UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

APR - 5 2010

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act, an environmental review has been performed on the following action.

TITLE: Proposed Award of a Saltonstall-Kennedy Grant to Capture and Tag Swordfish (*Xiphias gladius*) off the coast of Southern California using Experimental Deep-set Buoy Gear

LOCATION: Nearshore waters of the Southern California Bight off the U.S. West Coast

SUMMARY: The project will utilize experimental deep-set buoy gear to capture and tag swordfish in the Southern California Bight. The gear and methods to be employed are specifically designed to avoid and/or minimize non-target catch. The research plan includes conservative terms and conditions to further mitigate any potential impacts to non-target species including limits on the number of sets, observer coverage, and time/area restrictions.

RESPONSIBLE OFFICIAL: Rod McInnis
Regional Administrator, Southwest Region
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
501 W. Ocean Blvd., Suite 4200, Long Beach, CA, 90802
(562) 980-4005

The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, an environmental impact statement was not prepared. A copy of the finding of no significant impact (FONSI), including the environmental assessment, is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the Responsible Official named above.

Sincerely,

for Paul N. Doremus
NOAA NEPA Coordinator

Enclosure

Proposed Award of a Saltonstall-Kennedy Grant to Capture and Tag Swordfish (*Xiphias gladius*) off the coast of Southern California using Experimental Deep-set Buoy Gear

Enviromental Assessment

PREPARED BY:
DEPARTMENT OF COMMERCE
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST REGION
LONG BEACH, CALIFORNIA

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MARCH 2010

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List of Acronyms

CCE – California Current Ecosystem
CDFG- California Department of Fish and Game
CPFV- Commercial Passenger Fishing Vessels
CPUE- Catch Per Unit of Effort
DSLL – Deep-Set Longline
EA- Environmental Assessment
EEZ- Exclusive Economic Zone
EFH- Essential Fish Habitat
ENP - Eastern North Pacific
EPO – Eastern Pacific Ocean
ESA- Endangered Species Act
F – Fishing Mortality Rate
Fmax – Maximum (Sustainable) Fishing Mortality Rate
FY – Fiscal Year
HMS- Highly Migratory Species
HMS FMP- Highly Migratory Species Fishery Management Plan for U.S. West Coast Fisheries
HMSMT- Highly Migratory Species Management Team
IATTC- Inter-American Tropical Tuna Commission
ISC- International Scientific Committee
ITS- Incidental Take Statement
MMPA- Marine Mammal Protection Act
MSA- Magnuson-Stevens Fishery Conservation and Management Act
MSY – Maximum Sustainable Yield
MUS – Management Unit Species
NEPA- National Environmental Policy Act
NM – Nautical Miles
NMFS- National Marine Fisheries Service
NOAA- National Oceanic and Atmospheric Administration
OY- Optimum Yield
PacFIN- Pacific Fisheries Information Network
PBR- Potential Biological Removal
Pelagics FMP- Fishery Management Plan for Pelagics Fisheries of the Western Pacific Region
PFMC- Pacific Fishery Management Council
PIER – Pfleger Institute of Environmental Research
PIFSC- Pacific Islands Fisheries Science Center
POCTRP – Pacific Offshore Cetacean Take Reduction Plan
PRD- Protected Resources Division
RecFIN- Recreational Fisheries Information Network
SAFE- Stock Assessment and Fishery Evaluation Report
SAR- Stock Assessment Report
SCB-Southern California Bight
S-K - Saltonstall-Kennedy Grant Program
SSLL-Shallow-set Longline
SWFSC – NMFS Southwest Fisheries Science Center
SWR – NMFS Southwest Region
TDR- Time and Depth Recorder
USFWS- United States Fish and Wildlife Service
WPFMC- Western Pacific Fishery Management Council

Glossary

Biological Opinion (BO): The written documentation of a Section 7 Endangered Species Act consultation.

Biomass: The estimated amount, by weight, of a highly migratory (HMS) population. The term biomass means total biomass (age one and above) unless stated otherwise.

Bycatch: Fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program.

California Current Ecosystem (CCE) - The marine ecosystem contained within the cold ocean current flowing southward along the western coast of the United States to northern Baja California.

Commercial fishing: Fishing in which the fish harvested, either in whole or in part, are intended to enter commerce through sale, barter, or trade.

Council: The Pacific Fishery Management Council, including its Highly Migratory Species Management Team (HMSMT), Highly Migratory Species Advisory Subpanel (HMSAS), Scientific and Statistical Committee (SSC), and any other committee established by the Council.

Eastern Pacific Ocean (EPO): The area of the Pacific Ocean bounded by the coastline of North, Central, and South America, and 50° N., 150° W., and 50° S.

–A climatic-oceanographic phenomenom that precipitates ocean warming of varying intensity and duration in the Pacific Ocean. This phenomenom is caused by an unusual weakening of the normally westward-blowing trade winds, which in turn allows warm surface waters to spread eastward.

Endangered Species Act (ESA): Enacted in 1973, the ESA directs federal departments and agencies to conserve endangered species and threatened species and utilize their authorities in furtherance of the purposes of the ESA.

Exclusive Economic Zone (EEZ): The zone established by Presidential Proclamation 5030, 3 CFR part 22, dated March 10, 1983, and is that area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal states to a line on which each point is 200 nautical miles (370.40 km) from the baseline from which the territorial sea of the United States is measured. Off the west coast states, the EEZ is the area between 3 and 200 miles offshore.

Fishing mortality rate (F): A measurement of the rate of removal of fish (fishing mortality) from a population by fishing.

Fmax: The level of fishing mortality that produces the greatest yield from the fishery.

Gangion: A single line suspended from the main line of fishing gear that terminates in baited hook(s).

High Seas: All waters beyond the EEZ of the United States and beyond any foreign nation's EEZ, to the extent that such EEZ is recognized by the United States (Note, this definition is used in the HMS Fisheries Management Plan (FMP) and differs from the definition in the Magnuson-Stevens Act, which defines "high seas" as waters beyond the territorial sea).

Highly Migratory Species (HMS): Pelagic species of fish (those that live in the water column as opposed to on the surface or on the bottom) including tunas, sharks, billfish/swordfish and which undertake migrations of significant but variable distances across oceans for feeding or reproduction.

Incidental take (ITS): "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect individuals from a species listed on the ESA. Incidental take is the non-deliberate take of ESA listed species during the course of a federal action (e.g., fishing under an FMP).

Incidental Take Statement: A requirement under the ESA Section 7 consultation regulations, it is the amount of incidental take anticipated under a proposed action and analyzed in a biological opinion.

Maximum sustainable yield (MSY): The largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

Optimum Yield: The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and, taking into account the protection of marine ecosystems; that is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and, in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery.

Overfishing or Overfished: As defined in the Magnuson-Stevens Fishery Conservation and Management Act, the terms "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.

Potential Biological Removal: A requirement of the MMPA, it is the estimated number of individuals that can be removed from a marine mammal stock while allowing the stock to maintain or increase its population.

Section 7 consultation: A requirement of all discretionary federal actions to ensure that the proposed action is not likely to jeopardize ESA listed endangered or threatened species. Refers to Section 7(a)(2) of the ESA.

Stock: A group of fish with some definable attributes which are of interest to fishery managers, for example: bigeye tuna stock.

Strategic Stock: A marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level which, based on the best available scientific information, is declining and is likely to be listed within the foreseeable future or is already listed as a threatened or endangered species under the ESA of 1973.

Take: The term is used with respect to protected species (marine mammals, sea turtles, and seabirds), is defined by the applicable statute (Marine Mammal Protection Act, Endangered Species Act, or the Migratory Bird Treaty Act), and the associated implementing regulations.

1.0 Introduction

The future viability of the west coast swordfish fishery has been raised by stakeholders and fisheries managers as an issue of concern because the fishery has declined substantially in response to, among other factors, the increased regulation of the California/Oregon Swordfish/Thresher Shark Large-Mesh Drift Gillnet (Swordfish DGN) fishery. A major driver of the increased regulation was the high rate of bycatch in the fishery including relatively frequent interactions with protected species such as sea turtles and marine mammals. Swordfish DGN operations are now significantly reduced within the traditional fishery range, which at one time extended as far north as the waters offshore of the Columbia River, Oregon. A small fleet of approximately 40-45 active Swordfish DGN vessels remains today restricted to operating seasonally in the Southern California Bight (SCB) with many west coast vessel owners and shoreside support industries suffering an economic disadvantage as a result. The current suite of swordfish fisheries and their underlying regulatory regime is likely contributing to the underutilization of a healthy swordfish stock whose geographic range extends well beyond the SCB area. Thus, development of an economically feasible/low bycatch gear for swordfish fishing along the U.S west coast may provide relief to swordfish fishermen and the communities that are supported by them. The relief would also be timely given the seafood trade imbalance that exists with over 80% of seafood consumed by Americans being supplied via imports[1].

1.1 Proposed Action

The proposed action is to recommend approval for funding of a Saltonstall-Kennedy (S-K) grant to the Pfleger Institute of Environmental Research (PIER), the applicant, to capture and tag swordfish off the coast of southern California using experimental deep-set buoy gear. The applicant proposes a two-year research plan with 300 sets of deep-set buoy gear to be deployed in year one utilizing their research vessel and 600 sets of buoy gear in year two using cooperative commercial fishing vessels as the research platform. The applicant will utilize the expertise and aerial reports from cooperative pilots and captains to locate swordfish concentrations which will provide insights into where to set the buoy gear to effectively target swordfish at depth (i.e., the applicant suggests that there may be some correlation with areas of basking swordfish and areas of swordfish abundance below the thermocline, an additional benefit to the proposed research). The gear would be set during daylight hours at depths below the thermocline (250-400 meters) and the proposed action would include, among other contingencies, NMFS-approved technical monitor/observer coverage, if requested. The research would take place from June-November except in the event of a declared El NiZo condition when the applicant has agreed to cease activities from June-August following the current restrictions placed upon the Swordfish DGN fishery. The basis for halting fishing

[1] "Food Safety", GAO Report to Congressional Requesters, GAO 04-246, January 2004, citing information from NOAA Fisheries.

operations is the increased likelihood of loggerhead turtles coming into the nearshore waters of the SCB.

1.3 Purpose and Need for Action

NMFS is responsible for the management and conservation of Federal fishery resources. Scientific research, including the testing of less invasive alternative fishing gears (aka "conservation engineering"), is an important means of gathering valuable information about the nation's living marine resources. Gathering such information is pivotal for making informed ecosystem-based decisions on the conservation and management of these fish stocks. One of the primary goals of the S-K Grant Program is to provide financial assistance for research and development projects to benefit the U.S. fishing industry. The S-K Grant Program funding priorities are consistent with the goals and objectives of the NOAA and NMFS Strategic Plans and the Magnuson-Stevens Fishery Conservation and Management Act. The objective of the S-K Grant Program is to address the needs of fishing communities (as defined in the Magnuson-Stevens Act) in optimizing economic benefits within the context of rebuilding and maintaining sustainable fisheries, and in dealing with the impacts of conservation and management measures.

The reauthorized Magnuson-Stevens Fisheries Conservation and Management Act (MSRA) states that the Secretary shall initiate and maintain, in cooperation with the Councils, a comprehensive program of fishery research which includes:

> "Conservation engineering research, including the study of fish behavior and the development and testing of new gear technology and fishing techniques to minimize bycatch and any adverse effects on essential fish habitat and promote efficient harvest of target species. (MSRA, Section 104)"

The primary objective of the proposed project would be to investigate the use of deep-set buoy gear to capture and tag swordfish without generating significant bycatch interactions. The information collected under the proposed action could provide a preliminary indication as to whether this gear type could potentially increase opportunity/yield in the Southern California swordfish fisheries through the testing of an alternative fishing gear that has been recently adopted and now is in commercial use along the Florida coast. The proposed work also aligns with the priorities and research and data needs presented at the Swordfish and Leatherback Sea Turtle Use of Temperate Habitat (SLUTH) workshop sponsored by NOAA Fisheries Southwest Region (SWR) and Southwest Fisheries Science Center (SWFSC) in 2008.

2.0 Alternatives

2.1 Alternative 1 (Preferred Alternative)

Alternative 1 is to recommend that funding be awarded to the applicant through NOAA's S-K Grant Program to conduct research of deep-set buoy gear in waters off southern California to target swordfish. The proposed research would involve modifying the night time shallow-set swordfish buoy gear currently being used in the Atlantic commercial fishery. The gear would be modified to target swordfish at depths of 250-400 meters (m) during daylight hours. The proposed research would include 300 sets of gear in year one and 600 sets of gear in year two with a single set of gear containing two baited hooks soaked on average for 4 hour periods. The proposed research period would be conducted from June-November with a caveat that research activities would not be conducted during the June-August time period in the event of a declared El NiZo episode. The applicant will use archival records from recent movement studies, along with time and depth recording devices, to position the gear within the water column at a depth range that targets swordfish and in theory reduces gear interactions with non-target species. The proposed research would use cooperative fishers and knowledgeable fisheries scientists and managers to test the gear in a conservation engineering approach to assess its efficacy and associated bycatch levels. The gear will be set at a target depth below the thermocline in the SCB which would theoretically constrain the abundance and distribution of many non-target species (Figure 1). The SCB encompasses an area bounded by Point Conception to the north (approximately 34 degrees north latitude) and the Mexican border to the south, and out to approximately 25 nautical miles (nm) from the coastline. For the purposes of this EA, NMFS is further defining the outer edge of the SCB to be 120 degrees west longitude (Fig 3), consistent with the regulatory definition of the loggerhead sea turtle closure area[2].

[2] Final Rule Loggerhead Closure can be found at: 50 CFR 660.713(c)(2).

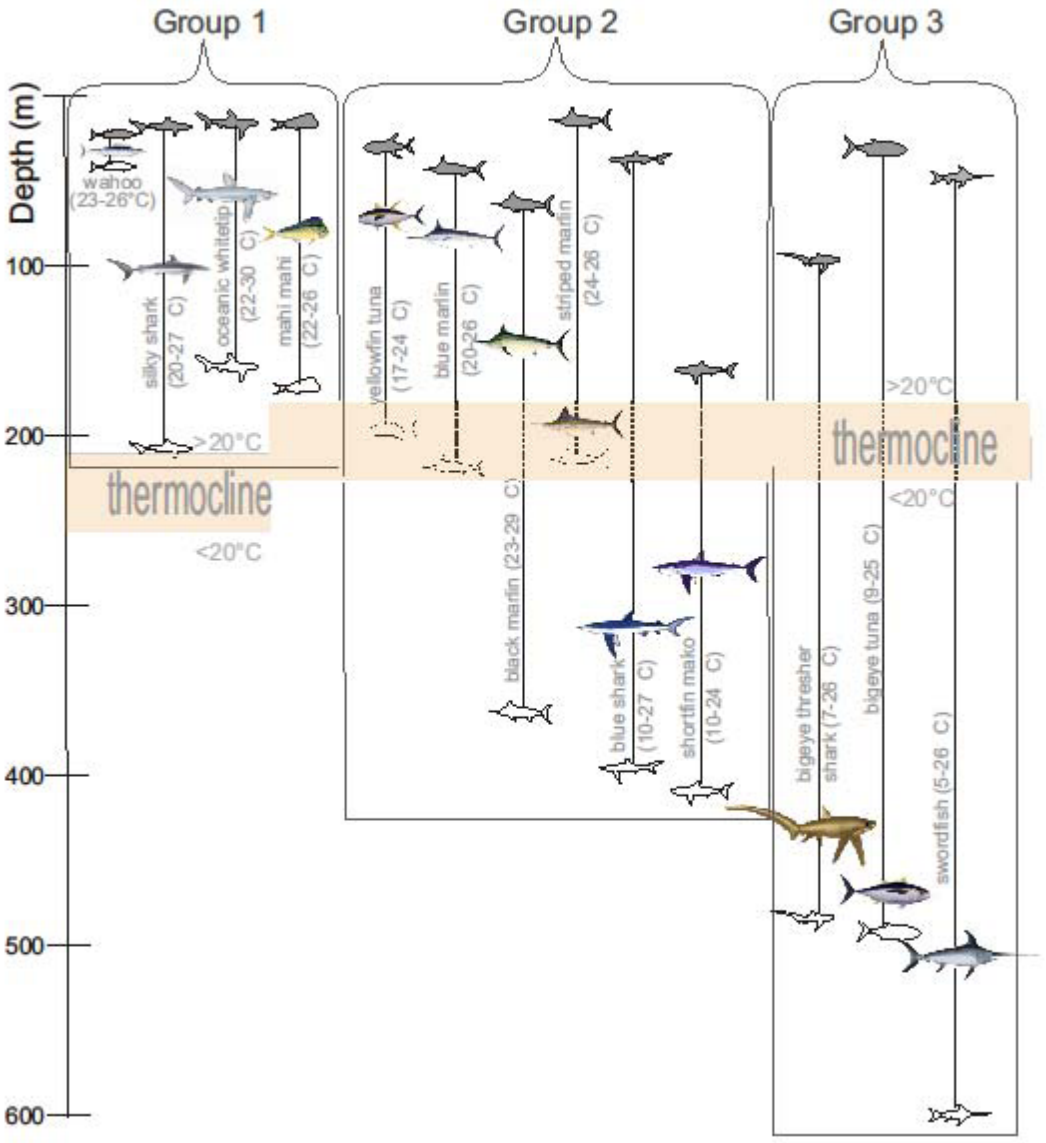

Figure 1. A schematic illustration depicting the thermal partitioning recently shown through the deployment of electronic tags (Bernal et al., 2009)

Numerous operational constraints are included in the proposed research plan to test the objectives of limiting bycatch while maintaining an economically viable catch rate for the target swordfish stock. The proposed gear to be tested would include a buoy flotation system (i.e., a strike-indicator float/flag, a large, non-compressible buoy and a float affixed with a radar reflector). A set of "gear" consists of 250-400 m 500 pound (lb) mainline monofilament rigged with a 1-2 kilogram (kg) drop sinker to orient the mainline

and terminal fishing gear vertically in the water column (Figure 2). The applicant proposes to select the operational drop sinker size and weight based on the completion of initial hook-free trials that would record the minimum weight needed to maintain gangions and the terminal hooks at a precise depth. Two monofilament gangions would branch from the mainline at 250-400 m and would be constructed of 400 lb monofilament leader containing a crimped 14/0 circle hook baited with either squid or mackerel. The applicant would make final bait type selection in consultation with local DGN, harpoon and longline fishers at pre-season seminars designed to incorporate local knowledge of swordfish feeding habits in the SCB. Experimental bait trials would be conducted in year one of the proposed project to test which baits would generate the best combination of highest target catch-per-unit-of-effort (CPUE) values along with the lowest bycatch CPUE values.

All non-target catch would be released immediately back into the ocean and target swordfish catch would be tagged, if their condition factor is acceptable, and released live back into the ocean. Those swordfish not in condition for tagging but still alive would be released after biometric and biological data is collected. Following the constraints of the applicant's current California Department of Fish and Game Scientific Collection Permit, the applicant may retain dead individuals for scientific research purposes. There is no compensation fishing (i.e., sale of harvested fish to offset project/vessel costs) proposed for this research project.

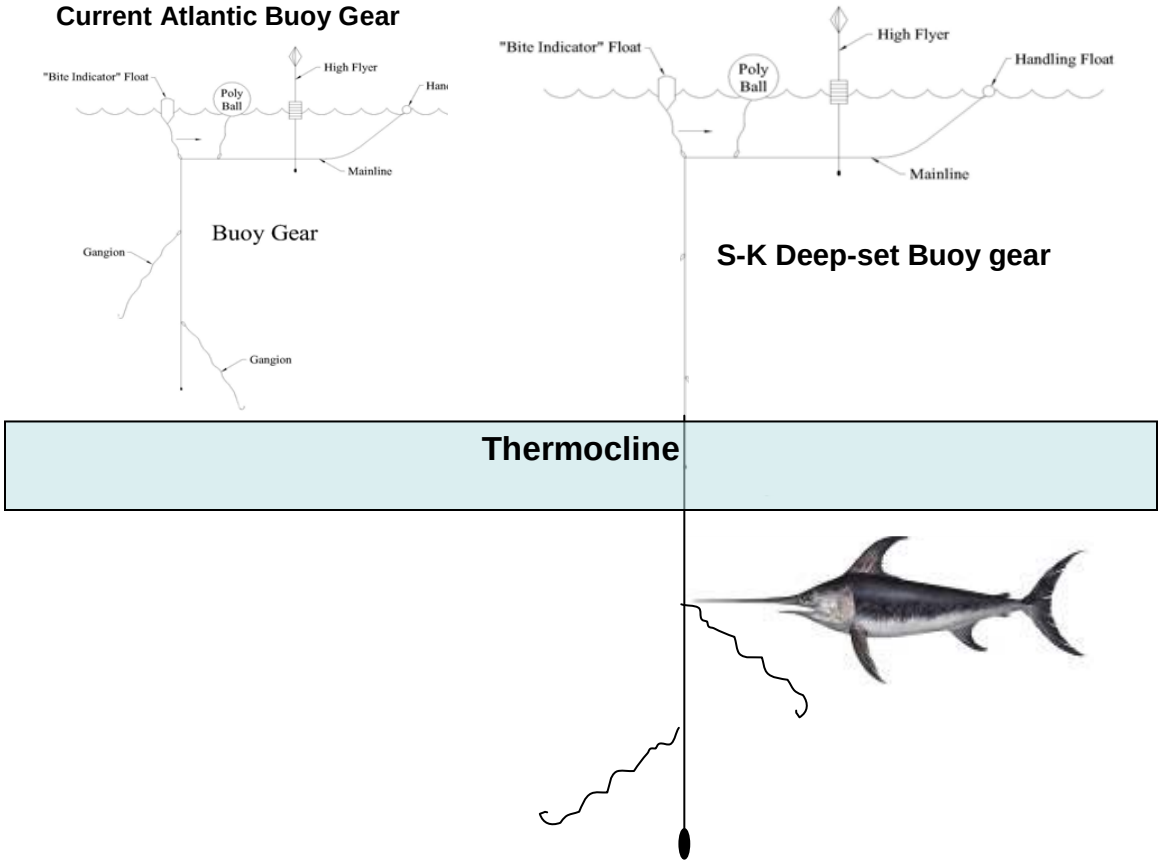

Figure 2. Schematic of the Atlantic shallow-set buoy gear and the proposed S-K Deep-set buoy gear.

2.1.1 Protective Measures for Alternative 1

Alternative 1 includes the conservation measures below to further avoid and minimize any potential environmental effects:

1. Fishing operations would be restricted to the SCB. In the event that an El Niño has been officially declared by NOAA[3] and prescribed sea surface temperature anomalies are observed prior to the opening of the fishery (consistent with the existing Federal regulation pertaining to an El Niño closure for the Swordfish DGN fishery in the SCB), the applicant will suspend research operations during the same time period that the DGN fishery would be likewise suspended (i.e., June-August)[4]. The suspension is an additional measure meant to avoid potential interactions with loggerhead sea turtles that may enter the SCB in greater numbers during an El Niño event. This would not affect the applicant's ability to conduct research during the months outside the prescribed closure period.
2. All research participants assisting in the field activities will be required to participate in a NMFS Protected Resources Division workshop to gain experience with de-hooking sea turtles and marine mammals in the unlikely event that any are captured.
3. Minimize sag or slack in the fishing line (maintain a vertical profile and keep hooks at or below 250 m depth) to minimize potential for marine mammal interactions.
4. The use of circle hooks which have been shown in other hook-and-line fisheries to increase post-hooking survivorship with selected non-target species.
5. If requested by NMFS, have technical monitors/observers (approved by NMFS) on all vessels that participate in the field to ensure that all applicable conditions of the permit are adhered to.
6. The maximum number of sets proposed is 300 the first year, 600 the second year, for a total not to exceed 900 sets for the duration of the proposed research plan.
7. There would be no retention for sale of any fish captured during the research (i.e., no compensation fishing). Swordfish, bigeye thresher sharks, and opah, the three principal species of research interest, would be tagged and released alive, condition factor permitting.
8. There would be initial sets without hooks utilizing Time-Depth-Recording devices (TDRs) to determine the ideal amount of weight for the lines to minimize sag and keep the hooks at depth.
9. The buoys would be deployed in a restricted spatial grid such that the applicant can visually monitor all of the indicator buoys from the vessel (within a maximum 4 nm grid area). When an indicator flag rises, the buoy set would immediately be tended and the animal caught would either be released or tagged and released in order to increase post-hooking survivorship of all animals.

[3] An overview can be viewed at http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml
[4] The rule was published in the Federal Register on December 16, 2003 and can be found at 68 FR 69962

10. A high speed electric reel will be used to speed up the retrieval operation thereby mitigating further the potential for interactions with non-target species by reducing the time that baits are within the upper water column.

Based on the proposed gear and methods to be utilized, coupled with the protected measures listed above, it is predicted that there will be no takes of any protected species under the proposed action. This determination was based in part on the following factors:

- The low probability of hooking and/or entanglement with the proposed gear which has been designed specifically to avoid bycatch interactions (e.g., zero protected species interactions to date in the Atlantic Swordfish Buoy Fishery with similar gear and higher effort levels),
- The minimal visual and/or sensory attractants to the gear in the upper water column (i.e., no surface chumming or offal discharge, no multiple hook slow sinking cues),
- The life history/ecology for the species in question including prey preference (e.g., bait and/or target/non-target catch), feeding behavior (e.g., day/night), seasonality, and habitat preference (e.g., time spent above or below the thermocline, target feeding zone at depth),
- And the presence/absence and relative abundance for the species in question during the proposed research time frame in the action area.

In addition, the majority of past interactions with protected species have occurred from fishing gears that pose a much higher threat level in regards to hazards such as trailing gear (e.g., high surface area drift gillnets, pot gear with relatively thick diameter polypropylene rope and long soak times, and extremely long, sagging horizontal pelagic longlines) than the gear and methods in the proposed action under consideration (i.e., single vertical weighted monofilament line with little or no sag).

In addition to these measures, the applicant will be required to comply with all federal and state permits necessary to conduct this research. The principal investigators both possess current Scientific Collection Permits[5] under the California Department of Fish and Game that allow for the take of swordfish using the proposed methods.

2.2 Alternative 2 (No Action)

Under the no action alternative, NMFS SWR would not award the S-K grant funds to the applicant to carry out the proposed research. The no action alternative would consist of not testing the deep-set buoy fishery gear to target swordfish. No experimental gear would be tested during daylight hours at depths of 250-400 m, thus no information regarding the effectiveness of this experimental gear in reducing bycatch or in targeting swordfish would be attained and the potential use of a more favorable fishing method in terms of bycatch impacts would be lost. Minimizing and mitigating bycatch in federally-

[5] SCP permit numbers SC-002471, SC-005463, and SC-004364.

managed fisheries is a key objective in both the MSRA (National Standard Guidelines) and the S-K Grant Program.

3.0 Affected Environment

3.1 Action Area

The proposed action would occur in U.S. waters of the Southern California Bight (SCB) (Figure 3), an area bounded by Point Conception to the north and the Mexican border to the south, and out to approximately 25 nm from the coastline. The applicant states that based on tagging efforts from the last five years, and to reduce vessel support costs, most of the research would be conducted within daily operational range of the ports of Dana Point and Oceanside, California (i.e., south of Pt. Vicente). The SCB is generally recognized as the coastline from Point Conception near Santa Barbara, to Cabo Colnett, near Ensenada, Mexico (SCCWRP 1999). The SCB is characterized by the dramatic recessed angle of the coastline that has created a mixture of cold water from the California Current flowing southward and warmer water from equatorial regions flowing northward. Marine species assemblages in the SCB are influenced by variations in the timing of coastal upwelling, strength and location of the California Current, and the amount of warm water (Love et.al. 2008).

The proposed action would be conducted in the water column below the thermocline, at depths of 250-400m, with fishing to occur only during daylight hours. The conditions at this depth consist of relatively cold, oxygen-poor waters that are inhospitable to most pelagic species, which are not physiologically equipped to continuously inhabit the water column at such depth, except for a few pelagic predators (Musyl et al., 2004; Bernal et al., 2009). Several depth distribution studies have corroborated this theory showing that swordfish occupy a unique niche utilizing habitat in depths below the thermocline during the day, a zone that few other pelagic predators have adapted to (Musyl et al., 2004; Takahashi et al., 2003; Bernal et al., 2009).

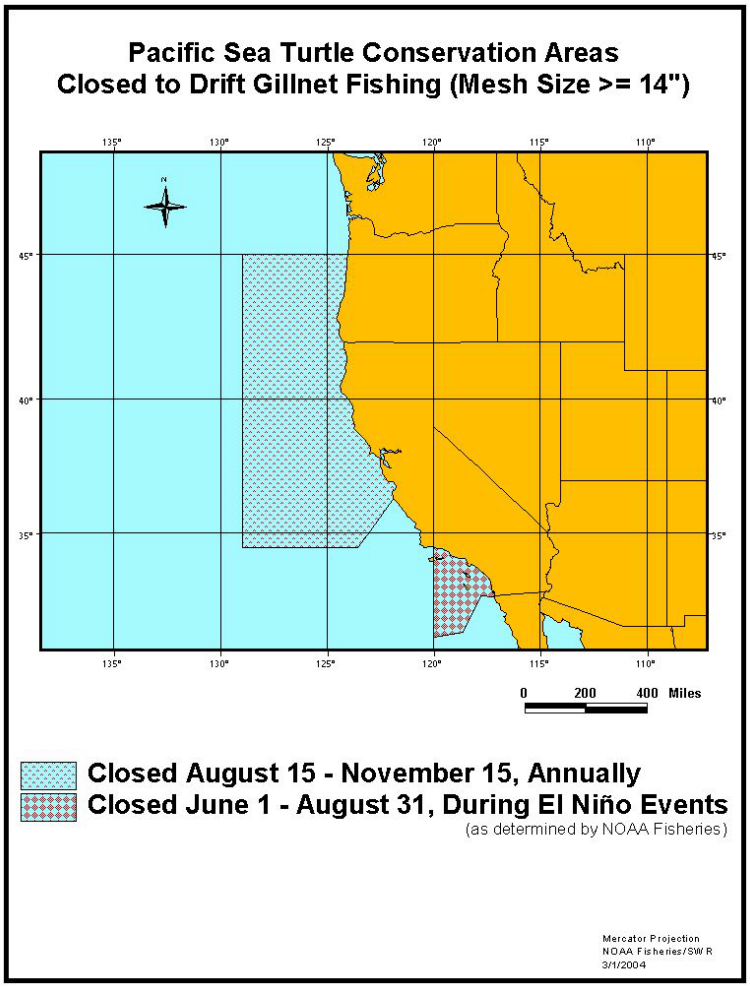

Figure 3. Pacific Sea Turtle Conservation Areas showing outline of the closed area for the DGN fishery and for the S-K applicant in SCB if there was a declared EL Niño event.

3.2 Climate and Biophysical Factors Contributing to Baseline Effects

3.2.1. West Coast Oceanography

The West Coast of North America from the Straight of Juan de Fuca to the tip of Baja California is part of an eastern boundary current complex known as the California Current System (Hickey 1988). The U.S. West Coast EEZ encompasses one of the major coastal upwelling areas of the world, where waters provide a nutrient-rich environment and high densities of forage for many living marine resources, including highly migratory species. In contrast to the SCB, rugged waters and sea state conditions are common north of Point Conception (NMFS 2007). The SCB provides an ideal basin for conducting the proposed research due to the calm, protected waters of the SCB and the presence of productive swordfish fishing grounds proximal to several southern California ports. Further, the location of the proposed research coincides with previous movement studies of swordfish and non-target species, which provides information necessary for the optimization of gear and minimizing bycatch interactions.

3.2.2. Oceanic Fronts

The occurrence and behavior of pelagic species like swordfish is strongly influenced by the thermal structure of the open ocean environment. Although swordfish occur widely in the Pacific, and tolerate a wide range of water temperatures (5-27 °C), they concentrate at oceanic fronts (Hinton, 2003). These fronts are areas of steeper temperature and salinity gradient. Although large open ocean frontal zones do not extend to the West Coast, localized frontal systems are set up within the California Current System in response to coastal upwelling and interaction with coastal geometry (Castelao *et al.*, 2006). Fronts develop close to the coast in the spring, particularly south of Cape Blanco, Oregon, and increase over the summer and into the fall, extending farther offshore (NMFS 2007). The presence of well defined SCB frontal features are key to the proposed research plan in regards to maximizing the odds of locating concentrations of target swordfish which is why the applicant has proposed the periods of summer and late fall for conducting operations.

3.2.3

Two meso-scale ocean-climate phenomena likely affect frontal activity and the distribution of swordfish, non-target finfish, and protected species that may be found in the SCB. The first is El o Southern Oscillation (El), which is characterized by a relaxation of the Indonesian Low and subsequent weakening or reversal of westerly trade winds, causing warm surface waters in the Western Pacific to shift eastward. Although the effects can be global, especially during an intense event, off the West Coast an El event brings warmer waters and a weakening of coastal upwelling. Tropical

species, such and tuna and billfish can exploit habitats further to the north; for example striped marlins were recorded off the Oregon coast during the strong 1997-99 El Niño event (Field and Ralston 2005). A related condition is termed La NiZa and results in inverse conditions (i.e., intensified Indonesian Low, strengthened westerly trade winds, pooling of warm water in the Western pacific and relatively cooler water in the Eastern Tropical Pacific and California Current System). Etnoyer, *et al.* (2004) found the Eastern North Pacific was less active in terms of front concentration and persistence during El Niño and relatively more active during La NiZa (NMFS 2007).

3.3 Baseline Description of Fisheries in Proposed Action Area

The following review of fisheries and available data sets provides a summary of information and actions that define the baseline and indicate potential exposure of species to the proposed gear and method as described in the proposed action. Because deep-set buoy fishing gear for swordfish has not been tested within the EEZ waters adjacent to California, there are no fishery dependent data sets available to quantitatively estimate the effects of testing this gear type. There are however, several proxy datasets, including logbook and observer data from other fisheries that allow at least some comparative snap shot of potential target and non-target catch estimates. The datasets reviewed included those from west coast HMS fisheries in adjacent areas within the proposed action area (including an experimental fishery) and/or from HMS fisheries prosecuted in mid- to deep-water habitat zones outside the proposed action area. These fisheries include:

- An experimental Southern California HMS Shark Longline Fishery
- the California/Oregon Swordfish/Thresher Shark Large Mesh Drift Gillnet Fishery
- the California Halibut/White Seabass Set Gill and Trammel Net Fishery
- the Atlantic Coast Swordfish Buoy Fishery
- the California and Hawaii Deep-Set Tuna Longline Fisheries

3.3.1 Southern California Experimental Shark Longline Fishery

An experimental commercial shark longline fishery was authorized by the State of California in 1988 to operate within a restricted area[6] of the SCB during the months of April-December (O'Brien and Sunada, 1994). The target species were shortfin mako shark (*Isurus oxyrinchus*) and blue shark (*Prionace glauca*). The gear consisted of a single stainless steel drift longline up to 6.4 km in length, 4 m steel gangions (branchlines), and 10 m long buoy lines. The average fishing depth was 10-20 meters.

[6] The gear was seasonally restricted in the area from Point Vicente and Santa Catalina Island in Los Angeles County to Point Loma in San Diego County. The purpose of the closure was to minimize conflicts between other commercial shark and sport shark fisheries.

The gear was set during daylight hours and left to fish for an average of 5 hours before retrieval. Because of concern over potential incidental catch of striped marlin, an observer program was required to monitor the catch with a coverage rate of approximately 19% of all sets for the years 1988-1989. The State issued ten permits in 1988 and 1989 and allowed the experimental fishery to continue during 1990 and 1991 without observer coverage due to the low non-target catches observed in 1988 and 1989. In 1992, however, the State denied the renewal of the permits and the fishery was terminated due to, among other things, the lack of suitable markets for the target catch. Blue sharks and shortfin mako sharks accounted for approximately 91% of the catch, with blue sharks approximately twice as common as shortfin mako sharks. No striped marlin were observed in the catch, and bycatch of other species was considered minimal (Table 1).

Table 1. Number of species observed captured in the experimental drift shark longline fishery, 1988-1989.
Source: California Department of Fish and Game observer data (O'Brien and Sunada, 1994).

Species	1988 (number captured)	1999 (number captured)
Blue shark	1,900	1,320
Short-fin mako	883	610
Pelagic stingray	265	194
California sea lion	3	2
Pacific mackerel	2	0
Hammerhead shark	2	0
Finescale trigger fish	1	0
Giant sea bass	1	0
Ocean sunfish (mola)	1	2

Note: The authors reference a green sea turtle *(Chelonia* mydas) in the observed catch textual summary of their report (p. 225), but no further information is provided as to why the observation was not listed in the observed table of catch in their report.

3.3.2 California/Oregon Swordfish/Thresher Shark Large Mesh Drift Gillnet Fishery

Detailed descriptions of the Swordfish DGN fishery can be found in the HMS FMP (PFMC 2003, Ch. 2 Pg. 13-17), and in the Biological Opinion on the Authorization to Take Listed Marine Mammals Incidental to Commercial Fishing Operations.[7] Currently, the DGN fishery is one of six West Coast HMS fisheries co-managed by the Pacific Fishery Management Council (PFMC) and NMFS in accordance with the HMS FMP. The Swordfish DGN fishery is a limited entry program, managed with gear, season, and area closures. Because of the seasonal migratory pattern of swordfish and seasonal fishing restrictions, over 90 percent of the fishing effort occurs from August 15 through January 31. The fishery has been monitored since 1996 by the NMFS Southwest Region's Observer Program at a 13%-21% annual coverage rate (based on number of sets observed; approximately one set per day is the fishery standard). The data obtained provides a large and reliable data set on target and non-target catch, landings, and discards in the proposed action area (Table 2). Swordfish DGN gear is typically set and fished during the night and hauled back during the morning which differ from the proposed research plan where set and haulback will take place and be completed during daylight hours. The portion of the water column fished by Swordfish DGN gear ranges from approximately 11 m below the surface to 76 m depth which differs considerably from the proposed buoy gear target depth of 250 m or greater. The species complex, however, will have some overlap with the proposed action given the open water nature of the Swordfish DGN fishing gear and the vertical migration patterns for the target and non-target species in question. Because of the vast differences among the different gear types (i.e., DGN vs. hook and line) most if not all of the species entangled in the DGN are not considered likely to be interacted with using the proposed methods.

Table 2. Target species, landings, effort, and percentage of sets for the Swordfish DGN fishery. Source: NMFS SWR Observer Program.

Year	# Vessels	# Sets*	Swordfish Landings (mt)	Thresher Shark Landings (mt)	% Observer Coverage
2005	42	1,075	220	155	21.2
2006	45	1,353	443	99	20.9
2007	46	998	478	167	15.8
2008	46	1060	372	107	13.7

* the number of sets actually cover a 2008-2009 time frame as the DGN season runs through January 31. Landings are calendar year annual estimates based on PacFIN database query.

[7] http://wr.nmfs.noaa.gov/psd/codgftac.htm

Table 3. Observed Swordfish DGN fishery effort in number of sets and target and non-target catch by numbers for selected species, 2005-2009.
Source: NMFS SWR Observer Program.

Season →	**2005/06**	**2006/07**	**2007/08**	**2008/09**
Observed Sets →	**228**	**284**	**158**	**146**
Total Sets in Season →	**1,075**	**1,353**	**998**	**1,060**
		Number Caught		
Swordfish	465	1,025	546	491
Albacore tuna	204	94	86	55
Bigeye thresher shark	75	39	15	15
Bigeye tuna	0	0	0	0
Blue shark	91	104	418	228
Bluefin tuna	47	13	12	30
Common thresher shark	415	180	144	160
Escolar	0	0	1	0
Louvar	16	9	8	8
Opah	62	258	324	143
Short fin mako shark	146	283	241	108
Striped marlin	2	11	11	9
Yellowfin tuna	0	8	13	3
Short-beaked common dolphin	9	5	7	9
Long-beaked common dolphin	5	2	0	0
Unid common dolphin	0	1	1	0
California sea lion	2	12	7	7
Northern elephant seal	1	0	1	0
Pacific white-sided dolphin	0	0	3	3
Risso's dolphin	0	0	0	1
Northern right whale dolphin	0	0	0	1
Loggerhead turtle	0	1	0	0
Northern fulmar (seabird)	5	0	0	0

3.3.3 California Halibut/White Seabass Set Gill and Trammel Net Fishery

In southern California, a bottom set net fishery employing gill and trammel nets with 8.5-inch mesh size and maximum length of 2,743 m is used to harvest halibut, white seabass, and other commercially valuable fishes. There are approximately 58 vessels that are permitted to operate in this fishery (NMFS LOF 2009). For the period 2004–2007, an average of 42 vessels actively participated in the fishery averaging 3,292 days of combined effort. Logbook records indicate that 2,247 thresher sharks, 1,128 makos, and 14 swordfish were caught. The NMFS SWR Observer Program deployed certified

observers on these set gillnet vessels during the 2006-2007 fishing seasons to collect data on, among other things, bycatch and discard levels. This data set, along with the logbook species composition noted above, provides a snap shot of potential species found in the SCB, however, the catch from the set gillnet and trammel net fisheries is predominantly made up of inshore species and the net activities take place in much shallower (10 to 100 m vs. 400m) waters than that of the proposed action under consideration.

Table 4. Total catch and final disposition of animals observed caught in the California Set Gillnet and Trammel Net fishery during 2006 and 2007 based on 59 trips and 260 sets.
Source: NMFS SWR Observer Program.

Species	Total Caught	Number Kept	Catch per 100 Sets
Seabass, White	1040	1025	400.0
Shark, Swell	317	0	121.9
Mackerel, Pacific	270	11	103.8
Halibut, California	210	163	80.8
Ray, Bat	110	0	42.3
Skate, California	109	27	41.9
Dogfish, Spiny	96	2	36.9
Barracuda, California	83	79	31.9
Shark, Leopard	82	69	31.5
Bass, Barred Sand	73	0	28.1
Ratfish, Spotted	69	0	26.5
Scorpionfish, California	55	30	21.2
Lingcod	37	0	14.2
Shark, Soupfin	34	27	13.1
Shark, Brown Smoothhound	30	2	11.5
Sea lion, California	34	0	13.1
Seal, Harbor	3	0	1.2
Pinniped, Unid.	1	0	0.4
Cormorant, Brandts	4	0	1.5
Cormorant, Unid.	1	0	0.4

Note: Finfish species with a CPUE of less than 10 per 100 sets are not included in this table. The only HMS not included was the common thresher shark with catch totaling 18 animals (15 kept, 6.9 catch per 100 sets).

3.3.4 Deep-set tuna Longline Fisheries

There are two U.S. flag deep-set tuna longline fisheries, one based in Hawaii and the other based in California, that routinely carry NMFS certified observers thereby providing data on target and non-target catch and bycatch. These deep-set tuna longline fisheries set gear at target depths close to (e.g., ~200 m), but not quite as deep, to the target depth in the proposed action (i.e., 250 m and deeper). Given these similarities, the non-target catch data generated is valuable in providing a sense of the species complex and catch rates for comparison purposes with the proposed action, keeping in mind the limitations of direct comparisons given the disparate areas being fished. The gear

description is similar for both fisheries with some minor modifications that will not be addressed in further detail. In general, deep-set longline gear consists of a continuous main line set on the surface and supported in the water column horizontally by floats with branch lines connected at intervals to the main line. A line shooter is used to deploy the mainline faster than the speed of the vessel, thus allowing the longline gear to sink to its target depth (average target depth in the Hawaii-based DSLL fishery targeting tuna on the high seas from 2003-2007 was 191 m) (PIFSC 2008).

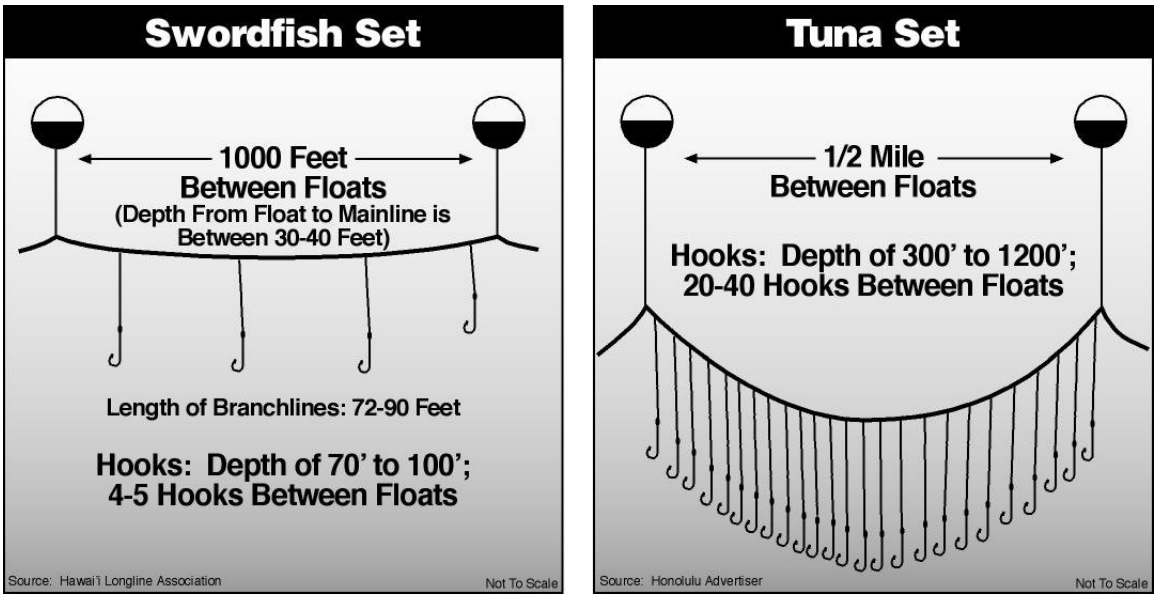

Figure 4. Schematic showing differences in gear type and depths fished for shallow-set swordfish longline gear (left) and deep-set tuna longline gear (right).

The main line is typically 30 to 100 km long with a minimum of 15, but typically 20 to 30, weighted branch lines (gangions) clipped to the mainline at regular intervals between the floats. Each gangion terminates with a single baited hook. The branch lines are typically 11 m to 15 m long. Bait consists of finfish such as saury, sardines, or mackerel. Longline vessels typically make a single gear haul (i.e., set) each day and gear is generally set in the morning and retrieved in the afternoon (Ito and Machado 2001).

3.3.4.1 West Coast-based Deep Set Longline Fishery (2005-present).

The west coast-based deep-set longline (DSLL) fishery, managed under the HMS FMP and operating outside of the EEZ since 2005, has only included one vessel to date. This vessel has had close to 100 percent observer coverage since the fishery began in 2005 so that NMFS could adequately characterize the impacts of DSLL fishing in this area. For the purposes of this EA, quantitative data collected from this vessel's operations cannot be disclosed for confidentiality reasons (i.e., less than three vessel aggregate rule). However, there has only been one interaction with a protected species (olive ridley turtle) to date for this fishery with a large number of hooks observed (i.e, a rare event). The

interaction took place well outside the proposed action area while the fisherman was conducting exploratory operations early in the fishery.

3.3.4.2 Hawaii-based Deep-set Longline Fishery (2003-2008).

Hawaii-based DSLL catch and effort estimates (17,334 observed sets/1,385 trips) were provided by the NMFS Pacific Islands Region Observer Program for the time period 2003-2007 (Table 5). The table includes only those finfish species that are likely to occur in any significant numbers in the SCB (i.e., discounts the infrequent visitor/record). The catch data provide some indication of the potential suite of species and their frequency of occurrence in the area at or below the thermocline depth, recognizing of course that the area is far removed from the SCB action area for the proposed SK buoy project. The area of fishing operations occurred between the latitudes of 1.345º N – 35.443º N. and the longitudes of 137.922º W - 173.62º W. Fishing depths were between 13 m and 728 m but averaged about 191 m. The number of hooks per set ranged from 85 to 4,110, and averaged 2,050 hooks per set. The total number of hooks observed was 35,526,205. Bait consisted of mackerel (1.1 percent, used in 198 sets), mixed fish (17.1 percent, used in 2,972 sets), sardine (30.9 percent, used in 5,364 sets), saury (49.9 percent, used in 8,654 sets), and other (0.8 percent, used in 146 sets). Soak times ranged from less than one hour up to 86 hours, with an average soak time of 19 hours.

Table 5. Total observed catch for selected species captured by the Hawaii-based DSLL fishery on the high seas that may occur in SCB (2003-2007).
Data source: NMFS Pacific Islands Fisheries Science Center.

Species Caught	Total Observed Catch Numbers	CPUE (catch/1,000 hooks)
Dolphinfish (Dorado, Mahimahi)	73,837	2.078
Escolar, Smith's	24,538	0.691
Lancetfish, Longnose	174,837	4.921
Mackerel, Snake	39,634	1.116
Marlin, Striped	20,601	0.580
Mola, Slender	2,102	0.059
Oilfish	895	0.025
Opah	13,543	0.381
Pomfret, Brama	868	0.024
Pomfret, Sickle	56,228	1.583
Remora	9,506	0.268
Shark, Bigeye Thresher	5,889	0.166
Shark, Blue	82,589	2.325
Shark, Shortfin Mako	2,419	0.068
Shark, Unidentified	999	0.028
Shark, Unidentified Thresher	605	0.017
Stingray, Pelagic	5,850	0.165
Swordfish, Broadbill	6,913	0.195
Tuna, Albacore	14,108	0.397
Tuna, Bigeye	143,885	4.050
Tuna, Skipjack	29,299	0.825

Tuna, Unidentified	1,598	0.045
Tuna, Yellowfin	34,575	0.973

Note: Finfish species with CPUE less than 0.010 were not shown.

Table 6. Marine Mammal Interactions with Hawaii Deep-set Longline Fishery, 2006-2008.
Source: NMFS PIFSC Observer Program.

Species	2006 Number of interactions	2007 Number of interactions	2008 Number of interactions
Bottlenose dolphin	1	0	0
Risso's dolphin	2	1	1
False killer whale	4	4	2
Short-fin pilot whale	2	1	3
Striped dolphin	1	0	0
Spotted dolphin	0	0	1
Unid. cetacean	2	1	2
Unid. dolphin	2	1	0
Unid. whale	0	0	3

Note: The striped dolphin, the spotted dolphin, and 1 of the 4 Risso's dolphin interactions were recorded as released dead. All other interactions listed in Table 6 were recorded as released injured.

Table 7. Sea Turtle Interactions with the Hawaii Deep-set Longline Fishery, 2003-2006.

Species (total number)	Dead	Released injured	Released alive	Entangled	Hooked	Unknown	Mouth	Front Flipper	Ingestion
Green (4)	4				4	1	1	2	
Leatherback (7)	3	4		3	6			6	
Olive Ridley (39)	38	1			39	2	25	4	8
Loggerhead (4)	1	2	1	1	3		2		1

Note: Only animals that were released alive were included in the "Gear Attached" section of the table
Source: PIFSC 2007.

3.4 HMS FMP Prohibited Species in the Proposed Action Area

The HMS FMP has identified a suite of prohibited species that must be immediately released if captured with authorized HMS gear (Table 8). The proposed action would not utilize gear and methods that are considered authorized HMS gear. The list includes five

species of Pacific salmon and the Pacific halibut which to date have not been captured in any of the proxy fishery observer records (see above) nor mentioned anecdotally by HMS fishermen as having been captured previously in the proposed action area of the SCB. These species will not be dealt with further in this EA.

The three species of prohibited sharks listed in Table 8 have been noted as captured in the Swordfish DGN fishery but none since the turtle closures were implemented in 2001 at which time the fishery became constrained for the most part to the waters of the SCB (i.e., capture of these prohibited shark species appears to be a rare event in the SCB). There have been no other bycatch records for megamouth and basking sharks in any other nearshore southern California fisheries apart from the Swordfish DGN observations. Given the rarity of encounters and entanglements for these species and the lack of any records for their interactions with hook and line gear, the potential for prohibited species interactions with the proposed action are negligible. There are records of great white shark interactions with net gear in the SCB but none for hook and line gear. The great white shark preys primarily on pinnipeds and is not expected to depredate the squid or mackerel bait type proposed to be fished at depths below the thermocline. As such, potential interactions for these species will not be further analyzed in this EA.

Table 8. HMS FMP prohibited species.

Common Name	Scientific Name
Great white shark	*Carcharodon carcharias*
Basking shark	*Cetorhinus maximus*
Megamouth shark	*Megachasma pelagio*
Pacific halibut	*Hippoglossus stenolepis*
Pink salmon	*Onchorhynchus gorbuscha*
Chinook salmon	*O. tshawytscha*
Chum salmon	*O. keta*
Sockeye salmon	*O. nerka*
Coho salmon	*O. kisutch*

3.5 Current Stock Status of Target Swordfish

Pacific swordfish occur throughout the Pacific Ocean between about 50° N. latitude and 50° S. latitude, with overall distribution varying with seasonal changes in water temperature. Swordfish prefer water temperatures of 64-72º F and tend to concentrate in areas of abundant food, inhabiting frontal zones where ocean currents or masses intersect to create temperature and salinity gradients and turbulence (Sakagawa 2008, SWFSC website). They exhibit a preference for deeper, cooler waters during daylight hours (IATTC 2008). They are caught mostly by the industrial longline fisheries with lesser amounts caught by drift gillnet and harpoon fisheries. The stock structure of swordfish is not well known in the Pacific, however, Hinton and Bremer (2007) concluded that there may be northern and southern stocks of swordfish in the EPO, with the boundary between

the stock distributions occurring at 5° S. latitude, and there may at times be some mixing of stocks from the Central Pacific with the northeastern stock. The northeastern stock appears to be centered off California and Baja California, Mexico, recognizing that there may be movement of a western North Pacific stock of swordfish into the EPO at various times. Catches in the region have been fairly stable since 1989, averaging about 3,700 mt in the northern region and 8,400 mt in the southern region annually. A special session of the ISC's Billfish Working Group was convened in November 2008 to address the uncertainty in stock structure. The ISC will be conducting a stock assessment of North Pacific swordfish in 2009 based on the outcome of the special session with results due out in 2010. Pending these results, the conclusions from the previous analyses provide the best available science indicating that swordfish stocks in the north and eastern Pacific are not overfished or undergoing overfishing (Hinton 2003).

3.6 Finfish Species Most Likely to be Affected by the Action

For the purposes of this EA, a list of finfish species which may be present in the action area and which have a reasonable probability of capture by the proposed action are presented in Table 9. This list is based in part on review of the suite of species captured in the proxy fisheries listed in the preceding sections. The list was further refined taking into consideration the proposed gear type and methodology and the likelihood of encountering a species based on that criteria. Probabilities were determined by weighing several factors including:

- A species life history and behavior profile (e.g., foraging/inhabiting deeper water)
- A species presence, frequency, and relative abundance in the proposed action area and research time frame.

Although tagging data have shown that many pelagic species have the capacity to occasionally "bounce-dive" to depths at or below the thermocline in the SCB, the majority of their time is spent foraging and/or inhabiting waters above the thermocline, which in the SCB is on average at a depth of approximately 70 m (Palacios et al., 2004).

Table 9. Selected finfish species present in the action area with a reasonable probability of capture under the proposed action.

Common name	Species
Albacore tuna	*Thunnus alalunga*
Bigeye thresher shark	*Alopias superciliosus*
Bigeye tuna	*Thunuus obesus*
Blue shark	*Prionace glauca*
Bluefin tuna	*Thunnus orientalis*
Common thresher shark	*Alopias vulpins*
Opah	*Lampris guttatus*
Shortfin mako	*Isurus oxyrinchus*
Striped marlin	*Kajikia audax*
Yellowfin tuna	*Thunnus albacares*
Pelagic stingray	*Dayatis violacea*

3.6.1 Stock Status of Non-Target Finfish Species Most Likely to be Affected by the Action

The following section provides an overview of the stock status for those species listed in Table 9. The 2008 HMS Stock Assessment and Fishery Evaluation Report (SAFE) provides an update and detailed account of the status of the HMS FMP management unit species, which includes all of the species listed in Table 9 with the exception of opah (PFMC 2009). Not all of the species listed in Table 8 have had their stock status assessed which is a precursor for determining whether or not a particular species is being overfished or experiencing overfishing.

3.6.1.1 Albacore Tuna

Currently there are no quotas or harvest guidelines established for North Pacific albacore catch under the HMS FMP. Stock status of North Pacific albacore is reviewed at one- to two-year intervals by ISC Albacore Working Group. The latest assessment was finalized by the working group in July 2007 at which time it was determined that North Pacific albacore stocks are not being overfished or experience overfishing. Spawning stock biomass (SSB) estimates for the period 1966-2006 show fluctuations around an estimated time series average of roughly 100,000 mt. The assessment demonstrates a recent increase in SSB from 73,500 mt in 2002 to 153,300 mt in 2006. The recent increases are likely due to strong year classes in 2001 and 2003. Despite the high SSB estimates relative to the time series average, fishing mortality rates are high relative to most commonly used reference points. If fishing continues at the current level, and all else being equal, then SSB is projected to decline to an equilibrium level of 92,000 mt by 2015. Considering the high fishing mortality rates, and the fact that total catch has been in decline since 2002, the ISC recommended that all nations' practice precautionary-

based fishing practices. Since the mid-1970s, the U.S. component of the overall pan-Pacific Ocean albacore catch is estimated at roughly 15 percent.

3.6.1.2 Bigeye Thresher Shark

The bigeye thresher is found in warm, temperate and tropical oceanic and coastal waters from the surface to depths of 500 m. Very little information exists on the life history and habits of the bigeye thresher shark in general and specifically within the SCB. It is known that they typically inhabit the deeper water column zone which overlaps the proposed action area and forage on benthic and pelagic schooling fish and squid. At this time there are no HMS FMP management measures in place and the status of the stock is unknown due in part to the lack of a current stock assessment for this species. This species is currently not the target of any large scale pelagic fisheries and is typically released when encountered.

3.6.1.3 Bigeye tuna

Stock status of bigeye tuna in the EPO is assessed every 1–2 years by IATTC. The latest assessment was conducted in May 2009 (Aires-Da-Silva and Maunder 2009). The assessment was based on the assumption that there is a single stock of bigeye tuna in the EPO. Results of the base case assessment indicate that at the beginning of January 2009, the spawning biomass of bigeye tuna in the EPO was below the MSY level and near the historic low level. The spawning biomass ratio (the ratio of the spawning biomass at that time to that of the unfished stock; SBR) was about 0.17, which is about 11 percent less than the level corresponding to the MSY, thus the stock is considered overfished. Both recent catches and fishing effort have been above levels corresponding to MSY. Recent catches are estimated to have been 19 percent higher than MSY levels. If fishing mortality is proportional to fishing effort, and the current patterns of age-specific selectivity are maintained, the level of fishing effort corresponding to the MSY is about 81 percent of the current (2006-2008) level of effort, thus the stock is also considered subject to overfishing. The IATTC did finally reach consensus on Resolution C-09-01 that placed restrictions in EPO tuna fisheries for 2009-2011[8] and if adhered to will result in the necessary reduction of fishing mortality on bigeye. Catch of bigeye tuna by U.S. west coast fisheries constitutes less than one percent of the eastern Pacific-wide catch.

3.6.1.4 Blue Shark

In the EPO, blue sharks range from the Gulf of Alaska down to Chile, migrating to higher latitudes during the summer, and lower latitudes during the winter. Within the SCB, blue sharks are found year round and captured as bycatch in the Swordfish DGN fishery but rarely taken by other commercial HMS fisheries. On the high-seas, blue sharks have been caught with both shallow-set and deep-set longline gear. Recreationally, blue sharks are considered a sport fish in the SCB and larger individuals provide a catch-and-

[8] http://www.iattc.org/PDFFiles2/C-09-01-Tuna-conservation-2009-2011.pdf

release challenge for fishermen using light tackle. For the North Pacific blue shark population, a range of examples of what might be considered "plausible" MSY were calculated in 2001 (Kleiber, *et al*. 2001). The data on which the analysis was based consisted of catch, effort, and size composition data collected during the period 1971–1998 from commercial fisheries operating in the North Pacific west of 130° W. longitude; primarily the Japan- and Hawaii-based pelagic longline fisheries, which catch significant numbers of blue sharks. The results indicated that the blue shark stock, under the fishing regime present at that time in the North Pacific, appeared to be in no danger of collapse. An updated analysis covering the same spatial area and which included data through 2003 was recently completed and produced results similar to the previous assessment, namely that blue sharks in the North Pacific, which includes the waters of the SCB, are neither suffering overfishing nor approaching an overfished state (Sibert, *et al*. 2006).

3.6.1.5 Bluefin Tuna

Stock status of Pacific bluefin tuna is reviewed at one-to-two year intervals by the Bluefin Working Group of the ISC. The latest assessment was conducted in January 2006, but the results were not sufficient to determine stock status without high uncertainty. Nevertheless, results from the multiple models provided some common conclusions: (1) biomass had local peaks in the late 1970s and late 1990s, with a decline after the second peak; (2) recruitment in recent decades has varied considerably, and the 2001 year class appears to be strong; and (3) there is no evidence of recruitment failure in recent years (ISC 2006a *in* NMFS 2007). The latest assessment, consistent with the 2004 assessment, demonstrates that current fishing mortality rates are high. Noting the uncertainty in the assessments, the ISC Plenary recommended that bluefin tuna fishing mortality not be increased above recent levels as a precautionary measure. Total catch has ranged widely from 1952-2006, with tonnage of 9,000-40,000, with the most recent catch averaging approximately 22,000 t (ISC 2009). Catch of bluefin tuna by U.S. west coast fisheries constitutes a negligible fraction of the eastern Pacific-wide catch.

3.6.1.6 Common Thresher Shark

Common threshers are migratory animals that inhabit both coastal and pelagic waters in tropical and temperate climates worldwide, from the surface to depths below the thermocline in the SCB. The common thresher shark is found year round in the SCB with peak aggregations of spawning and pupping animals forming in the spring months with the arrival/availability of their preferred prey (sardines, anchovies, squid). When water temperatures warm and prey availability wanes, the larger animals tend to move out of the SCB, however, the juvenile and sub-adult sharks continue to forage in the nearshore waters of the SCB. The HMS FMP has set an annual harvest guideline of 340 mt for the common thresher shark. To date, the combined commercial and recreational take of commercial shark has not exceeded the established guideline based on the best available science. The SWFSC is currently preparing an update to that assessment with delivery due sometime in 2010.

3.6.1.6 Opah

The opah is a pelagic species found worldwide in tropical, warm temperate waters preferring deeper water habitat well below the thermocline in the SCB. It is thought that opahs are solitary animals and they have been caught on tuna longlines in the Pacific as well as by albacore and salmon gear (Barut 1999). In the SCB they are caught as a commercially important non-target catch by the Swordfish DGN fishery ranking third as value following swordfish and thresher shark. Opahs are caught to a lesser extent by recreational anglers fishing for tuna in the SCB. Very little is known regarding the life history and ecology of this species, including seasonality. Studies in the central North Pacific found that opah generally inhabited the 50-400m depth (50-150 m at night, 100-400 m during daylight) in the subtropical gyre northwest of the Hawaiian Islands, where temperatures ranged from 8-22˚C (Polovina *et al. 2008*). These studies also found vertical habitat use by opah to vary with local oceanic conditions. Opah is thought to feed primarily on midwater fishes and invertebrates, mainly squids. The applicants predict that opah will be one of the more common non-target catches (along with bigeye thresher sharks) encountered during the proposed research. The size of the opah population off the coast of California, and whether local subpopulations exist, is not known at this time. To date there has been no assessment conducted on this stock.

3.6.1.7 Shortfin Mako Shark

The shortfin mako shark is a predominantly pelagic species found worldwide in tropical and temperate seas. In the EPO makos are distributed from Oregon to Chile and it has been hypothesized that this species migrates seasonally from the coast of California along the Baja peninsula following favorable seasonal water conditions (Cailliet and Bedford 1983). Juvenile makos are common in the SCB during the summer months when water temperatures warm and like common thresher sharks, they may be utilizing the SCB as a pupping and rearing ground. Tagged juvenile shortfin mako sharks spent less than 1% of their time below 200 m, however, they have been recorded down to depths of 740 m (Sepulveda et al., 2004). Mako sharks are a common non-target catch in the Swordfish DGN fishery and other net fisheries operating in the SCB with predominantly juvenile age classes being captured. Shortfin mako is an important component of California's ocean recreational fishery. The majority of makos are caught by anglers fishing with rod-and-reel gear from private vessels in the Southern California Bight from June through October, with a peak in August. Basic population dynamic parameters for mako sharks are unknown. Catch statistics from the Swordfish DGN fishery suggest that the shortfin mako was not overexploited through the 1990s; however, CPUE rates indicated a possible overall decrease (PFMC 2003). Clear effects of exploitation have not been shown, and it is tentatively assumed that overfishing of the local stock is not occurring. To date, there has been no EPO stock assessment conducted for this species, however, it is being managed under the HMS FMP with a precautionary harvest guideline of 150 mt. The overall commercial catch of mako shark taken by the principal DGN fishery has declined as a result of state and Federal regulatory action (e.g., turtle time/area closures).

3.6.1.8 Striped Marlin

Striped marlin are found throughout the Pacific Ocean between about 45° N. and 45° S. latitude. The depth distribution of striped marlin within the SCB has been studied showing that this species has a predominantly surface-oriented distribution, with dives below the thermocline rare (Brill et al., 1993). They are caught mostly by the longline fisheries of the Far East and Western Hemisphere nations. Lesser amounts are caught by recreational, gillnet, and other fisheries. The HMS FMP prohibits commercial take of striped marlin, however there is a small seasonal recreational fishery for striped marlin in the SCB in the late summer months. Similarly, in Mexico, commercial take of striped marlin is prohibited within 50 nm of the coast to provide opportunities for recreational anglers. The stock structure of striped marlin in the Pacific Ocean is not well known. The status is difficult to determine due to a range of uncertainties in the fishery data as well as biological uncertainties. Nonetheless, the results of two models demonstrate that biomass has declined to levels that are 6 to 16 percent of their level in 1952. In addition, landings and indices of abundance have declined markedly, and recruitment has been steadily declining with no evidence that strong year-classes have or are about to enter the fishery. There appears to be inconsistency in the indices developed for the Western Pacific and the Eastern Pacific, and it was recommended that stock structure in the NPO be investigated. Although there are no agreed upon biological reference points, the ISC Plenary recognized that current levels of fishing effort across the North Pacific are not likely to be sustainable. It was further recommended that a committee be formed to determine ways to reduce fishing mortality on striped marlin without adversely affecting target species, and until that work is completed, that fishing effort not be increased above current levels. The next striped marlin stock assessment is scheduled for 2011. Catch of striped marlin by U.S. West Coast fisheries constitutes about one percent of the Eastern Pacific-wide catch.

3.6.1.9 Yellowfin tuna

Stock status of yellowfin tuna in the EPO is assessed every 1–2 years by IATTC. The IATTC conducted the latest stock assessment of eastern Pacific yellowfin tuna in May 2009 (Maunder and Aires-Da-Silva 2009). The 2008 base case assessment indicates that at the beginning of 2009 the spawning biomass ratio of yellowfin in the EPO was above the level corresponding to MSY, thus the stock is not overfished, and effort levels are estimated to be less than those that would support the MSY, but recent catches are substantially below the MSY level. In addition, the recent fishing morality rate (*F)* was below the level corresponding to MSY, thus the stock is also not subject to overfishing. Under current levels of fishing mortality (2006-2008), the spawning biomass is predicted to slightly decrease, but remain above the level corresponding to MSY. Catch of yellowfin tuna by U.S. west coast fisheries constitutes less than one percent of the eastern Pacific-wide catch.

3.6.1.10 Pelagic Stingray

The pelagic stingray has a global distribution occupying tropical to temperate waters. In the eastern Pacific it is thought that they migrate to the warmer waters off Central America during the winter to give birth before migrating to higher coastal latitudes including the waters of the Southern California Bight (Mollet 2002). This species is commonly caught and discarded as bycatch in HMS pelagic longline and Swordfish DGN fisheries. A stock assessment has not been conducted for this species to date. A high percentage of pelagic stingrays are noted as discarded alive in the available observer records.

3.7 Protected Species Most Likely to be Affected by the Action

Most of the information presented in the following section was drawn from species descriptions and current status reports presented on the NMFS Protected Resources homepage and associated links[9]. The SCB hosts a wide array of species protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). A full description of all marine mammal species likely to occur in the proposed action area can be found in the 2008 U.S. Marine Mammal Stock Assessments (SARs)[10] (Carretta *et al.* 2009). A comprehensive review of the status of sea turtles can be found in the most recent the Five Year Sea Turtle Status Review Reports published by the U.S. Fish and Wildlife Service and NMFS and in the HMS FMP Biological Opinion (NMFS 2004). Given the availability of these comprehensive background materials, detailed information on the life history for the species likely to be found in the action area will not be repeated in this EA.

For the purposes of this EA, only protected species that have been determined to have the potential to interact with the proposed action/gear type (Table 10) are discussed. The list was compiled considering a number of factors including the natural history/behavior of the species, their spatial and temporal distribution, their historic observed interactions with the proxy fisheries, and their relative abundance in the proposed action area. It is assumed that species that are most abundant in the action area are more likely to have individuals interact with the proposed gear.

[9] http://www.nmfs.noaa.gov/pr/species/
[10] http://www.nmfs.noaa.gov/pr/sars/region

Table 10. Protected Species with the Potential for Interaction under the proposed action.

Note: All marine mammals are protected under the MMPA. Those that are listed as a strategic stock or a depleted stock under the MMPA are designated in the table as S (strategic) or D (depleted). Those stocks listed under the ESA are listed as E.

Marine Mammals	Designation Status
Cetaceans	
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)	
Risso's dolphin (*Grampus griseus*)	
Short-beaked common dolphin (*Delphinus delphis*)	
Long-beaked common dolphin (*Delphinus capensis*)	
Blue whale (*Balaenoptera musculus*)	S, D, E
Fin whale (*Balaenoptera physalus*)	S, D, E
Gray whale (*Eschrictius robustus*)	
Humpback whale (*Megaptera novaeangliae*)	S, D, E
Pinnipeds	
California sea lion – US Stock (*Zalophus californianus californianus*)	
Sea Turtles	
Leatherback turtle (*Dermochelys coriacea*)	E
Loggerhead turtle (*Carretta Carretta*)	E
Olive ridley (*Lepidochelys olivacea*)	E
Green turtle (*Chelonia mydas*)	E

3.7.1 Stock Status of Protected Species Most Likely to be Affected by the Action

3.7.1.1 Marine Mammals

The population indices/estimates (abundance, Potential Biological Removal) for the marine mammal species cited in the following section are reported from the 2009 U.S. Marine Mammal Stock Assessment Report (Carretta *et al.* 2009) and from information extracted off the NMFS PRD website, unless otherwise cited. The Potential Biological Removal (PBR) provides an estimate of the number of individuals that can be removed from a particular marine mammal stock while allowing the stock to maintain or increase its population.

3.7.1.1.1 Pacific white-sided dolphin

Pacific white-sided dolphins range in the Eastern Pacific Ocean from the Gulf of Alaska to the Gulf of California. They are most common between the latitudes of 38°N and 47°N. Sighting patterns from recent aerial and shipboard surveys conducted in California, Oregon and Washington (Green et al. 1992; 1993; Barlow 1995; Forney et al. 1995) suggest seasonal north-south movements, with animals found primarily off California during the colder water months and shifting northward into Oregon and Washington as water temperatures increase in late spring and summer (Green et al. 1992; Forney 1994). Seasonal abundance estimates off the entire coast of California are an order of magnitude higher in February-April than in August-November. Off San Clemente Island, California, Pacific white-sided dolphins were present only during the cold-water months of November-April (Carretta *et al.* 2000). Brownell *et al.* (1999) suggested that their occurrence off Southern California appears to be variable, possibly relating to changes in oceanographic conditions on seasonal or inter-annual time scales (*i.e.*, El Niño events). The estimated population range-wide (including the North Pacific stock) is more than 900,000 animals with the California/Oregon/Washington stock estimated to be 59,000 animals. Pacific white-sided dolphins have been observed taken in the Swordfish DGN fishery. The PBR for this stock is 155 animals per year.

3.7.1.1.2 Risso's dolphins

Risso's dolphins are found in temperate, subtropical and tropical waters and their spatial distribution may be limited by water temperature (preferred range 15-20°C). However, very little is known of their migration patterns or movements, but they may be affected by movements of spawning squid and oceanographic conditions. Risso's dolphins are capable of diving to at least 300 m for up to 30 minutes, but more commonly make shorter dives of 1-2 minutes. They feed on fish (e.g., anchovies), krill, and cephalopods (e.g., squid, octopus and cuttlefish) mainly at night when their prey is closer to the surface. The majority of their diet consists of squid, and they have been known to move into continental shelf waters when following their preferred prey. The California/Oregon/Washington stock is estimated between 13,000-16,000 animals. Risso's dolphins have been observed taken in the Swordfish DGN fishery and the deep-set tuna longline fishery. The current PBR is 97 animals per year.

3.7.1.1.3 Short-beaked common dolphin

Short-beaked common dolphins prefer warm tropical to cool temperate waters (10-28° C) that are primarily oceanic and offshore, but still along the continental slope in waters 200-2,000 m deep. Off the U.S. west coast, the majority of the populations are found off of California, especially during the warm-water months. Short-beaked common dolphins are capable of diving to at least 200 m to feed on fish from the deep scattering layer at night, and usually rest during the day. The majority of their prey is epipelagic schooling

fish and cephalopods (e.g., squid). Short-beaked common dolphins commonly associate with schools of tuna and seabird feeding flocks, especially in the eastern tropical Pacific Ocean. The California/Oregon/Washington stock is estimated between 366,000-450,000 animals. Short-beaked common dolphins have been observed taken in the Swordfish DGN fishery. The current PBR is 3,387 animals.

3.7.1.1.4 Long-beaked common dolphin

Long-beaked common dolphins generally prefer shallow, tropical, subtropical and warmer temperate waters closer to the coast and on the continental shelf. They are commonly found along the U.S. west coast, from Baja California northward to central California. Long-beaked common dolphins generally prefer shallower and warmer waters closer to the coast when compared to short-beaked common dolphins. Long-beaked common dolphins are capable of diving to at least 280 m for periods up to 8 minutes to feed on prey. The majority of their diet consists of small schooling fish (e.g., anchovies, hake, pilchards, and sardines), krill and cephalopods (e.g., squid).Long-beaked common dolphins are not as abundant as short-beaked common dolphins, but they are not considered threatened or endangered. For management purposes, long-beaked common dolphins inhabiting U.S. waters have been placed in a single California Stock. Currently, it is estimated that there are 25,000-43,000 animals off the U.S. coast of California. Long-beaked common dolphins have been observed taken in the Swordfish DGN fishery. The current PBR estimate is 95 animals per year.

3.7.1.1.5 Blue whale

Blue whales are found seasonally in the SCB (June-November) and are considered part of the Eastern North Pacific strategic stock. The current estimate of abundance for the Eastern North Pacific blue whale stock is 2,842 animals (CV=0.22). The PBR for this stock is currently set at two animals per year. Barlow et al. (2003) estimated an abundance of 2,862 blue whales based on a habitat model output for the California Current Ecosystem (CCE). There is some indication, however, that the stock is increasing in abundance (Carretta *et al.* 2009). There have been no observed takes of blue whales in any of the proxy fisheries under consideration.

3.7.1.1.6 Fin whales

Fin whales are found almost year round in the SCB and are considered part of the CA/OR/WA strategic stock. The current estimate of abundance for the CA/OR/WA fin whale stock is 2,636 animals (CV=0.15). The PBR is currently set at 14 animals per year. Barlow et al. (2003) estimated an abundance of 3,388 fin whales based on a habitat model output for the CCE. There has been a single observed take of a fin whale in the Swordfish DGN fishery.

3.7.1.1.7 Gray whales

Gray whales transit through the SCB on their way to and from their principal calving and breeding grounds in the lagoons and nearshore waters of Baja Mexico (southbound February-March; northbound April-June). They are considered part of the Eastern North Pacific (ENP) strategic stock The current estimate of abundance[11] for the ENP stock of gray whales is 18,813 animals (CV=0.069). Using a 23 year time series of shore-based counts of southbound migrating whales passing Carmel, California, Laake et al. (2007) produced an abundance estimate of 19,126 ENP gray whales (CV=0.071). They concluded that the ENP stock of gray whales may have achieved an optimal population size. Gray whales have been observed taken in the Swordfish DGN fishery

3.7.1.1.8 Humpback whale

Humpbacks typically appear in the SCB in the fall as they migrate to winter mating and birthing season off the coasts of Mexico and Central America. They are considered part of the eastern North Pacific strategic stock. The current estimates of abundance for the Eastern North Pacific stock of humpback whales is 1,391 (CV=0.13) animals. Barlow et al. (2003) estimated an abundance of 1,373 humpback whales based on a habitat model output for the CCE. Humpback whales have been observed taken in the Swordfish DGN fishery

3.7.1.2 Pinnipeds

3.7.1.2.1. California Sea Lion

California sea lions comprise a single stock ranging from the Pacific coast of Central Mexico north to British Columbia, Canada. Their primary breeding range is from the Channel Islands in Southern California to Central Mexico. The stock-wide abundance is estimated to be 238,000 sea lions. The population has been increasing since at least 1975, with an estimated annual growth rate from 1983 to 2003 of about 6.5%; however, the growth rate has decreased since the 1990s as the population approaches the carrying capacity of its environment. The stock is within its "optimum sustainable population" limits. California sea lions feed mainly in upwelling areas on a variety of prey such as squid anchovies, mackerel, rockfish, and sardines. They also take fish from commercial fishing gear, sport-fishing lines, and at fish passage facilities at dams and rivers. California sea lions have been observed taken in all of the proxy fisheries under consideration.

[11] http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2008whgr-en.pdf

3.7.1.3 Sea Turtles

The life history and population dynamics information presented in the following section was cited principally from the Five-Year Sea Turtle Status Review Reports published by the U.S. Fish and Wildlife Service and NMFS[12] unless otherwise noted.

3.7.1.3.1 Leatherback Turtles

Leatherbacks are highly migratory, exploiting convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Morreale, *et al*. 1994; Eckert 1998; Eckert 1999). Based on limited telemetry tracking data, there is evidence that on rare occasion leatherback turtles will transit through the SCB from March through July on their way to and/or from preferred jellyfish rich feeding grounds in central California and points north. Available dive data suggests that these transiting animals do not typically perform deep dives (>250 m) while transiting through these waters (Scott Benson, personal communication). The leatherback turtles that are encountered in the SCB belong to the western Pacific population. Recently published estimates of breeding females suggest that the western Pacific population is 2,700 to 4,500 adult females (Dutton, *et al*. 2007). This number is substantially higher than the population estimate of 1,775 to 1,900 western Pacific breeding females published in 2000 and used to predict possible extinction in the Pacific (Spotila 2000). The larger population estimate is due to adding in a number of nesting females from beaches that were not previously included in population estimates and thus is not indicative of a positive growth trend in the population. Leatherback turtles have been observed taken in the Swordfish DGN fishery and the Hawaii deep-set tuna longline fishery.

3.7.1.3.2 Loggerhead Turtles

Loggerheads are circumglobal, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. In the EPO, the waters off Baja, California, Mexico, have been identified as a key foraging area for juvenile and sub-adult loggerheads that feed on pelagic red crabs (Polovina, et al., 2004). Juveniles and subadult loggerhead aggregations numbering in the thousands are found off the southwestern coast of Baja California, with over 10,000 km from the nearest significant nesting beaches (Nichols, et al. 2000; Pitman 1990). Loggerhead turtles are not likely to occur in the proposed action area in any significant numbers as the SCB is well north of their preferred habitat. Loggerheads have been shown, however, to push north into the SCB during El NiZo events most likely following blooms of pelagic red crabs. Polovina, et al., (2003) found that 90 percent of loggerhead dives occurred within the top 40 m of water. Major nesting grounds for loggerhead turtles are generally located in temperate and subtropical regions, with scattered nesting in the tropics. In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located

[12] www.nmfs.noaa.gov/pr/pdfs/species/loggerhead_5yearreview.pdf (enter leatherback or green turtle after species/ to access those reports).

in Japan) which is comprised of separate nesting groups. Current estimates of abundance show an annual average of 4,133 nests in Japan for the period 2001-2004. Loggerhead turtles have been observed taken in the Swordfish DGN fishery and the Hawaii deep-set tuna longline fishery.

3.7.1.3.3 Olive Ridley Turtles

The olive ridley has an extensive global distribution and is considered the most abundant sea turtle in the world, with an estimated 800,000 nesting females annually. In the Eastern Pacific, they occur from Southern California to Northern Chile. The olive ridley is mainly a pelagic sea turtle, but has been known to inhabit coastal areas, including bays and estuaries. The olive ridley is omnivorous feeding on a wide variety of food items, including algae, lobster, crabs, tunicates, mollusks, shrimp, and fish. Olive ridleys can dive to depths of about 150 m to forage on benthic invertebrates. Olive ridleys mostly breed annually and have an annual migration from pelagic foraging, to coastal breeding and nesting grounds, back to pelagic foraging. They prefer water temperatures in the, 23-28° C range with preferred foraging grounds primarily in the North Pacific (Polovina, *et al*. 2004). (Márquez, *et al*. 2005). Olive ridley turtles are not likely to occur in the proposed action area in any significant numbers as the SCB is well north of their preferred habitat.

3.7.1.3.4 Green Turtles

Green turtles are found throughout the world, occurring primarily in tropical and, to a lesser extent, subtropical waters. Green turtles spend the majority of their time in coastal foraging zones with some limited use of more offshore oceanic habitat by oceanic-stage juveniles and migrating adults. The coastal-oceanic connection is not well understood and the presence of green turtles in the SCB is highly variable. They are thought to leave the SCB sometime in the spring (March-April) and possibly return in the fall (September-October). Using a precautionary approach, Seminoff (2002) estimates that the global green turtle population has declined by 34 percent to 58 percent over the last three generations (approximately 150 years); although, actual declines may be closer to 70 percent to 80 percent. In the Pacific Ocean nesting aggregations occur within the eastern, central, and western regions. In the EPO, green turtles nest in the Galapagos Islands, along the Pacific Coast of Central America and Mexico. Current abundance estimates are 1,650 nests in Galapagos, 184-344 nests in Central America, and 1,485 nests in Mexico. Green turtles have been observed taken in the Swordfish DGN fishery and the Hawaii deep-set tuna longline fishery.

3.8 Socioeconomic Environment

The socioeconomic characteristics of the swordfish fishery are described in various sections of the HMS FMP (PFMC 2003). Historical measures of economic performance for the swordfish fishery are provided in various sections of the HMS SAFE report

(NMFS 2007). Relevant portions of this description are incorporated in the following section as background on the socioeconomic environment affected by the alternatives.

The data presented below in Table 11 shows that the swordfish fishery was dominated by longline gear up until 2004, when the West Coast longline fishery closed resulting in a significant decrease in landings. Further, before the longline closure (1999-2003), landings from drift gillnet and harpoon gears comprised 19% and 2% of total swordfish landings, respectively. After the longline closure (2005-2008), drift gillnet and harpoon gears made up 80% and 15% of total swordfish landings, respectively.

Table 11. Swordfish landings by gear for the past 10 years (1999-2008).

West Coast Swordfish Landings (Round MT) By Gear				
Year	**Drift Gillnet**	**Harpoon**	**Longline**	**Total**
1999	592.31	80.82	1,324.91	1,998.04
2000	634.94	90.09	1,873.22	2,598.25
2001	350.82	52.19	1,748.17	2,151.18
2002	297.89	89.96	1,330.59	1,718.44
2003	199.24	106.60	1,809.63	2,115.47
2004	181.81	68.84	897.89	1,148.54
2005	219.57	76.46	*	296.03**
2006	443.48	70.68	*	514.16**
2007	478.43	58.95	*	537.38**
2008	371.83	48.05	76.61	496.49
* Data not shown due to confidentiality restrictions ** Does not include longline gear due to confidentiality restrictions.				

Table 12. West Coast revenue from swordfish landings by gear in real $2008.

Ex-vessel revenue ranged from about $7.6 million to $14.4 million before the longline closure (1999-2003) and after the closure ex-vessel revenue ranged from $2.0 million to $3.0 million. This is a 74%-79% decrease in ex-vessel revenue.

West Coast Revenue (real $2008) By Gear				
Year	**Drift Gillnet**	**Harpoon**	**Longline**	**Total**
1999	$2,471,960	$787,010	$6,323,880	$9,582,850
2000	$3,436,220	$938,400	$10,038,220	$14,412,840
2001	$1,873,600	$569,310	$7,934,190	$10,377,100
2002	$1,794,190	$812,540	$5,015,360	$7,622,090
2003	$1,206,490	$981,970	$6,879,880	$9,068,340
2004	$1,076,160	$763,650	$3,601,740	$5,441,550
2005	$1,305,870	$782,460	*	$2,088,330**
2006	$2,132,240	$679,520	*	$2,811,760**
2007	$2,564,050	$476,090	*	$3,040,140**
2008	$1,587,130	$458,480	$195,470	$2,241,080
* Data not shown due to confidentiality restrictions ** Does not include longline gear due to confidentiality restrictions.				

Table 13. Vessels making swordfish landings in California by gear.

Number of Vessels in California Landing Swordfish				
Year	**Drift Gillnet**	**Harpoon**	**Longline**	**Total**
1999	80	29	37	146
2000	78	26	48	152
2001	63	23	38	124
2002	47	29	20	96
2003	43	34	23	100
2004	35	28	20	83
2005	37	24	*	61
2006	38	23	*	61
2007	38	28	*	66
2008	37	30	5	67
* Data not shown due to confidentiality restrictions				

Table 14. U.S. Swordfish Demand.
Sources: U.S. Department of Commerce. 2008. Commercial fishery landings. Accessed at: http://www.st.nmfs.noaa.gov/st1/commercial/index.html.

United States Swordfish Demand (includes domestic landings & imports)								
Year	**U.S. Landings[a]**	**Imports[b]**	**Demand**	**Share of Demand (%)**		**Pacific landings[a]**	**Pacific Share (%) of U.S. Supply**	**Pacific Share (%) of U.S. Landings**
	(metric tons / round weight)			**U.S.**	**Imports**	**(metric tons / round weight)**		
1999	7,454	27,929	35,383	21%	79%	5,127	14%	69%
2000	8,008	29,513	37,521	21%	79%	5,611	15%	70%
2001	4,266	26,701	30,967	14%	86%	2,503	8%	59%
2002	3,930	30,260	34,190	11%	89%	2,035	6%	52%
2003	4,142	26,115	30,257	14%	86%	2,282	8%	55%
2004	2,742	21,426	24,168	11%	89%	1,422	6%	52%
2005	3,022	20,084	23,106	13%	87%	1,859	8%	62%
2006	2,711	20,106	22,817	12%	88%	1,719	8%	63%
[b]U.S. Department of Commerce. 2008. U.S. Foreign Trade. Accessed at: http://www.st.nmfs.noaa.gov/st1/trade/index.html.								

3.8.1 United States Swordfish Demand

The U.S. annual swordfish demand is comprised of that year's U.S. landings plus imports. Exports are omitted from U.S. demand because only an extremely small amount (< 1.0 mt) of swordfish is exported out of the U.S. From 1999-2006, the U.S. swordfish demand has ranged from about 20,000-30,000 mt; however, only 11%-20% of this demand was supplied by the U.S. and the rest was imported from other countries. The share of U.S. swordfish demand supplied by landings into Hawaii and the States of Washington, Oregon, and California are 6%-14% of total U.S. supply during 1999-2006. Between 52%–70% of U.S. swordfish landings are supplied by Pacific landings during the same period.

4.0 Environmental Consequences

4.1 Effects of Alternative 1

Impacts to target swordfish and non-target finfish species are principally reflected in potential increased removals of these species based on the estimates of effort levels discussed in the description of the proposed action. While the intention is to release all swordfish and non-target fish live back into the ocean, some proportion of the fish returned to the sea will die after release because of the trauma of capture and release. However, this is not considered a significant impact due to the population status of these

species. There are several key factors in the proposed research plan that are directed at minimizing interactions and increasing survivorship of captured non-target species present in the action area: 1) the use of a heavily weighted (1-3 kg lead sinkers) vertical mainline fishing only 2 circle hooks per buoy, 2) the target fishing depth of 250 meters or greater, 3) the short soak times proposed (4 hours or less), and 4) the constant monitoring proposed by the applicant which will include the presence of a NMFS approved observers onboard the vessel(s) at all times. The short soak times and constant monitoring will facilitate release of all non-target catch in an expeditious manner which may further minimize the impacts to these species under the proposed action. Unlike conventional horizontal pelagic longline gear which has a tendency to capture non-target species as it "fishes" throughout the water column during deployment and retrieval, the heavily weighted vertical longline gear proposed in this action will move quickly through the water column minimizing the exposure time and opportunity for non-target species capture. The applicant estimates that time to deploy the gear to target depth will be 1 minute or less and time for retrieval will be approximately 3 minutes. This is considerably shorter than standard deployment times for a conventional horizontal longline set and retrieval which can span hours. The low-oxygen, low-temperature habitat present at the target fishing depths below the thermocline would also serve to minimize the number of species present and their abundance further minimizing the potential suite of non-target species interacted. Several depth distribution studies have corroborated this theory showing that swordfish occupy a unique niche utilizing habitat in depths below the thermocline during the day, a zone that few other pelagic predators have adapted to (Musyl et al., 2004; Takahashi et al., 2003; Bernal et al., 2009).

4.1.1 Direct and Indirect Impacts of Alternative 1 on Target Swordfish

In recent years, a commercial swordfish handgear fishery has developed off the east coast of Florida and a detailed history of this fishery may be found in the 2006 Atlantic Consolidated HMS FMP (NMFS 2006). The applicant has designed the proposed action in close consultation with active Florida buoy gear fishermen with some minor gear and operational modifications recognizing the unique habitat and ecological considerations of fishing within the SCB. The two gear types and fishing methods, however, are very similar (Figure 2) and the target catch and effort estimates from the Atltantic fishery serve as a reasonable proxy in that regard. Of 135 total fish observed during the research, 120 were target swordfish (D. Kerstetter, personal communication). The preliminary anaylsis of the data suggest that the catch by number per set of target swordfish is extremely variable. Since the proposed research objective under evaluation in this EA is to tag and release all captured swordfish, the only assumed swordfish mortality would be for fish that did not survive the capture/tag event. Given the gear and methods proposed for this project, it is assumed that a very high percentage of the swordfish would be in good condition when retrieved. This assumption is based upon short soak periods coupled with the continuous monitoring by the applicant of the gear for quick attention and retrieval of flagged gear (indicating a catch event), and the use circle hooks which have shown to increase post-hooking survivorship in several pelagic fisheries (Read, 2007). As such the survivorship of released animals should be high. The highest potential effort scenario for the preferred alternative would be 600 hooks in year one (300 sets times 2

hooks per set) and 1,200 hooks in year two (600 sets times 2 hooks per set) for a total of 1,800 hooks worth of effort for the duration of the project. For the purposes of this EA, a conservative mortality rate of 15% will be used as a proxy estimate along with a successful hooking rate of 10%. These estimates were derived in consultation with the applicant and other knowledgable West Coast HMS fishermen and are not based on empirical field data as no such data sets exist. Therefore, an estimate of target swordfish removal, applying an average landed swordfish weight of 80 kg, (based on SCB DGN records), would be as follows:

1,800 hooks x 10% hooking rate = 180 swordfish catch 180 swordfish catch x 15% mortality rate = 27 dead swordfish 27 swordfish x 80 kg. Average weight per swordfish = **2,160 kg (~2.2 mt).**

This estimate of total removals equates to roughly 0.4% of the current U.S. domestic west coast swordfish landings (496 mt in 2008). Given the health of the swordfish stock on the west coast coupled with the recent low average annual landings of swordfish, the proposed action would not have a measurable impact on the swordfish stock.

4.1.1.1 Cumulative Impacts of Alternative 1 on Target Swordfish

The cumulative impact of removing 2.2 mt of swordfish from the north Pacific swordfish population is negligible and would not lead to an overfishing or overfished condition. Catches in the region have been fairly stable since 1989, averaging about 3,700 mt in the northern region and 8,400 mt in the southern region annually. The existing west coast swordfish fisheries in the proposed action area are in a stable or declining trend in regards to vessel participation and expected future landings. This trend is not expected to change much given the restrictive regulatory environment and strong environmental advocacy opposition these fisheries are operating under in part due to bycatch concerns, both perceived and real.

4.1.2 Direct and Indirect Impacts of Alternative 1 on Non-target Finfish

Based on some preliminary research data collected from the Atlantic Buoy Fishery, non-target fish catch levels have been very low, including a few carcarhinid sharks (mainly silky and night sharks), a few scalloped hammerhead sharks, one bigeye thresher shark, one dolphinfish, one bigeye tuna, one blackfin tuna, one snake mackerel, and one oilfish (D. Kerstetter, personal communication). According to Kerstetter, "…while there has not been observed the anecdotally very rare catches of istiophorid billfishes (primarily sailfish) in the Atlantic buoy fishery, the participating captains have either caught these species on non-observed trips or heard about such catches by other captains"[13].

[13] None of the captains in the fishery that Dr. Kerstetter has talked with have ever seen – or even heard about – bycatch with either marine mammals or sea turtles.

A summary of the Atlantic Swordfish Buoy Fishery logbook records was supplied by staff from the NMFS Southeast Region's Sustainable Fisheries Division to help shed some light on the suite of species being captured and their relative magnitudes. The data did not include estimates of the number of sets made per trip therefore no attempt was made to calculate a CPUE estimate.

Table 15. Atlantic Buoy fishery effort.
Source: NMFS Pelagic Logbook Program.

	2007	2008
Number of Vessels	42	44
Number of Trips	745	598
Avg. Buoy Gears Deployed per Trip	11.0	11.2
Total Number of Hooks Set	11,742	8,922
Avg. Number Hooks per Gear	1.4	1.3

Table 16. Atlantic Buoy fishery landings in pounds dressed weight.
Source: NMFS Pelagic Logbook Program.

	2007	2008
Swordfish	183,982	122,700
Dolphin	966	1,031
Oilfish	346	414
Shortfin mako shark	308	797
Wahoo	63	227
Bigeye tuna	150	0
Blacktip shark	9	0
King mackerel	0	194

Table 17. Atlantic Buoy fishery catches and discards in numbers of fish.
Source: NMFS Pelagic Logbook Program.

	2007	2008
Kept		
Swordfish	2,849	1,843
Dolphin	63	103
Oilfish	7	10
Bigeye tuna	5	0
Blackfin tuna	3	7
Wahoo	2	6
Bonito	0	7
King mackerel	0	53
Shortfin mako	3	4
Hammerhead shark	1	0
Blacktip shark	1	0
Silky shark	0	1

	2007	2008
Released Alive		
Swordfish	1,559	1,018
Blue marlin	1	0
White marlin	0	3
Sailfish	2	1
Hammerhead shark	14	7
Blue shark	0	2
Thresher shark	0	1
Dusky shark	4	0
Night shark	16	1
Oceanic whitetip shark	0	1
Bigeye thresher shark	4	0
Tiger shark	1	2
Sandbar shark	1	0
Longfin mako shark	4	3
Shortfin mako shark	0	1
Discarded Dead		
Swordfish	129	80
Silky shark	9	0
Hammerhead shark	1	0

The preliminary logbook and observer results from the Atlantic Swordfish Buoy fishery show that the gear is very effective at targeting swordfish without capturing significant quantities of non-target species. Of the 7,790 total fish captured, approximately 7,434 (~95%) were target swordfish. Of the remaining 356 non-target finfish catch (~5% of total), 261 were landed for sale as commercially valuable market species (e.g., dorado, king mackerel), 85 fish were discarded alive and 9 fish were discarded dead (dusky sharks).

Although some of the finfish species present in the SCB have the capacity to occasionally "bounce-dive" to the proposed action target depths (e.g., tunas), the information gathered for this EA reveals that most of their time is spent in the waters above the thermocline. Based on the information above and the fact that the fishing gear would be deployed directly off the vessel, with hooks sinking rapidly out of the range of most of the non-target fish species highlighted in Table 9, it is unlikely that a significant number of species would be hooked by the proposed fishing gear. For the species listed in Table 9, only some of the tuna species pose an issue in regards to their stock status and the potential for the proposed action to increase catch of these exploited species. But as stated earlier, the proposed gear was specifically chosen and tailored to reduce interaction with non-target species and the abundance of tuna species in the proposed action area will be minimal. The EPO bigeye tuna stock has been declared overfished and the albacore, bluefin, and yellowfin tuna stocks, while not currently considered overfished or in an overfishing condition, are at or near full exploitation based on commonly used reference points for Thunnids. The projected take for these tunas under the proposed action would

be limited to a few individuals (1-5) and thus should not have a discernable impact on the stocks in question. The IATTC working in conjunction with NMFS and the U.S. State Department recently passed a multi-year conservation resolution that will serve to reduce the fishing effort on these commercially valuable species to sustainable and optimal levels. Unilateral action by the U.S., including denying award of research projects such as the proposed action, will not improve the status of these exploited stocks given their highly migratory nature and the fact that most of the harvest is taken by countries other than the U.S.

Based on input from applicant, NMFS predicts that opah and bigeye thresher shark will be the top two non-target species captured during the proposed action. For the purposes of this EA, a conservative mortality rate of 15% will be used as a proxy estimate for opah along with a successful hooking rate of 1%. These estimates were derived in consultation with the applicant and other knowledgable West Coast HMS fishermen and are not based on empirical field data as no such data sets exist.

Therefore, an estimate of non-target opah removal, applying an average landed weight of 35 kg (based on the CA DGN fishery), for the duration of the proposed research would be as follows:

1,800 hooks x 1% hooking rate = 18 opah catch
18 opah catch x 15% mortality rate = 3 dead opah
3 opah x 35 kg. average weight = **105 kg (~0.1 mt).**

For the purposes of this EA, a very conservative mortality rate of 25% will be used as a proxy estimate for bigeye thresher shark along with a successful hooking rate of 1%. These estimates were derived in consultation with the applicant and other knowledgable West Coast HMS fishermen and are not based on empirical field data as no such data sets exist. Therefore, an estimate of non-target bigeye thresher shark removal, applying an average landed weight of 75 kg , for the duration of the proposed research would be as follows:

1,800 hooks x 1% hooking rate = 18 bigeye thresher catch 18 bigeye thresher catch x 25% mortality rate = 5 dead bigeye threshers 5 bigeye threshers x 75 kg. average weight **= 375 kg (~0.4 mt).**

Given the low numbers of the other non-target finfish listed in Table 9 that are expected to found below the thermocline, combined with the minimal time the gear will be "fishing" above the thermocline (set and retrieval), the potential catch and estimated removal weights for these species will be assumed negligible for the proposed action and is not considered a significant impact.

4.1.2.1 Cumulative Impacts of Alternative 1 on Non-target Finfish

The cumulative impacts of Alternative 1 on non-targt finfish are deemed to be insignificant based on the proposed gear and methods to be employed which are designed specifically to minimize non-target catch (e.g., use of circle hooks, setting gear below thermocline, and fast deployment and retrieval of gear). The removals of opah and bigeye thresher shark, two species identified by the applicant as the most likely non-target species to be captured under the proposed action, are deemed to be negligible given the low removal quantities estimated and the non-retention aspect of the research plan. The Swordfish DGN fishery harvests on average about 50 mt of opah per year. There is very little information available in regards to the population status of opah, bigeye thresher shark, and many of the non-target finfish listed in Table 9. For the species listed in Table 9 for which stock assessment information is available, the interactions identified under the proposed action would not in themselves elevate a conservation concern given the best available information at the time of this analysis. The HMS species (tuna, billfish, dorado, and sharks) are managed under RFMO overview which include conservation resolutions aimed to manage the populations on a sustainable level.

4.1.3 Direct and Indirect Impacts of Alternative 1 on Protected Species

Of the various proxy fisheries analyzed in Chapter 3, the Atlantic Buoy fishery presents the most similar gear type for comparison with the proposed action. Data from the other proxy fisheries, duly noting the disparate gear and methods, helps provide a snapshot of the suite of species previously taken in the SCB thereby assisting with the exposure analysis. To date there are no records of any protected species interactions, including marine mammal, sea turtle, or seabirds, in either of the two Atlantic Buoy Fishery data sets (logbook/observer) available for analysis. As described in the original description of the proposed action, one of the principal objectives of the research is avoid interactions with non-target species, including protected species. Along the U.S. West coast, fishing gear and protected species interactions within the SCB have been linked predominantly to net fisheries (i.e. entanglements). Because of the gear configuration proposed in this action (i.e., single weighted line, hooks fished below the thermocline) it is highly unlikely that any protected species would interact with the fishing gear to be used in the proposed action. The depths targeted by the experimental deep-set buoy fishery gear are consistent with depths that are well below those considered to be common for the majority of the protected species listed in Table 10. The proposed action includes, if requested by NMFS, a NMFS-approved technical monitors/observers who would facilitate observance of any protected species in the proposed action area and allow the applicant to delay setting gear until these animals leave the immediate area or move to a different area within the proposed action area. However, in the unlikely event that a protected species is hooked/entangled, the gear configuration and methods employed (e.g., constant visual observation of the gear and quick attention and retrieval, via electric reel, when strike indicator is tripped) makes it likely that any hooked/entangled animals would be tended to in an expeditious fashion. One of the conditions that would be imposed on the applicant and all personnel involved with the research is to undergo a safe handling and release workshop given by NMFS Protected Resource Division staff. Although the long-

term effects of animals being hooked and released from fishing gear are not well known, it is generally believed that in some instances and fisheries, animals released expeditiously with all gear removed, and no other injuries, do not suffer from debilitating long-term effects (Angliss and DeMaster 1998; Ryder *et al.* 2006 *in* NMFS 2007. Impacts to protected species are not considered significant.

4.1.3.1 Direct and Indirect Impacts of Alternative 1 on Marine Mammals

Based on the exposure analysis presented in chapter 3, it is likely that one or more of the marine mammal species listed in Table 10 would be encountered in the action area during the proposed research time frame. However, the likelihood of these species interaction with the proposed action is predicted to be negligible. This prediction is based on the methods and contingencies to be employed and the sub-thermocline habitat to be fished. A review of the proxy data sets show that many of the cetacean interactions in the SCB have occurred via entanglement in net fisheries fished in relatively shallow depths. The entanglements in these net fisheries are unique to that gear type based in part on the frequent presence and use of the shallow water SCB habitat by a host of marine mammals. The Swordfish DGN entanglements have been significantly reduced as a result of gear modifications and regulations that were instituted by NMFS and the POCTRT (e.g., use of pingers and net depth extenders). In contrarst, the proposed action will employ a limited number of single, weighted monofilament lines fished at great depths in a habitat zone not typically frequented by the protected species listed in Table ?. A review of the proxy data sets show that the infrequent marine mammal interactions involving hook and line gear have been depredation events on traditional horizontal longline gear fished at shallower depths than those under the proposed action. That gear type differs significantly from the proposed gear type in that there is substantial bait attractant factor along the multi-kilometer length of the main line. The slow manner in which the large numbers of baited hooks are set and retrieved also increases chances of protected species interactions as the baited hooks “fish” throughout the upper water column. Even considering these factors, the data sets reveal a very low marine mammal interaction rate (i.e., number of marine mammal entangled or hooked per hooks set) relative to the fishing effort employed in these commercial grade fisheries. The potential interaction rate would be even less for this experimental fishery with effort levels for the duration of the two year study equal to or slightly greater than a single set of commercial pelagic longline gear (i.e., 1,800 hooks total). No significant impacts are expected.

4.1.3.2 Direct and Indirect Impacts of Alternative 1 on Sea Turtles

Based on a review of the proxy data sets, the likelihood of take of any of the four species of sea turtles potentially present in the SCB (leatherback, loggerhead, green, and olive ridley) under the proposed action is predicted to be neglible. The proposed gear configuration is designed specifically to avoid turtles and other non-target species by only deploying hooks at depths not frequented by protected species. The area in which the

experimental gear will be deployed is not an area of high sea turtle abundance and the constant monitoring of the gear will provide information on sea turtle proximity, which can be used to temporarily halt operations if turtles are present. The manner in which the gear is deployed and retrieved also minimizes the time in which it is within the portion of the water column shown to be most probable for any interaction. Further, of the 23 recorded interactions between Swordfish DGN gear and leatherback, only 2 occurred south of Pt. Conception (i.e., within the proposed action area). Loggerhead and olive ridley turtles are not likely to occur in the proposed action area in any significant numbers as the SCB is well north of their preferred habitat. Loggerhead sightings have been shown to increase in the SCB during warm water and El Niño events and thus the proposed action has taken on specific measures to reduce interactions during these warm water episodes. If an El Niño has been officially declared by NOAA, the applicant will halt testing of the buoy gear in the SCB during the period from June to August. This is consistent with a current regulation on the DGN fishery to reduce the risk of loggerhead interactions. As with leatherback turtles, in the unlikely event that a loggerhead or olive ridley turtle is encountered during the proposed action, the gear configuration and methods employed (e.g., constant visual observation of the gear and quick attention and retrieval, via electric reel, when strike indicator is tripped) makes it likely that any hooked/entangled animals would be tended to in an expeditious fashion, thus limiting the likelihood of mortality or severe injury. In addition, the large hook size proposed has also been shown to reduce post-hooking turtle mortalities in several hook-and-line fisheries (Read, 2007). No significant impacts to sea turtles are expected.

4.1.4 Cumulative Impacts of Alternative 1 on Protected Species

There are no anticipated impacts of the proposed action on protected species. Therefore, no cumulative effects were analyzed.

4.1.5 Direct and Indirect Socio-Economic Effects of Alternative 1

The main socio-economic effect the proposed action would have is the actual cost of the research itself. This is not considered a significant impact since the costs are included in the grant award amount. The applicant is not allowed to sell any of the catch thereby negating any potential market impacts with current fishery participants. The proposed action would, however, have some indirect long-term positive effects if the experimental buoy gear proves to be effective swordfish gear type. The data generated by the proposed action would be of assistance to the Pacific Fishery Management Council and NMFS for future management considerations. A potential new swordfish gear type would allow current participants greater flexibility and economically viable options in choosing which gear to use and may also revitalize select west coast ports that have been adversely impacted by protected species regulatory actions (a key objective under the S-K Grant Program). This gear also has the potential to augment the ongoing traditional harpoon fishery, which is severely limited by weather and basking rates of swordfish. An increased amount of swordfish fishing and landings would not only be beneficial to the

fishermen directly but would also serve associated dependent industries, such as shoreside supply services, fish processors and wholesalers. Further, the United States would benefit from greater domestic swordfish landings, by diminishing the reliance on swordfish imports, especially from countries whose fisheries are not as strictly regulated as the United States. There would be start-up financial costs to current or new fishermen that decide on purchasing buoy gear in the future; however, it is assumed that fishermen would only purchase the gear if it would be more efficient than their current situation and therefore economically beneficial. Further, there is no evidence at this time that a future buoy gear fishery would eliminate current gears (harpoon and drift gillnet) from use, nor would it eliminate current participants, since the swordfish stock is not in danger of being overfished.

4.1.5.1 Cumulative Impacts of Alternative 1 on Socio-Economic Effects

The cumulative impacts of alternative 1 on the socio-economic effects are deemed to be insignificant. This is due in part to the no-retention clause built into the proposed action (i.e, no swordfish from this project will compete in market with swordfish commercially sold from other west coast swordfish fisheries) along with the very low level of anticipated catch (~2.2 mt of target swordfish). There will be a minor positive impact to local businesses in southern California in regards to increased sales of fuel, bait, and marine services to support the field work over the anticipated two year time frame.

4.2 Effects of Alternative 2 (No Action).

Alternative 2, the no action alternative, represents the state of the environment if the grant was not awarded and the testing of the deep-set buoy fishing gear for swordfish would not occur. Alternative 2 would not have any impacts to the resources discussed in chapter 3.

5.0 Other Applicable Laws

5.1 Endangered Species Act

NMFS is required under Section 7(a)(2) of the ESA to ensure that any action it carries out is not likely to jeopardize the continued existence of any endangered or threatened marine species or adversely modify designated critical habitat. It has been determined through informal consultation with NMFS PRD that the proposed action may affect, but is not likely to adversely affect, ESA listed species. A signed concurrence letter between NMFS Sustainable Fisheries Division and NMFS Protected Resources Division reflecting this determination is on file.

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7.0 **List of Preparers and Agencies Consulted**

Name and Affiliation	Responsibility
Ms. Diane Windham, Fishery Biologist, NMFS SWR, Sustainable Fisheries Division	Preliminary Draft EA preparation
Mr. Craig Heberer, Fishery Biologist, NMFS SWR, Sustainable Fisheries Division	Principal author and Final EA submission
Ms. Corinne Pinkerton, Regional Economist, NMFS SWR, Sustainable Fisheries Division	Principal author Chapter 3.8 Socio-Economic section
Dr. David Kertstetter, Research Scientist and Adjunct Faculty, NSU Oceanographic Center	Provided bycatch data from Atlantic Swordfish Buoy Fishery research project
Mr. Bill Sutton, Commercial Fishermen	Consulted on DGN fishery

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

Finding of No Significant Impact for the Proposed Award of an S-K Grant To Capture and Tag Swordfish off the Coast of Southern California Using Experimental Deep-Set Buoy Gear

The National Oceanic and Atmospheric Administration Administrative Order 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. §1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQs context and intensity criteria. These include:

1) Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

Response: The proposed action is not expected to jeopardize the sustainability of any target species since the proposed research objective is to tag and release all captured target swordfish, the only assumed mortality would be for fish that did not survive the capture/tag event. Given the gear and methods proposed for this project, it is assumed that a very high percentage of the swordfish would be in good condition when retrieved. Given the health of the swordfish stock on the west coast coupled with the recent low average annual landings of swordfish, the proposed action would not have a measurable impact on the swordfish stock or future sustainability.

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

Response: The proposed research project is not expected to jeopardize the sustainability of non-target finfish populations affected by the action. The proposed gear and methods are designed specifically to minimize the potential non-target species interactions. The proposed action would set gear below the thermocline at depths (250-400 m) that have been shown to harbor fewer species due to the unique conditions present (e.g., low oxygen, low prey abundance). As such, only a handful of non-target species are expected to interact with the gear. These include, among others, the bigeye thresher shark, opah, and several species of tunas. The EPO bigeye tuna stock has been declared overfished and the albacore, bluefin, and yellowfin tuna stocks, while not currently considered overfished or in an overfishing condition, are at or near full exploitation based on commonly used reference points for Thunnids. The projected take for these tunas under the proposed action would be limited to a few individuals given the time and area fished (i.e.,

proposed action outside core EPO tuna habitat) and thus should not have a discernable impact on the stocks in question. In addition, the fact that most of the harvest is taken by countries other than the U.S. Combined population removals of bigeye thresher shark and opah are estimated to be approximately 0.5 mt for the two year duration of the project. There are no existing stock assessments for these species but the low levels of removals combined with the minimal landings of these species by existing commercial and recreational fisheries does not point towards a sustainability issue under the proposed action.

3) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?

Response: The proposed action is not expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs. The proposed action would deploy pelagic-type fishing gear in open water at depths of 250-400 m, at a considerable distance above the bottom of the ocean. Given the limited scope and duration of the proposed action coupled with the strict terms and conditions that would be applied, the proposed action is not expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act. It was determined that some of the non-target species associated with the proposed action are considered EFH for the various federally managed species within the HMS FMP. Therefore, the potential reduction in quantity of prey species would adversely affect EFH for certain species in the HMS FMP, albeit it very minor quantities relative to the prey species populations as a whole and this is not considered a significant impact. Although the removal of prey species would adversely affect EFH, NMFS finds that the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH.

4) Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

Response: The proposed action involves up to three fishing vessels operating in open waters off California (1 vessel in year one and 2 vessels in year two). There are no public health implications involved. Since substantial adverse impacts on public health or safety are not expected, they were not further evaluated in the EA.

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

Response: The proposed gear type is designed to specifically minimize/avoid interactions with non-target species, including sea turtles and marine mammals. The EA evaluates impacts to Endangered Species Act (ESA) listed species and their designated critical habitat, and marine mammals, which are protected under the Marine Mammal Protection Act (MMPA). After reviewing the available scientific and commercial fisheries data, current status of the affected species, environmental baseline for the action area, effects of the proposed action and cumulative

effects, NMFS determined that the proposed action is not likely to adversely affect ESA listed species or species protected under the MMPA. A Memo to the File in regards to this determination was prepared by the NMFS Protected Resources Division on March 30, 2010. There is no designated critical habitat within the proposed action area, so an analysis of adverse modification or destruction of critical habitat was not required.

6) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: The proposed action would potentially have a very minor adverse effect on biodiversity and ecosystem function through the removal of target and non-target species, but this impact is not considered significant. Removals under the proposed action would represent a very minor proportion of the total biomass of these species and would have a remote likelihood of adversely affecting biodiversity and ecosystem function. Since the main objective of the proposed action is to tag and release species of research interest the primary emphasis is to collect much needed data for science and management purposes. Given the limited amount of effort and the strict terms and conditions that will be applied, substantial impacts on biodiversity and/or ecosystem function within the affected area are not expected. The proposed gear and methods are designed to minimize interactions with non-target species and for those species captured, to assure quick and timely release to increase survivorship and further mitigate any impacts on biodiversity and/or ecosystem function.

7) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: The proposed action would not have any significant social or economic impacts. There is no compensation fishing under the proposed action (i.e., no sale of fish to offset costs). The applicant has built in the costs of conducting the research as part of the budget submitted and approved under the S-K grant proposal. If approved, the proposed action could provide some limited economic gains to the port communities located within the action area. These gains may include, among other things, increases in sales of fuel, bait, supplies, and marine services.

8) Are the effects on the quality of the human environment likely to be highly controversial?

Response: The effects of this limited research project are not likely to be highly controversial.. The proposed action was thoroughly vetted and the proposed methods deemed scientifically sound through a NMFS internal panel set up to review and rank the submitted S-K proposals.

9) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

Response: This activity would occur in the marine environment and has no direct effect on the biophysical component of the terrestrial environment. No unique areas would be affected. Nothing has been identified in association with the proposed action that would result in adverse

effects to historical, archaeological, paleontological, or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas. The impacts of the proposed action on EFH were examined by NMFS and a determination of no significant adverse effect was made.

10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: The risks are neither unique nor unknown; similar gear and methods are currently in use in the Atlantic Coast swordfish buoy fishery and pelagic HMS hook-and-line gear is in use in the high seas area adjacent to the West Coast EEZ, out of Hawaii, and in the Atlantic, providing detailed information on possible catch and bycatch, and take of protected species. Actual target and non-target interaction rates within the proposed action area may differ from what has been experienced on the Atlantic Coast and/or outside the West Coast EEZ. Therefore, the risks are to some extent uncertain in terms of their intensity, although mitigation measures (such as limits on fishing effort, time/area closures, observer coverage, and proactive skipper workshops on safe handling and release of non-target species) would be expected to both reduce impacts and uncertainty about their intensity. There were no uncertain effects or unique or unknown risks identified during the development of alternatives for the proposed action, nor did any surface during preparation of the required environmental documentation.

11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: The EA describes past and present activities that contribute to the kinds of impacts identified for the proposed action (e.g., fishing mortality and non-target species interactions). The proposed action will interact with target and non-target species that are taken in several other commercial and recreational fisheries, including the existing DGN fishery within the proposed action area. These fisheries are regulated by state and/or federal management actions, including FMPs. The fisheries have been examined as part of the EA for this action to determine their impacts on target and non-target species interactions, and no cumulatively significant impacts have been identified.

12) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

Response: Nothing has been identified in association with the proposed action that would result in adverse effects to historic places eligible for the National Register, nor cause the destruction or loss of significant scientific, cultural or historical resources.

13) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: The proposed action does not involve the transport of non-indigenous species. The research vessels participating in the proposed action are located in local ports and would not

increase the risk of introduction through ballast water or hull fouling. The proposed action would catch and tag targeted swordfish, with incidental catch of a limited suite of non-target species, all under very controlled conditions. Handling of captured and tagged animals would not include any translocation of living marine resources, or use of any non-indigenous species as bait.

14) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: The proposed action is intended to gather scientific information on the catch-per-unit-effort and movement patterns of target swordfish and to a lesser extent non-target opah and bigeye thresher shark. In addition to the applied scientific research interest, the information could be used to preliminarily assess, among other things, the potential economic viability of a new gear type to target swordfish. The EA only covers the proposed research activities that will take place on vessels under control of the applicant for the duration of the project. The proposed action includes an effort cap and time/area constraints meant to minimize interactions with non-target species. If the proposed research is conducted, the information gathered will be shared with the pertinent management bodies, including NMFS and the Pacific Council, for determination of what, if any, future actions might be considered. Any future research proposals or modifications to current gear and/or existing HMS fisheries would be subject to review and recommendation for approval/disapproval by the Pacific Council and NMFS. Any potential future action would be evaluated in an EA or EIS with separate decisions taken on proceeding at each step. For these reasons the action does not establish a precedent for future actions with significant effects nor does it represent a decision in principal about a future consideration.

15) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Response: The proposed action will not threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

16) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: The proposed action would conduct limited and tightly controlled test fishing for the purpose of, among other things, gathering information to assist NMFS and the Council in effectively managing HMS fisheries. Given the conservative terms and conditions that will be imposed, the incremental effects of such a limited research project would not result in cumulatively significant adverse effects to the sustainability of the targeted fishery resources and non-targeted species.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Proposed Award of an S-K Grant to Capture and Tag Swordfish off the Coast of Southern California using Experimental Deep-Set Buoy

Gear, it is hereby determined that the proposed action under consideration will not significantly impact the quality of the human environment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

FOR Rodney R. McInnis, Regional Administrator,
NOAA Fisheries, Southwest Region

7 April 10
Date