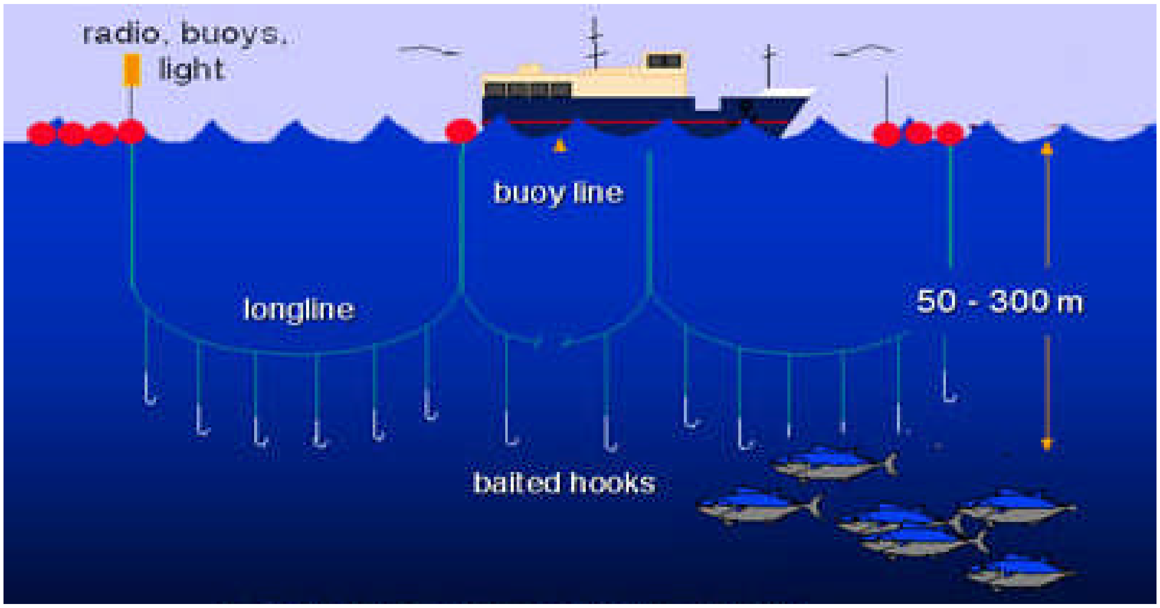


Figure 2. Typical setup of longline gear; baited hooks would be set at a depth of less than 100 m to target swordfish.

Pelagic longline gear does not touch the seafloor and therefore does not directly damage physical habitat. With technological and operational modifications, this gear is now being considered a selective fishing gear, which is gear that has undergone innovative gear-based and operational solutions to protect many organisms while still allowing target species to be caught (Kennelly and Broadhurst 2002). Pelagic longline gear is also not likely to become derelict gear or marine debris because of the use of radio buoys, which are usually attached to the mainline of the longline gear at intervals and at either end. This configuration allows fishermen to locate the line at the start of the haul or in the event of a break in the line (Beverly and Chapman 2007).

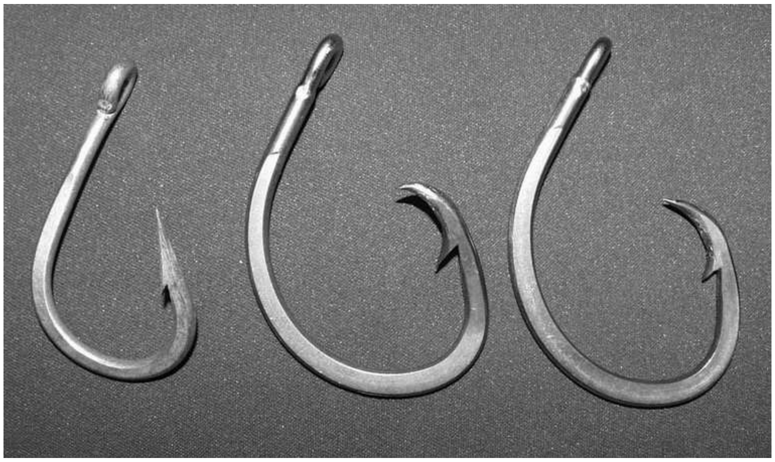
Gear Modifications and Operational Procedures to Reduce Bycatch

The EFP would allow one vessel to target swordfish utilizing large circle hooks (18/0) with up to a 10º offset and mackerel (*Scomber scombrus*) or mackerel-type bait. The use of large circle hooks and mackerel bait has been proven to reduce sea turtle interactions[3] as compared to traditional "J" hooks and squid (*Illex* spp.) bait while maintaining an economically viable fishery. These gear modifications have proven successful in existing domestic (e.g., western Atlantic Ocean and Hawaii-based) and foreign (e.g., Italy, Brazil, Ecuador and Uruguay) shallow-set longline fisheries (Largacha, *et al*. 2005; Gilman, *et al*. 2006; Watson and Kerstetter 2006; Boggs and Swimmer 2007; Lewison and Crowder 2007; Watson, *et al*. 2005).

The predominant hook type used historically in U.S. pelagic longline fisheries for swordfish was the 9/0 "J" hook with 20-25º offset, and the predominant bait was squid (Hoey and Moore 1999). Offset hooks are hooks with the point bent sideways (usually 18-20º) in relation to the shank (see Figure 3; Watson, *et*

[3] 'Interactions' are defined as hooking, entanglement, or a combination of both in the fishing gear.

al. 2005). Mackerel bait has proven to be effective in reducing the interaction rate of sea turtles, most likely due to the fact that sea turtles primarily prey on squid, and fish bait tends to come free of the hook while being progressively eaten by the turtle in small bites, while squid bait holds much more firmly to the hook and tends to result in turtles gulping down the hook with the entire squid (Gilman, *et al*. 2006).



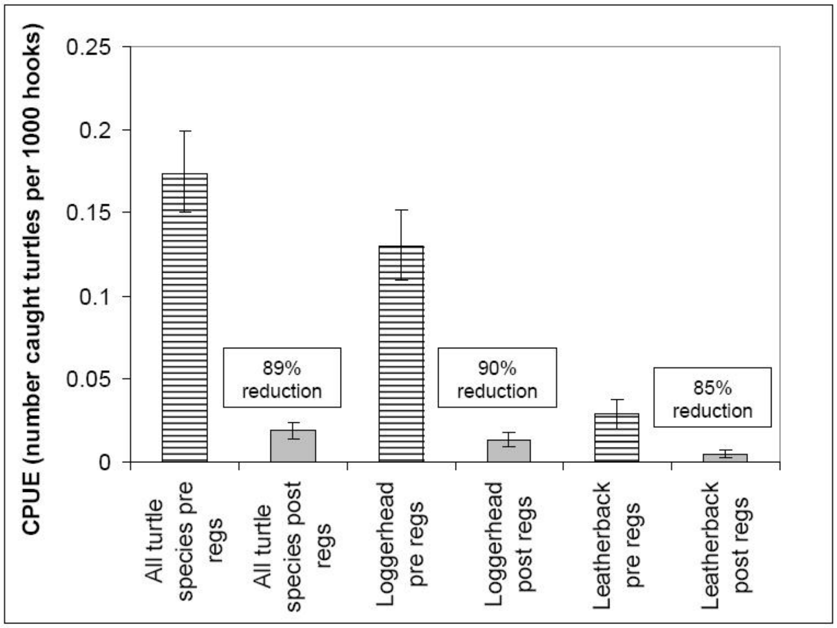
Source: Watson, *et al*. 2005.

Figure 3. Comparison of hook designs; from left to right: 9/0 "J" hook with 25° offset, 18/0 circle hook with 10° offset, and 18/0 circle hook with 0° offset.

Watson, *et al*. (2005) investigated the effectiveness of using 18/0 circle hooks and mackerel bait as compared with 9/0 "J" hooks and squid bait in the Atlantic pelagic longline fishery to evaluate whether these gear modifications reduced sea turtle interactions while maintaining swordfish catch rates. Circle hooks used in combination with mackerel bait resulted in a significant reduction in the capture[4] rate of loggerheads (*Caretta caretta*) and leatherbacks (*Dermochelys coriacea*), with no negative impact on the primary target species catch rate. Loggerhead and leatherback catch rates were reduced by 90 percent and 66 percent, respectively, and swordfish catch rate was increased by 30 percent (Watson, *et al*. 2005).

Gilman and Kobayashi (2007) analyzed Hawaii shallow-set longline observer data from the period before the new regulations that required the use of mackerel-type bait and 18/0 circle hooks with a 10º offset (1994-2002) and the period after the regulations (2004-2006) and found that significant reductions in sea turtle capture rates occurred. Capture rates of combined turtle species, leatherback sea turtles, and loggerhead sea turtles decreased by 89 percent, 85 percent and 90 percent, respectively (see Figure 4). These results meet, and in some cases exceed those observed in experiments conducted in the Atlantic Ocean.

[4] 'Capture' refers to those interactions that result in a turtle being restrained by the fishing gear until it is observed by the crew or observer.



Source: Gilman and Kobayashi 2007.

Figure 4. Leatherback and Loggerhead sea turtle take rates in the Hawaii-based longline swordfish fishery 1994-2001 (pre-regulations) and 2004-2007 (post-regulations)

The EFP would include sea turtle caps that would further limit the number of interactions and mortality associated with the fishing activity. If either the sea turtle take or mortality caps are reached, the observer on board the vessel would immediately notify NMFS via satellite phone, NMFS would require that all fishing activity authorized under the EFP immediately cease, and the EFP would be revoked[5]. There would be 100 percent NMFS certified observer coverage on all trips. The caps would be based on the Endangered Species Act Section 7 consultation and biological opinion that NMFS's Protected Resources Division completed in August 2008. According to the biological opinion, the only species of sea turtle that may interact with the EFP fishing activity is the leatherback sea turtle, and it was determined that the action would not likely jeopardize the continued existence of the species. A precautionary cap of three leatherback takes (interactions) and one mortality would be implemented as part of the EFP.

Loggerheads are unlikely to be found in the proposed action area and are unlikely to be affected by the proposed action. Observer records from the drift-gillnet fishery strongly suggest that juvenile loggerheads only move into the waters off California during El Niño years and are generally found within the Southern California Bight, where shallow-set longline fishing would not occur under the proposed action (personal communication with Lyle Enriquez, National Marine Fisheries Service, Observer Program Coordinator, 2008). The Council did also recommend setting caps for other species as a precautionary measure, including: 12 striped marlin (*Tetrapturus audax*), 1 short-finned pilot whale (*Globicephala macrorhynchus*), and 1 short-tailed albatross (*Phoebastria albatrus*). If any of these caps were reached, fishing would immediately cease and the EFP would be revoked.

[5] The applicant could apply for another exempted fishing permit the following year; however, this would require Council approval, additional Section 7 consultation and NEPA analysis.

The EFP would strive to minimize seabird bycatch by requiring measures that have proven to be effective in other pelagic longline fisheries, including: 1) gear must be set at least one hour after sunset and fully deployed before sunrise; 2) bait must be completely thawed; 3) sufficient quantities of offal must be retained for the purpose of discharging the offal strategically; 4) hooks must be removed from offal prior to discharging the offal; 5) fish, fish parts (i.e., offal), or spent bait being discharged while setting or hauling longline gear must be discharged on the opposite side of the vessel from where the longline is being set or hauled; and 6) a weight of at least 45 grams must be attached to each branch line within one meter of the hook.

Gear Modifications and Operational Procedures to Reduce Post-hooking Mortality

The use of large circle hooks and mackerel bait also has the potential to reduce sea turtle post-hooking mortalities[6] of non-target species as compared to traditional "J" hooks and squid bait while maintaining an economically viable fishery. Recent studies have shown that circle hooks with no offset or minor offset (10º offset or less) cause less physical damage to fish and certain species of sea turtles compared to "J" hooks because of the tendency of circle hooks to engage fish and sea turtles in the mouth rather than in the pharynx, esophagus, or stomach; in addition, circle hooks minimize foul hooking (externally hooked) and bleeding (Prince, *et al*. 2002; Skomal, *et al*. 2002). It is also hypothesized that using larger bait may make it harder for turtles to swallow the bait and thus the hook, but this remains to be tested.

According to Watson, *et al.* (2005), these modifications in fishing methods significantly reduced the post-hooking mortality of sea turtles, swordfish, and blue shark (*Prionace glauca*), and did not negatively impact the primary target species catch rate. With respect to loggerhead sea turtles, circle hooks resulted in a significant change in hooking location. Of the 80 loggerheads that were taken using "J" hooks, nearly 70 percent swallowed the hook. In contrast, only 3 of the 11 loggerheads (27.3 percent) caught on circle hooks swallowed the hooks; most were hooked in the mouth, where the hooks could be removed more safely. With respect to leatherbacks, the change in hooking location was not as pronounced; however, the sample size was too small to statistically evaluate the interaction of bait and hook type on the hooking location. Fishermen have also reported that a larger percentage of swordfish are alive and active when being hauled in when using circle hooks, as compared to "J" hooks, and that the quality of the fish is better (presumably because they are more likely to be caught in the mouth and stay alive longer after being hooked) (Watson, *et al*. 2005). In addition, undersized swordfish that are discarded likely have a higher probability of surviving the interaction with circle hooks (Watson, *et al*. 2005). In regards to blue shark, mackerel bait reduced the catch of blue sharks on both 18/0 circle hooks by an estimated 31 percent. Blue sharks were more frequently hooked in the gut with 9/0 "J" hooks compared with 18/0 circle hooks; however, circle hook offset also resulted in a greater gut hooking, but still less than that with "J" hooks (Watson, *et al.* 2005).

According to Gilman and Kobayashi (2007), there has been a highly significant reduction in the proportion of turtles that swallowed hooks into the esophagus or deeper (deeply hooked, versus being hooked in the mouth or body or entangled) in the Hawaii-based shallow-set longline fishery after the 2004 regulations were implemented that required the use of mackerel-type bait and 18/0 circle hooks with a 10º offset. In addition, there has been a highly significant increase in the proportion of turtles released alive after removal of all terminal tackle, which may increase the likelihood of turtles surviving post-hooking mortality[7]. During the pre-regulations period, 53 percent of captured sea turtles (111 of 211) were deeply

[6] Mortality is defined here as turtles that were either observed or estimated to have suffered mortality as a result of interaction with fishing gear.

[7] This may also be partially due to the fact that some fishermen have been more cautious in removing gear from sea turtles and releasing them alive in order to avoid the closure of the fishery as a result of reaching the sea turtle mortality caps that were also implemented as part of the 2004 regulations.

hooked, while only 12 percent of captured sea turtles (6 of 51) were deeply hooked in the post-regulations period (see Table 1).

Table 1. Hawaii-based longline swordfish fishery 1994-2001 (pre-regulations) and 2004-2007 (post-regulations).

	Manner of Sea Turtle Capture			
	Lightly Hooked	Deeply Hooked	Entangled [1]	Unknown [2]
2 March 1994 – 20 Feb 2002				
Combined species	95	111	5	12
Loggerhead	61	99 [3]	3	4
Leatherback	26	3	2	6
Olive ridley	3	7	0	0
Green	5	0	0	0
Unknown hardshell	0	2	0	2
3 May 2004 – 31 March 2007				
Combined species	41	6	4	4
Loggerhead	29	6	4	1
Leatherback	12	0	0	1
Olive ridley	0	0	0	0
Green	0	0	0	0
Unknown hardshell	0	0	0	2

Source: Gilman and Kobayashi 2007.

In addition, NMFS produced a memorandum[8] that summarized the actual number of sea turtles that were captured in the Hawaii-based shallow-set longling fishery from when the fishery resumed in late 2004 to the end of 2007, and provided an estimate of mortality resulting from these interactions. The actual number of sea turtles captured in the fishery was determined with 100 percent observer coverage from 2004-2007. All turtles captured in the fishery during this period were released (or escaped) alive with various injuries and release conditions, resulting in total estimated mortality of 3.56 leatherbacks, or an estimated 22.3 percent mortality rate of captured leatherbacks.

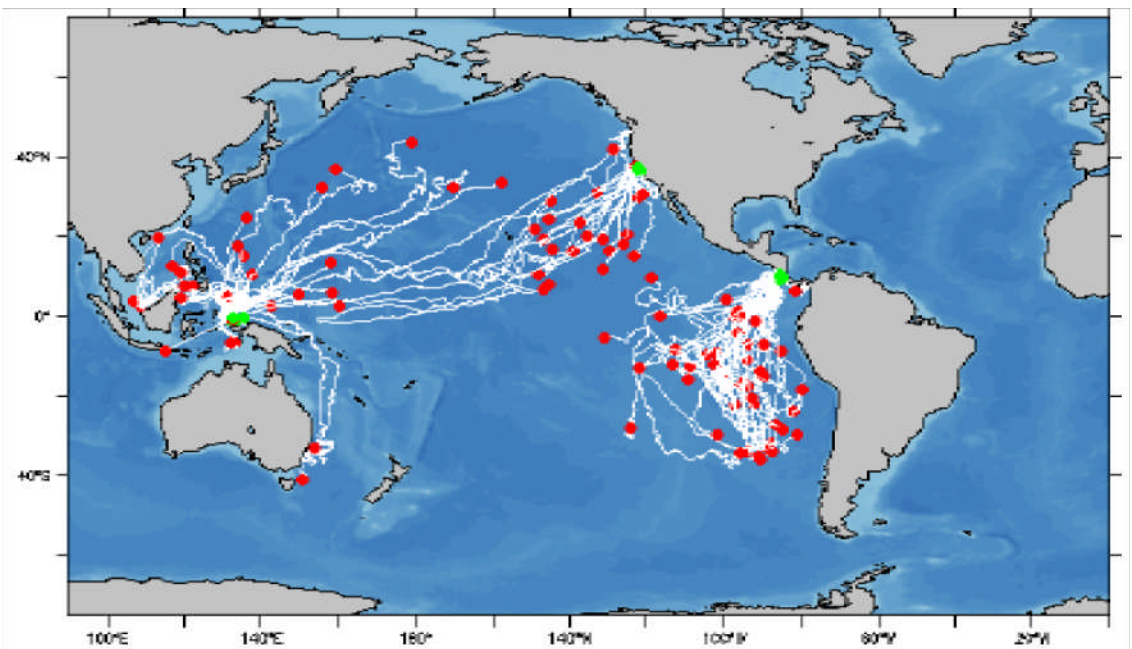
U.S. fishermen, including the EFP applicant, are also required to have bycatch release and removal gear (e.g., turtle de-hookers, line cutters) on board to assist in boarding and de-hooking sea turtles, as well as training in resuscitation techniques to maximize the survival rate of sea turtles. Swimmer, *et al*. (2006) conducted a tagging study of olive ridley sea turtles caught with pelagic shallow-set longline gear and concluded that olive ridley turtles that are lightly hooked and handled properly survive and generally behave normally after being released. In addition, longer branch lines allow sea turtles and marine mammals to surface and breathe after being hooked; however, this depends on the fishing depth (Bellagio Blueprint 2004). Longer branch lines would be required in the proposed EFP and would be long enough to allow sea turtles and marine mammals to surface and breathe after being hooked.

[8] Memorandum dated February 1, 2008 from Chris Yates and Alvin Katekaru, Assistant Regional Administrators, Pacific Islands Regional Office, to William Robinson, Regional Administrator, Pacific Islands Regional Office, in regards to observed captures and estimated mortality of sea turtles in the HI shallow-set longline fishery, 2004-2007.

PACIFIC LEATHERBACK SEA TURTLES

Current Status

Recent satellite tagging and genetic research has revealed that there are two distinct populations of leatherback sea turtles in the Pacific Ocean. Eastern Pacific leatherbacks, which nest in Central America and Mexico, have been documented to migrate southward into tropical and temperate South Pacific waters (Eckert and Sarti 1997). Western Pacific leatherbacks have recently been recorded migrating from nesting beaches in Indonesia northeastward across the tropical Pacific towards the temperate waters off North America in the eastern North Pacific, westward towards the South China Sea, or northward to the Sea of Japan (Benson, *et al.* 2007). Both populations are considered endangered and have exhibited large declines during the last two decades; although the declines have been more severe at the eastern Pacific nesting beaches (Spotila, *et al*. 1996; Hitipeuw, *et al.* 2007). Based upon satellite tracking of leatherbacks tagged in both California and in the western Pacific, and genetic analyses of leatherbacks off the U.S. West Coast, it is most likely that potential interactions between the fishing activities proposed under the EFP would be with leatherbacks originating from western Pacific nesting beaches (see Figure 5).



Source: Benson 2007.

Figure 5. Results of satellite tagging of leatherback sea turtles in the Pacific Ocean.

Jamursba Medi and Warmon beaches in Papua, Indonesia represent the largest remaining leatherback nesting population in the western Pacific and together account for approximately 75 percent of nesting in the western Pacific (Dutton, *et al*. 2007). Nesting from the two beaches is on the order of 5,000-6,000 nests per year. NMFS's Southwest Fisheries Science Center reports that there may be 1,100 to 1,800 females nesting annually at 28 nesting sites in the western Pacific; a minimum total estimate of nesting females in this area is approximately 2,700 to 4,500 animals (taking into account an estimated re-nesting interval of 2.5 years) (Dutton, *et al*. 2007).

Aerial surveys conducted during the late summer and fall months reveal that leatherbacks forage for jellyfish off central California, generally at the end of the summer, when upwelling relaxes and sea surface temperatures increase. Leatherbacks were most often spotted off Point Reyes, south of Point Arena, in the

Gulf of the Farallones, and in Monterey Bay. Researchers estimated an average of 170 leatherbacks were present between the coast and roughly the 50 fathom isobath off California. Abundance over the study period, 1990–2003, was variable between years, ranging from an estimated 20 leatherbacks in 1995 to 366 leatherbacks in 1990 (Benson, *et al.* 2007).

Threats to Sea Turtles and a Holistic Approach to Conservation

The capture of sea turtles in pelagic longline fisheries is only one of the threats faced by these species. Anthropogenic and non-anthropogenic effects on leatherback sea turtles include poaching of eggs, killing of females at nesting beaches, human encroachment on nesting beaches, incidental capture in fishing gear and retention as food, climate change and rising sea temperatures, beach erosion and microclimate-related impacts at nesting sites (e.g., loss of trees due to deforestation near nesting sites on beaches can cause sub-optimal incubation conditions for eggs in nests), egg predation by animals, and low hatchling production (Tapilatu and Tiwari 2007).

Recovery of sea turtle populations requires addressing multiple sources of mortality, including beach conservation, protecting nesting females, their eggs, and their nesting beaches to maximize hatchling production; enhanced at-sea survival of turtles on the high seas and in commercial coastal fisheries; and reduced artisanal coastal fisheries mortality of turtles (Dutton and Squires 2008). Some attempts to conserve Pacific sea turtles have focused on unilaterally shutting down commercial fisheries; however, with trans-boundary species such as turtles migrating across many nations' EEZs and the high seas, fish formerly caught in the fishery are likely to be caught by other nations and imported back into the nation with the closed fishery, creating production and trade leakages and resulting in little or no net conservation gain for sea turtles (Dutton and Squires 2008). Furthermore, if U.S. demand for swordfish remains high and there are lower catches from U.S fisheries due to fishery closures, reliance on imports will most likely increase. If the regulations and enforcement on the fisheries that are supplying the imports to the United States are less stringent, the number of turtle interactions may increase (Gjertsen 2008). According to U.S. market sources, much of the swordfish supply that was lost from the Hawaii closure was replaced by fresh fish imports from foreign longline fisheries (Bartram and Kaneko 2004; Rausser, *et al*. in press). The main sources of imports were Mexico, Panama, Uruguay, Brazil, Costa Rica, and South Africa, all of which have higher associated sea turtle bycatch per unit of effort (Rausser, *et al.* in press). For instance, over the period 1994-2001, the Hawaii longline swordfish fishery (before the requirements to use circle hooks and mackerel-type bait) averaged 0.17 turtles per metric ton (mt) of swordfish, whereas Uruguay ranged from 0.8 to 1.2 turtles per mt of swordfish, Brazil averaged 23.2 turtles per mt of swordfish, and South Africa averaged 1.58 turtles per mt of swordfish (Rausser, *et al*. in press).

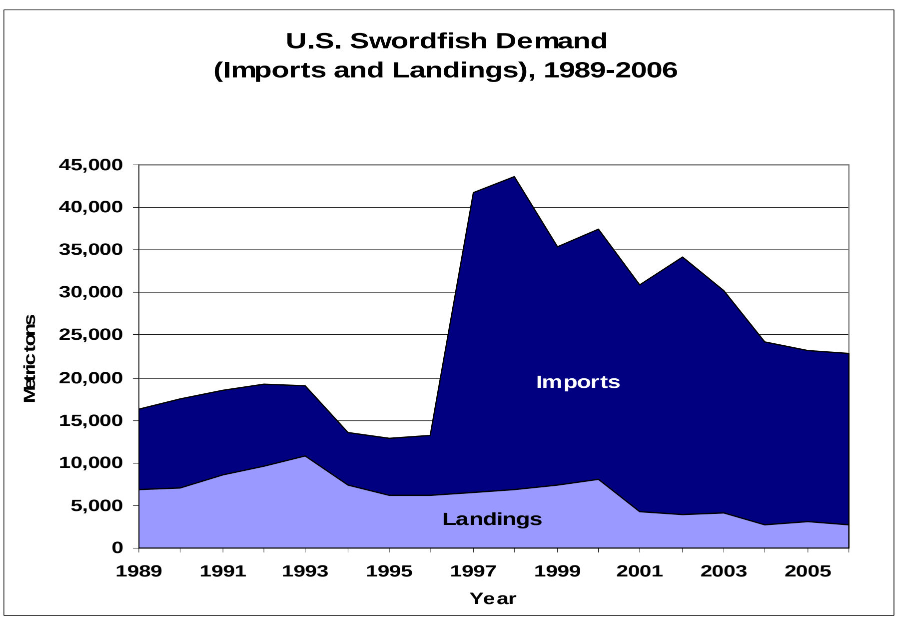
The Rausser, *et al*. (in press) study also examined the market transfer effect of endangered sea turtle bycatch as a result of the closure of the Hawaiian pelagic swordfish fishery, and found that the restrictions of fishing effort in the Hawaii-based shallow-set longline fishery resulted in an estimated transfer of 1,602 mt of swordfish catch to non-U.S. fisheries. This study also found that at the comparative bycatch rates indicated for those regions benefiting from the transfer of swordfish production, the market transfer effect of the regulation led to an estimated additional 2,882 sea turtle interactions[9]. Following the re-opening of the Hawaiian shallow-set longline fishery under strict gear (i.e., circle hooks and mackerel-type bait required) and effort limits, the U.S. imports for 2005-2006 show that there was a statistically significant decline in imports from several regions (Rausser, *et al*. in press). Well-regulated fisheries may also demonstrate to unregulated fisheries that practices such as the use of circle hooks and fish bait can reduce turtle bycatch while maintaining profitability, which might lead to more widespread use of these practices (Hall and Mainprize 2005; Rausser, *et al*. in press).

[9] Author's note: there is a lot of uncertainty associated with the estimated number of sea turtle interactions and it is referenced here primarily to illustrate the magnitude of potential impacts that a market transfer effects can have on sea turtle populations.

A study conducted by NMFS's Southwest Fisheries Science Center compared the costs and benefits of three different conservation strategies being employed in the Pacific aimed at recovering endangered sea turtle populations (Gjertsen 2008). These strategies included nesting beach protection in Papua, Indonesia, gear and effort regulations in the Hawaii-based swordfish longline fishery, and a time/area closure in the California/Oregon DGN fishery. According to the study, current nesting beach protection of leatherback sea turtles nesting sites in Jamursba Medi and Warmon, Indonesia resulted in protection of approximately 134 adult females at a cost of $209,261 per year, or $1,558 per adult female per year. In comparison, it is estimated that the California/Oregon DGN fishery Pacific Leatherback Time/Area Closure costs $2,053,964 per year and reduces mortality of 10 adult female leatherbacks, or $205,396 per adult female leatherback per year. The 2004 Hawaii shallow-set longline fishery regulations reduced mortality of leatherback sea turtles by 100 adult females at a cost of $2,805,426 per year, or $28,054 per adult female leatherback per year. Thus, preliminary results indicate that nesting beach conservation is the most cost-effective means of achieving increases in leatherback populations, and technological fixes will in general be cheaper than time/area closures, since they can still allow some level of fishing (i.e., at a lower bycatch level), compared to time/area closures which often close the most productive fishing grounds (Gjertsen 2008).

SWORDFISH SUPPLY AND DEMAND

Between 1989 and 2006, U.S. annual swordfish demand (i.e., U.S. landings plus imports) ranged from 12,820 metric tons (mt) to 43,633 mt, averaging 25,228 mt. During this period, total U.S. landings averaged 6,236 mt (about 25 percent of demand) and imports, 18,992 mt (about 75 percent of demand). U.S. landings of swordfish showed a general pattern of decline from the early 1990s through the early 2000s, with landings in 2006 of 2,711 mt at only 25 percent of the record landings of 10,851 recorded in 1993 (Figure 6). Demand of swordfish has increased sharply since 1997 when there was a large increase in imports from Singapore. The share of U.S. swordfish demand supplied by imports increased from 43 percent in 1993 to 88 percent of the total in 2006. In 2006, U.S. imports of swordfish were 10,334 mt (product weight) valued at about $76 million.



Source: U.S. Department of Commerce 2008.

Figure 6. U.S. Swordfish Demand (U.S. Landings and Imports), 1989-2006.

These statistics highlight the amount of U.S. demand currently being met by foreign landings of swordfish. Since protected marine sea turtles are migratory species, continued reliance on foreign swordfish landings to meet U.S. import demand could potentially have implications for the global level of marine turtle bycatch. Many foreign fishing nations do not have as stringent environmental laws or exercise the same management controls for minimizing and mitigating fishery bycatch as required in U.S. fisheries.

OTHER ISSUES AFFECTING THE EXEMPTED FISHING PERMIT

Commercial Fisheries Currently Targeting Swordfish in the U.S. EEZ

The two west-coast-based fisheries commercially harvesting swordfish in the U.S. EEZ are the DGN fishery and the harpoon fishery, which are both managed by the Council through the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP). The DGN fishery targets swordfish and thresher sharks and is the largest west-coast-based swordfish fishery. In 2006, 45 DGN vessels reported landing 442 mt of swordfish and 99 mt of common thresher shark. The EFP applicant currently has a DGN permit and if the EFP is approved, he would like to begin assessing whether he could use SSLL fishing gear instead of DGN gear to cost effectively target swordfish.

The harpoon fishery currently contributes a relatively small share of total west coast swordfish landings. In 2006, 23 harpoon vessels reported landing only 47 mt of swordfish. Some conservation groups have submitted public comments to NMFS supporting the expansion of the harpoon fishery instead of the longline fishery; however, the U.S. harpoon fishery does not have the potential or capacity to serve as a reliable gear for commercially harvesting swordfish in the U.S. west coast EEZ to meet current demand. The expansion of the fishery is limited by low catch rates, a narrow band of favorable waters and time periods for sighting and harpooning swordfish (i.e., the Southern California Bight), negative economic constraints based on increased fuel consumption and operational costs for this gear type (e.g., the use of spotter planes), and the narrow market niche for this higher-priced product. In addition, since swordfish are only sighted when they are finning or basking in the Southern California Bight, good weather conditions and calm seas are also required for successful harpoon fishing. While not as selective as harpoon gear, NMFS finds that SSLL gear has become exceedingly more selective since the agency adopted technologies and measures (e.g., large circle hooks, mackerel-type bait, take caps) to reduce bycatch in other regions (i.e., the Atlantic and western Pacific).

Drift-gillnet Pacific Leatherback Closure Area

There has been a misconception that the Pacific Leatherback Closure Area (PLCA) applies to all fishing within the prescribed closure area; however, the DGN closure applies only to the DGN fishery. The PLCA was required due to a determination that the DGN fishery would jeopardize the continued existence of leatherback sea turtles. The PLCA prohibits DGN fishing in the area north of Point Conception, California to mid-Oregon, and west of 129º W. longitude from August 15 to November 15 when leatherbacks are commonly found off central and northern California (see Figure 7). Time/area closures are an appropriate strategy to reduce bycatch for entangling gear types, such as drift-gillnets. In the

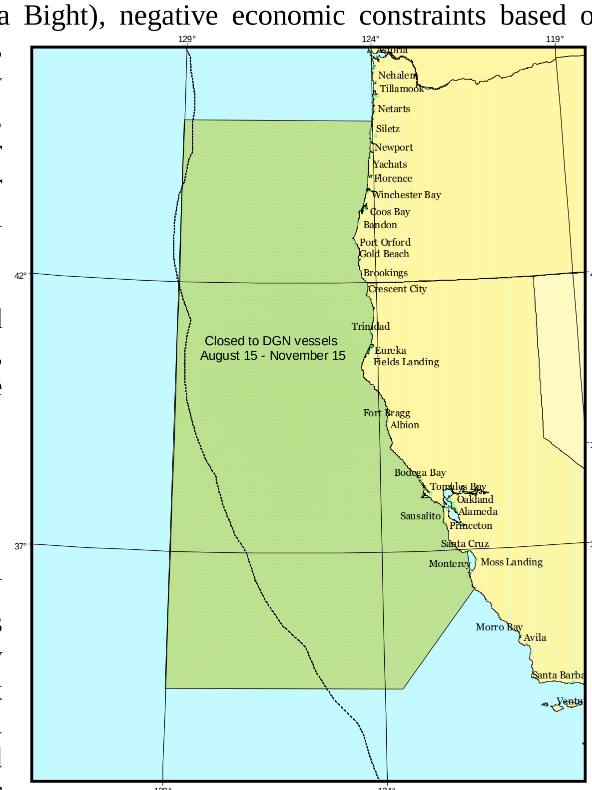


Figure 7. Drift-gillnet Pacific Leatherback Closure Area from August 15 to November 15.

case of longline gear, the preferred approached is the development of selective gear modifications to reduce bycatch, such as requiring the use of circle hooks and fish bait. There are no other prohibitions on fishing in the proposed action area due to sea turtle interactions.

Leatherback Critical Habitat Petition

Pursuant to the Endangered Species Act, there was a petition to the Secretary of Commerce through NMFS to revise the critical habitat designation for the leatherback sea turtle to include marine waters along the California and Oregon coasts that the petitioners[10] consider essential foraging areas for the species. NMFS anticipates making a final decision on a petition to designate waters off California as critical habitat for Pacific leatherback sea turtles in November 2008. NMFS is currently conducting a 12-month review of the petition to determine if critical habitat should be designated. However, designation of critical habitat does not preclude commercial fisheries. For example, NMFS has designated critical habitat for Southern Resident killer whales in Washington State and right whale critical habitat in the Atlantic, but commercial fisheries continue in both areas. If critical habitat is designated, NMFS would be required to determine if this or any Federal action adversely affects or destroys the habitat. For most fishery actions, the fishing gear itself does not affect the habitat, thus the analysis is based upon whether animals may be directly taken (e.g., entangled or hooked) and whether this would result in mortality that is likely to jeopardize the continued existence of the species. As part of the Endangered Species Act Section 7 consultation for the proposed EFP, NMFS will examine the indirect effects of the fishing activity and whether it may have an effect on the species habitat, regardless of whether critical habitat has been designated or not.

Potential Benefits to West Coast Fishing Communities

Exploring more conservative methods to catch swordfish is important for west-coast-based fishermen because it could maintain, or potentially increase, swordfish catch-per-unit-of-effort while decreasing bycatch and bycatch mortality. Fish processors and consumers would benefit from an additional supply of locally-caught and sustainable fresh swordfish, and restaurants would benefit from having a reliable local supply of fresh swordfish. This issue is also important to fishery scientists and managers who view this gear as a realistic means to further minimize bycatch while establishing a commercially viable fishery, and potentially transferring this technology to other countries.

Supporting Documents

To view the 2007 final environmental assessment, the 2008 supplemental environmental assessment, and for updates on the 2008 EFP application and supporting documents visit the NMFS Southwest Region website: http://swr.nmfs.noaa.gov/fmd/longline/Default.htm.

[10] The petitioners are the Center for Biological Diversity, Oceana, and Turtle Island Restoration Network.

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