UNITED STATES DEPARTMENT OF COMMERCE
Office of the Deputy Under Secretary
for Oceans and Atmosphere
Washington, D.C. 20230

AUG 20 2001

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: Environmental Assessment for the Interim Final Rule to implement the reasonable and prudent alternative in the biological opinion related to the California/Oregon drift gillnet fishery

LOCATION: Waters of the Pacific United States

SUMMARY: This Is an Interim Final Rule to close areas to California and Oregon drift gillnet fishing during certain periods in waters off California and Oregon to protect listed sea turtles.

RESPONSIBLE OFFICIAL: Rebecca Lent
Regional Administrator for Fisheries
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
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Phone: 562/980-4001

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, including the environmental assessment, is enclosed for your information. Please submit any written comments to the responsible official named above. Also, please send one copy of your comments to my staff in Room 6121, NOAA/SP, U.S. Department of Commerce, Washington, D.C. 20230.

Sincerely,

Scott B. Gudes
Acting Undersecretary for
Oceans and Atmosphere/
Administrator and Deputy
Under Secretary

Enclosure

ENVIRONMENTAL ASSESSMENT ON THE IMPLEMENTATION OF THE REASONABLE AND PRUDENT ALTERNATIVE ON THE ISSUANCE OF THE MARINE MAMMAL PERMIT UNDER SECTION 101(a)(5)(E) OF THE MARINE MAMMAL PROTECTION ACT FOR THE CALIFORNIA/OREGON DRIFT GILLNET FISHERY

Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Protected Resources Division
August 13, 2001

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Environmental Assessment on the Implementation of the Reasonable and Prudent Alternative Required by the Biological Opinion on the Issuance of the Marine Mammal Permit Under Section 101(a)(5)(E) of the Marine Mammal Protection Act

1.0. INTRODUCTION

1.1. Section 118 Requirements

In the 1994 amendments to the Marine Mammal Protection Act (MMPA), section 118 established the immediate goal that the incidental mortality or serious injury of marine mammals occurring in the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within 7 years of enactment (i.e., April 30, 2001). The amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP). Section 118(f) of the MMPA requires that the National Marine Fisheries Service (NMFS) develop and implement TRPs designed to assist in the recovery, or prevent the depletion of, strategic marine mammal stock(s) which interact with Category I or II fisheries. A strategic stock is: (1) a marine mammal species that is listed as endangered or threatened under the U.S. Endangered Species Act (ESA); or (2) a marine mammal stock for which the human-caused mortality exceeds the potential biological removal (PBR) level; or (3) marine mammal stock which is declining and likely to become listed as a threatened species under the ESA. The PBR level is the maximum number of animals, not including natural mortalities, that may be annually removed from a marine mammal stock while allowing that stock to reach or maintain its optimal sustainable population level.

The immediate goal of a TRP is to reduce, within 6 months of its implementation, the mortality and serious injury of strategic stock(s) incidentally taken in the course of commercial fishing operations to levels less than the PBR levels established for those stock(s). The long-term goal of a TRP is to reduce, within 5 years of its implementation, the incidental mortality and serious injury of marine mammals incidentally taken in commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate, taking into account the economics of the fishery, the available existing technology, and existing State or regional management plans (section 118(f)(2)). NMFS is currently in the process of developing a final definition of the ZMRG.

NMFS must establish take reduction teams (TRT) to prepare draft TRPs. Team members must have expertise regarding the conservation or biology of the marine mammal species which the take reduction plan will address, or the fishing practices which result in the incidental mortality or serious injury of such species. Members shall include representatives of Federal agencies, each coastal State which has fisheries which interact with the species or stock(s), appropriate Regional Fishery Management Councils, interstate fisheries commissions, academic and scientific organizations, environmental groups,

all commercial and recreational fisheries groups and gear types which incidentally take the species or stock(s), Alaska Native organizations or Indian tribal organizations, or others as the Secretary of Commerce deems appropriate. TRTs are not subject to the Federal Advisory Committee Act and meetings of the teams are open to the public with prior notice of the meetings made public in a timely fashion (section 118(f)(6)(C and D)).

Where the human-caused mortality and serious injury to a strategic stock is estimated to be equal to or greater than the PBR level, as determined under section 117 of the MMPA, and such stock(s) interacts with a Category I and II fishery, the TRT will submit a draft take reduction plan for such stock(s) to NMFS not later than 6 months after the team has been established. Such draft TRP will be developed by consensus. In the event consensus cannot be reached, the TRT shall advise NMFS in writing on the range of possibilities considered by the TRT, and the views of both the minority and majority. Not later than 60 days after the submission of the draft plan, NMFS will publish in the Federal Register the draft plan, any changes proposed by NMFS with an explanation of the reasons therefore, and proposed regulations to implement the plan if necessary, for public review and comment for a period not to exceed 90 days. Not later than 60 days after the close of the public comment period, NMFS will issue a final plan and implementing regulations (section 118(f)(7)).

TRPs must include a review of information in the final stock assessment reports (SAR) and any substantial new information that may have become available since the publication of the SARs, an estimate of the total number and, if possible, age and gender, of animals from the stocks that are being incidentally killed or seriously injured each year during the course of commercial fishing operations, recommended regulatory or voluntary measures for the reduction of the incidental mortality and serious injury, and recommended dates for achieving the specific objectives of the plan. In implementing a TRP prepared in accordance with section 118 of the MMPA, NMFS may, where necessary to implement a TRP to protect or restore a marine mammal stock or species covered by such a plan, promulgate regulations under the MMPA. These regulations may include, but are not limited to, measures to:

> (1) establish fishery-specific limits on incidental mortality and serious injury of marine mammals in commercial fisheries or restrict commercial fisheries by time or area;
>
> (2) require the use of alternative commercial fishing gear or techniques and new technologies, encourage the development of such gear or technology, or convene expert skippers' panels;
>
> (3) educate commercial fishers, through workshops and other means, on the importance of reducing the incidental mortality and serious injury of marine mammals in affected commercial fisheries; and
>
> (4) monitor the effectiveness of measures taken to reduce the level of incidental mortality and serious injury of marine mammals in the course of commercial fishing

operations.

NMFS and the TRTs will meet every 6 months, or at other intervals as NMFS determines are necessary, to monitor the implementation of the final TRP until such time as NMFS determines that the objectives of the TRP have been met. NMFS will amend the final TRP and implementing regulations if necessary. The Pacific Offshore Cetacean Take Reduction Team have been meeting on an annual basis to review the effectiveness of the take reduction plan measures at reducing the incidental marine mammal mortalities and serious injuries after the completion of each fishing season.

1.2. Section 101(a)(5)(E) Requirements

If a fishery incidentally takes marine mammal species that are listed under the ESA during the course of commercial fishing activity by persons using vessels of the United States or foreign vessels that have valid fishing permits issued in accordance with section 201(b) of the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1824(b)), a small take permit under section 101(a)(5)(E) of the MMPA must be obtained to authorize the lawful incidental taking of those species under the ESA, except the southern (California) sea otter. California sea otters are managed under Public Law 99-625; 100 Statute 3500. A permit may be issued during a period of up to 3 consecutive years if:

(1) the incidental mortality and serious injury from commercial fisheries will have a negligible impact on such species or stock;

(2) a recovery plan has been developed or is being developed for such species or stock pursuant to the ESA;

(3) a monitoring program is established under section 118(d) of the MMPA;

(4) vessels are registered in accordance section 118(c) of the MMPA; and

(5) a take reduction plan has been developed or is being developed for such species or stock under section 118(f) of the MMPA.

In making these determinations, NMFS will publish an announcement in the Federal Register of the fisheries having takes of marine mammals listed under the ESA, including a summary of available information regarding the fisheries interactions with the listed species for public comment. Subsequently, NMFS will publish in the Federal Register a list of the fisheries for which the determinations were made and a summary of the information used to make the determination. Permits will be issued to fisheries that are required to register under the Marine Mammal Authorization Program (Category I and II vessels) for which determinations are made.

Vessel owners engaged only in Category III fisheries for which determinations are made will not be

subject to penalties under the MMPA for the incidental taking of listed marine mammals as long as the vessel owner or operator reports any incidental mortality or injury of such marine mammals. If during the commercial fishing season, NMFS determines that the level of incidental mortality or serious injury from commercial fisheries for which a determination was made has resulted or is likely to result in an impact that is more than negligible on the endangered or threatened species or stock, NMFS will follow the emergency authority under section 118(g) of the MMPA to protect such species or stock, and may modify any permit granted as necessary.

NMFS may suspend or revoke a permit granted under section 101(a)(5)(E) of the MMPA if NMFS determines that the conditions or limitations set forth in the permit are not being complied with. In addition, NMFS may amend or modify, after notification and opportunity for public comment, the list of fisheries for which a permit was issued whenever NMFS concludes there has been a significant change in the information or conditions used to make a determination.

1.2.1. Negligible Impact Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably likely to adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 226.103). In 1990, the Marine Mammal Commission submitted guidelines to NMFS to govern the incidental taking of marine mammals in the course of commercial fishing operations. In those guidelines, the Marine Mammal Commission recommended NMFS consider the impact to be negligible if the mortality and serious injury incidental to commercial fishing operations would cause no more than a 10 percent increase in the time to recovery. In addition, participants at the NMFS 1994 workshop to develop guidelines for stock assessment reports agreed that authorized levels of human-related mortality should not increase recovery time of endangered stocks by more than 10 percent. Therefore, a default recovery factor of 0.1 was chosen to use in the PBR equation for endangered stocks of marine mammals (Barlow *et al*., 1995). Using a PBR containing a recovery factor of 0.1 would allow a large portion of the stock's annual net production to be used for recovery rather than being authorized for removal due to incidental mortality. This would allow a large fraction of the net production of the population to contribute to population increase and eventual recovery, and thus, have a relatively insignificant negative impact upon the population (Wade 1998). Consequently, when incidental mortality and serious injury is below the stock's PBR, such mortality and serious injury would have no more than a negligible impact on the stock.

1.3. Pacific Offshore Cetacean Take Reduction Plan

1.3.1. Development of Plan

The California/Oregon (CA/OR) drift gillnet fishery for thresher shark and swordfish is classified as a Category I fishery under the MMPA. At the time the Pacific Offshore Cetacean Take Reduction Team (TRT or Team) was established, the fishery incidentally took several marine mammal stocks at levels

that were estimated to be above their PBR levels. Consequently, NMFS convened the Team on February 12, 1996 (61 FR 5385). NMFS chose the team members after extended interviews were conducted by a professional facilitator. Members on the TRT included representatives of the CA/OR drift gillnet fishery, environmental groups, the California Department of Fish and Game, the Pacific States Marine Fisheries Commission, independent fisheries scientists and whale biologists, and NMFS. Representatives of other groups and agencies (i.e., recreational fishers and the Oregon Department of Fish and Wildlife) were interviewed but did not choose to participate on the team.

The Team was charged to provide a draft Pacific Cetacean Take Reduction Plan (PCTRP) to NMFS by August 1996. The team held five meetings in locations near Los Angeles, San Diego, and San Francisco between February and June, 1996. Each meeting was open to the public and mediated by a professional facilitator. The TRT considered a full menu of potential take reduction strategies for inclusion in the draft PCTRP. The TRT reviewed the literature on incidental taking of marine mammals in drift gillnets and heard presentations on the status of strategic stocks incidentally taken by the fishery, the estimated annual taking of these stocks from observer data, and strategies currently used by the fishery to avoid taking marine mammals. In addition, the TRT reviewed extensive analyses of observer data (which was gathered over the previous five fishing seasons) to determine if there were correlations between incidental take of cetaceans and fishing techniques, gear used, or oceanographic factors that might suggest appropriate take reduction strategies.

1.3.2. Elements of Take Reduction Team's Draft Plan

On June 27, 1996, the TRT reached consensus on a draft plan. The TRT believed that no single strategy could meet the goals of the MMPA. Therefore, the TRT identified four primary strategies which, if implemented as a package, the TRT expected would meet the 6-month goal of reducing the takes of strategic stocks to below PBR, and to some extent, the long term goal of attaining a ZMRG and serious injury rate for all marine mammal stocks. In addition, there is a section of the Plan that addresses possible contingency strategies, should the primary strategies prove less effective than anticipated and a section describing additional recommendations to NMFS regarding supplementary data gathering and study activities. Moreover, the PCTRP also included: (1) a review of the current information on the status of the affected strategic marine mammal stocks; (2) a description of the CA/OR drift gillnet fishery; (3) an analysis of data from NMFS's CA/OR drift gillnet fishery observer program from 1990-1995; (4) recommendations to enhance NMFS's CA/OR drift gillnet observer program; and (5) an evaluation of other potential strategies to reduce strategic stock bycatch in the fishery. The TRT assumed that each individual strategy would be refined or modified if necessary based upon the initial year results. The TRT submitted its draft PCTRP to NMFS on August 15, 1996. The strategies included:

Acoustic Devices -- NMFS and the fishery should initiate a multi-year experiment to test the effectiveness of acoustic devices (pingers) beginning in the 1996-97 fishing season, before a final PCTRP is adopted by NMFS. The success of pingers in reducing overall cetacean incidental take

during the fishing season August 15, 1996 through January 31, 1997 should determine whether pingers are recommended as a mandatory strategy for reducing takes when the final PCTRP is in place.

Gear Modifications -- There should be fleetwide deployment of 6-fathom (36 feet) minimum buoy line extender length on a mandatory basis. NMFS and the TRT should review the efficacy of this strategy after the final PCTRP has been in place for at least 6 months to determine if the minimum extender length should be modified.

Skipper Education and Feedback -- NMFS should conduct skipper workshops on the PCTRP coupled with expert skipper panels to further generate and consider potential, additional take reduction strategies. Workshop attendance will be mandatory when the final PCTRP is implemented.

Reduction in the Number of Drift Gillnet Permits --The California Department of Fish and Game (CDFG) should continue its policy of not issuing new shark and swordfish drift gillnet permits to replace those that have lapsed. The Oregon Department of Fish and Wildlife should continue to issue only up to 10 unlimited landings permits. A permit buy-back program should be instituted for CDFG drift gillnet permit holders to encourage part-time skippers to leave the fishery permanently.

1.3.3. National Marine Fisheries Service's Proposed Changes to Draft Plan and 1997 PCTRT Recommendations

Under section 118(f)(7)(B) of the MMPA, NMFS must take the draft PCTRP submitted by the Pacific Offshore Cetacean TRT into consideration, and then publish the plan proposed by the team and any changes proposed by NMFS with an explanation of the reasons for the proposed changes in the *Federal Register*, along with proposed regulations to implement the draft PCTRP. NMFS adopted the primary strategies recommended in the draft PCTRP with only a minor change.

On May 29-30, 1997, NMFS reconvened the PCTRT to review the final results from the 1996/1997 CA/OR drift gillnet pinger experiment and evaluate the need for effort reduction and potential implementation mechanisms as recommended by the Team in the draft PCTRP (draft PCTRP, 1996). The Team also reviewed at the meeting the status of the implementation of the final Plan and final Rule to implement the Plan, Skipper Education Workshops, the drift gillnet observer program, and draft 1997 SARs. On July 18, 1997, the Team submitted to NMFS recommendations on the final plan and rule (PCTRP, 1997). NMFS adopted the majority of the PCTRT's recommended changes and/or additions to the final rule (PCTRP, 1997). The following summarizes the Team's recommended changes and an explanation of NMFS's minor changes to these recommendations.

Depth of Fishing Requirement

In August 1996, the PCTRT recommended that NMFS establish a fleetwide 6-fathom minimum extender line (buoy line) requirement. At the May 1997 PCTRT meeting, the team concurred with

NMFS's proposed rule requiring the use of extenders that are equal to or greater than 6 fathoms for all vessels in the CA/OR drift gillnet fishery. The final rule prohibited the use of extenders that are less than 6 fathoms (36 feet; 10.9 m).

Pinger Requirement

In 1996, the PCTRT recommended that if the results from a pinger experiment indicate pingers are effective at reducing cetacean bycatch, then the use of pingers should be mandatory (PCTRP, 1996). In contrast, before final results from the 1996/1997 pinger experiment in the CA/OR drift gillnet fishery were available, NMFS proposed the mandatory use of pingers in the proposed rule to implement the PCTRP. Between September 1996 and January 1997, NMFS and the fishery implemented a single-blind experiment through NMFS's drift Gillnet Observer Program as recommended by the PCTRT (PCTRP, 1996). Preliminary results from the experiment indicate that cetacean entanglement and pinger use is statistically dependent (Chi-square test, p=0.006) (NMFS unpublished data). The odds of entanglement decrease from 0.099/set without pingers to 0.022/set with pingers, or a decrease of over 75 percent. Based on the dramatic results from the 1996/1997 pinger experiment, the Team recommended by consensus during its May 1997 meeting that the use of pingers be mandatory for all vessels in the CA/OR drift gillnet fishery beginning in the 1997/1998 fishing season. The final rule required the use of pingers in the fishery.

At its May 1997 meeting, the PCTRT also expressed concern about whether a sufficient supply of pingers would be available at the start of the swordfish fishing season (August 15). At that time, NMFS was aware of only one manufacturer that produced a pinger consistent with the specifications in the final rule and expected that these pingers would be available by October 1, 1997. In addition, information on the distribution of fishing effort in the CA/OR drift gillnet fishery over the previous few years indicated that the peak fishing effort occurred after September 30 each year (CDFG unpublished data). Because cetacean entanglement is significantly correlated with fishing effort, the highest levels of incidental entanglement also occurs after September 30 (PCTRP, 1996). For these reasons, although the PCTRT recommended that pingers be required in the fishery by August 15, 1997, the final rule required the use of pingers by vessels in the CA/OR drift gillnet fishery to begin on October 27, 1997.

Although the Team concurred with the pinger specifications and configurations in the proposed rule, they suggested that the final rule include a mechanism to allow for limited experimentation with alternative pinger specifications and configurations in the fishery. The Team recommended that any pinger experiment undergo peer review and the experiment should not detract from the NMFS's CA/OR drift gillnet fishery observer program or the fishery's requirements to meet bycatch reduction goals of the MMPA.

In the proposed rule, NMFS stipulated that only "NMFS-approved pingers" could be used in the fishery and that if requested, NMFS may authorize the use of non-NMFS approved pingers for limited experimental purposes. The final rule stipulates specifications for pingers that are required to be used in

the CA/OR drift gillnet fishery. Since all pingers used in the fishery must meet these specifications, all references to "NMFS-approved pingers" were removed from the final rule.

The PCTRT also recommended during its 1997 meeting that NMFS require manufacturers of pingers to provide independent certification that a new prototype meets the final rule's pinger specifications. The PCTRT made this recommendation because it thought the definition of the term "NMFS-approved pinger" was unclear in the proposed rule. Although the proposed rule described the sound specifications for pingers, NMFS agreed that the term "NMFS-approved" was unclear. Nevertheless, NMFS did not agree that manufacturers should have an "independent company" certify that new prototype pingers meet the required pinger specifications because independent companies would not necessarily be more credible at testing pinger sound characteristics. However, manufactures of new pinger prototypes will need to provide documentation that their pingers meet the specifications of the final rule. For these reasons, any reference to the term "NMFS-approved" was removed from the final rule. The final rule did not require that manufactures of new prototype pingers have an "independent company" certify that their pingers meet the pinger specifications .

In order to better enforce the pinger requirement, the PCTRT recommended that NMFS require any driftnet vessel with swordfish or shark on board to have pingers. Although NMFS agreed that drift gillnet vessels that are at sea should be required to have pingers onboard, it believed that pingers should be on the drift gillnet vessel at all times, even when no shark or swordfish are on the boat. Regardless of whether drift gillnet sets catch swordfish or shark, these sets may still incidentally entangle cetaceans. For these reasons, the final rule stipulated that anytime a CA/OR drift gillnet fishery vessel is at sea with a multifilament drift gillnet onboard it must carry a sufficient number of pingers to meet the configuration requirements setforth under the rule, even when no shark or swordfish are on the boat.

The draft PCTRP (1996) and proposed rule stipulated that pingers must be attached on both the floatline and leadline and spaced no more than 300 ft (91.44 m) apart. During the pinger experiment, pingers were attached to the floatlines and leadlines with approximately 1 and 6 ft (0.30 and 1.82 m) lanyards, respectively. Results from this experiment indicated that attaching pingers directly to buoy lines (i.e., extenders) may be a more efficient attachment method because it would facilitate pinger attachment. Pingers attached in this manner did not require individual attachment and removal to and from the floatline during each set because this would automatically occur during routine extender attachment/removal. For example, if extenders were attached to the net at 100 ft (30.48 m) intervals, one pinger could be attached to every third extender and the 300 ft (91.44 m) spacing requirement would be maintained. For these reasons, the final rule authorized the placement of pingers on extenders as long as the 300 ft (91.44 m) spacing requirement was maintained near the floatline and pingers were no more than three feet above the floatline. In addition, the final rule authorized pingers to be attached to the leadline with lanyards that are up to 6 ft (1.83 m) in length.

Skipper Education Workshop Requirement

In August 1996, the PCTRT recommended that NMFS conduct mandatory skipper workshops on the components of the PCTRP, together with expert skipper panels, to further generate and consider potential, additional take reduction strategies (PCTRP 1996). At its May 1997 meeting, the team concurred with the proposed rule's requirement that all vessel operators be required to attend a skipper workshop before initiating fishing each fishing season. The final rule required all CA/OR drift gillnet vessel operators, after notification by NMFS, to attend one Skipper Education Workshop by September 1997. In addition, CA/OR drift gillnet vessel operators must attend Skipper Education Workshops at annual intervals thereafter, unless that requirement is waived by NMFS. NMFS provides advance notice to vessel operators by mail prior to convening workshops.

1.3.4. Take Reduction Plan Amendments

Longer Pinger Lanyards

On January 22, 1999 (64 FR 3431), NMFS amended the PCTRP to allow pingers to be deployed farther away from the net. At the 1997 skipper workshops, representatives of the CA/OR drift gillnet fishery reported to NMFS that allowing pingers to be deployed farther away from the net should facilitate more efficient and safe attachment of pingers during the "setting" of the net and removal of the pingers during net retrieval. Specifically, they suggested that allowing pingers to be deployed within 30 feet (9.14 m) of the floatline and within 36 feet (10.97 m) of the leadline would allow for more efficient and safe placement of pingers on the net. At the June 1998 TRT meeting, the Team recommended that the PCTRP be amended to allow pingers to be attached within 30 feet (9.14 m) and 36 feet (10.97 m) of the floatline and leadline, respectively.

Increasing the length of pinger lanyards was not expected to affect the efficacy of pingers at reducing cetacean bycatch in the fishery because Title 50 section 229.31(c)(1) of the Code of Federal Regulations stipulates that only pingers that broadcast a sound frequency of 10 kHz ($\pm$2 kHz) at 132 dB ($\pm$4 dB) re 1 micropascal at 1 m, lasting 300 milliseconds ($\pm$ 15 milliseconds) and repeating every 4 seconds ($\pm$2 seconds) may be used in the CA/OR drift gillnet fishery. In addition, pingers must be operational to a water depth of at least 100 fathoms (600 feet or 182.88 m). Pingers were originally designed to produce a sound level that is audible at 15 dB above ambient noise levels at a distance of 100 m (328 ft) from the pinger. To conservatively maintain this sound level in all areas of the net, pingers were placed every 300 feet (91.44 m) on the floatline and leadline, with 150 feet horizontal distance between the floatline and leadline pinger. Therefore, by extending the distance from the net an additional 27 feet on the floatline and 30 feet on the leadline, the entire net will still be covered by the sound of the pinger.

In addition, the average stretched mesh size in the CA/OR drift gillnet fishery is 19 in (48.26 cm), but ranges from 16-22 in (48.26-55.68 cm). For 22-inch (55.88 cm) mesh (stretched size), the distance between the two opposing knots when the net is in the water is approximately 12 in (30.48 cm). Thus, because the maximum observed net depth (measured in meshes) is 160 meshes, the maximum vertical

length of a drift gillnet while it is being fished is approximately 160 feet (48.74 m) (160 meshes x 1 ft (.3048m) per mesh). Since pingers attached to the floatline with 30 feet (9.14 m) lanyards and pingers attached to the leadline with 36-feet (10.97 m) lanyards would not be more than approximately 226 feet (68.88 m) apart (160 + 30 + 36), the same level of marine mammal bycatch reduction should be maintained with the longer pinger lanyards.

1.4. Purpose and Need for Action

After determining that the impact of CA/OR drift gillnet fishery and other commercial fisheries that interact with the same marine mammal species listed under the ESA were having a negligible impact on the listed marine mammal populations, NMFS issued a permit under section 101(a)(5)(E) of the MMPA to authorize the incidental take of four marine mammal stocks. To authorize the incidental take these marine mammal species under the ESA, NMFS completed a section 7 consultation on October 23, 2000. During that consultation, NMFS concluded that the fishery would likely jeopardize the continued existence of leatherback and loggerhead sea turtles. As a consequence of that jeopardy determination, NMFS was required to develop a reasonable and prudent alternative to avoid the likelihood of jeopardy to the continued existence of the leatherback and loggerhead sea turtles. The purpose of this action is to implement the reasonable and prudent alternative developed by NMFS in the biological opinion, or to implement another reasonable and prudent alternative that is determined to be at least as effective, to avoid the likelihood of jeopardizing the continued existence of the leatherback and loggerhead sea turtle populations, with the least economic and environmental impacts.

1.5. Scope

The immediate goal of the reasonable and prudent alternative is to avoid the likelihood that the continued operation of the CA/OR drift gillnet fishery will jeopardize the continued existence of the leatherback and loggerhead sea turtle populations. The reasonable and prudent alternative could be implemented by the state of Oregon and California, since they are responsible for the management of the fishery, or under the ESA (16 USC 1531 *et seq*.), since the CA/OR drift gillnet fishery is not currently subject to a fishery management plan under the Magnuson-Stevens Fishery Conservation and Management Act. The ESA allows for the promulgation of regulations to implement measures to protect and conserve listed species. The rule will apply to all U.S. drift gillnet fishing vessels operating in waters seaward of the coast of California or Oregon, including adjacent high seas waters.

2.0. ALTERNATIVES

Table 1 provides an overview of the alternatives that are being considered in the Environmental Assessment. Under each alternative, fishers are required to comply with the existing take reduction plan requirements (use of pingers, 36 feet or greater extenders, and attend skipper education workshops) and to register with NMFS to obtain an Authorization Certificate, carry biological observers if requested by NMFS, and report any incidental mortality or serious injury of marine

mammals within 48 hours of returning to port from a fishing trip. In addition, vessel operators must comply with existing State codes that regulate gear, equipment and fishing seasons.

As a reasonable and prudent measure under the Incidental Take Statement issued under section 7(b)(4) and 7(o)(2) of the ESA, NMFS is responsible for ensuring that CA/OR drift gillnet vessel operators are educated on sea turtle biology and on methods that will reduce injury or mortality during fishing operations. Therefore, each alternative will include regulations implementing the reasonable and prudent measure to require CA/OR drift gillnet vessel operators to learn about sea turtle biology and methods to reduce injury or mortality during fishing operations (resuscitation on comatose turtles). These workshops will be incorporated into the Pacific Offshore Cetacean Take Reduction Plan skipper education workshops which provide an opportunity for CA/OR drift gillnet vessel operators to learn about relevant information regarding marine mammal and sea turtle takes, and more importantly elicit feedback on how to reduce incidental take of these species.

2.1. Alternative 1: Status Quo, or No Action Alternative

Under this Alternative, no regulations would be issued to implement the reasonable and prudent alternative in the biological opinion, or another alternative that is determined to prove at least as effective. Under this alternative, no take of listed marine mammals or sea turtles would be authorized.

2.2. Alternative 2: Issuance of Regulations to implement Reasonable and Prudent Alternative

This Alternative would establish regulations to implement the reasonable and prudent alternative of the biological opinion which authorizes the incidental take of marine mammals and sea turtles listed under the ESA. The reasonable and prudent alternative restricts fishing effort by CA/OR drift gillnet vessels during August, September, and October north of Point Conception and south of Point Conception during August and January during El Niño events.

2.2.1. Restrict Fishing Effort North of Point Conception

CA/OR drift gillnet vessels would be restricted from fishing in waters off of California and Oregon from Point Conception (34°27'N), north to 45°N, and west to 129°W, from August 15th to October 31st (Figure 1). During the time and area closure, vessels are allowed to fish outside of the closed area (south of Point Conception to the Mexico border, north of 45°N, and west of 129°W). However, during El Niño years under this alternative, vessels would not be allowed to fish south of Point Conception and east of 120°W between August 15th and August 31st, and during the month of January.

2.2.2. Restrict Fishing Effort South of Point Conception

During El Niño events, CA/OR drift gillnet vessels would be restricted from fishing in waters off of

California south of Point Conception (34º27'N) to the Mexico border and east of 120ºW between August 15th and August 31st, and between January 1st through January 31st (Figure 2). Under this alternative, vessels are still allowed to fish outside of the closed area west of 120ºW, or north of Point Conception after October 31st.

2.3. Alternative 3: Issuance of Regulations to Implement Take Reduction Team Recommendation

2.3.1. Northern Closure

This Alternative would implement the recommendation developed by the Pacific Offshore Cetacean Take Reduction Team (TRT) at the May 8-9, 2001, meeting in Monterey, California. At the meeting, the TRT recognized the need and importance for NMFS to develop a strategy to protect leatherback sea turtles. However, the TRT also felt that perhaps there might be another measure that would provide the same level of protection for leatherbacks as the alternative in the biological opinion, yet still allow fishing to occur north of Point Conception during September and October. As a result, the TRT requested that NMFS conduct a quantitative analysis of turtle takes in the CA/OR drift gillnet fishery and evaluate the influence of season, region, and extender length. If such an analysis supports that the measure provides an equal or greater level of protection for leatherback turtles, the TRT recommends that NMFS consider adopting the measures.

The strategy that the TRT recommended includes:

- Close the region north of 36º15'N to 45º00'N and east of 129ºW from August 15th to November 15th (Figure 3).
- Require that extender lengths in the area north of the line extending due west of Point Conception be increased to a minimum of 60 feet.
- If a leatherback turtle is taken in an observed set for this fishery, it would trigger the southward expansion of the closure area for 15 August to 15 November to a line west from Point Conception until such time that projected total takes no longer exceed 3 leatherback turtles through the end of the first year, 6 leatherbacks through the end of the second year and 9 leatherbacks through the end of the third year.

2.3.2. South of Point Conception Closure

In the absence of a specific recommendation by the TRT on the measure identified in the biological opinion to address the incidental mortality and serious injury of loggerhead sea turtles by the CA/OR drift gillnet fishery, NMFS is using the measure identified in the biological opinion as part of the TRT recommendation (Figure 2).

2.4. Alternative 4: Issuance of Regulations to Implement Modified Take Reduction Team

Recommendation (Preferred Alternative)

2.4.1. Northern Closure

NMFS modified the recommendation from the TRT to ensure that the measure would provide at least the same level of protection for leatherback sea turtles as the reasonable and prudent alternative identified in the biological opinion. This alternative is based on the recommendation from the TRT and recent satellite telemetry tracking data obtained from two leatherback sea turtles that were tagged in Monterey Bay in September 2000. Based on these data, NMFS proposes to retain the time closure (August 15 through November 15) suggested by the TRT and to enlarge the closed area proposed by the TRT. For simplicity and because Point Sur is a recognized landmark for navigational purposes, NMFS has chosen to modify the TRT recommendation to use Point Sur (36°18.5'N) instead of the unnamed point at 36°15'N as the anchor point on land for the closed area. Using Point Sur, NMFS has identified the southern boundary of the closed area as a line from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W. From this point, the closure continues west to 129°W, then north to 45°N, then east to where the 45°N parallel reaches land. The diagonal line from Point Sur to 34°27'N 123°35'W was developed by reviewing the leatherback satellite tracking data trajectory and maintaining the satellite track points to the north of the line. NMFS believes this will protect the potential migratory corridor for leatherback turtles departing Monterey Bay for their nesting beach in Indonesia (Figure 4). In addition, since observer data (1990-2000) do not suggest that the lengthening of extenders to 60 feet would definitively cause a decrease in the potential for leatherback interactions, this measure was not included. This alternative also has removed the "trigger" language identified by the TRT to extend the area closure in a southerly direction to Point Conception if a leatherback was observed taken because NMFS does not consider this extra precaution necessary since this alternative provides the same, if not greater protection for leatherback turtles than the reasonable and prudent alternative in the biological opinion (Section 4.4.3.1.).

2.4.2. South of Point Conception Closure

To reduce the likelihood of an incidental mortality or injury of loggerhead sea turtles, CA/OR drift gillnet vessels would be restricted from fishing in waters off of California south of the line extending west from Point Conception (34°27'N) to the Mexico border and east of 120°W between August 15th and August 31st, and between January 1st through January 31st, during an El Niño event (Figure 2). Under this alternative, vessels are still allowed to fish outside of the closed area west of 120°W, or north of Point Conception inside the open area that is south of the line extending from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W.

Table 1. Overview of Alternatives.

Alternative 1 **No Action.**	**Alternative 2** **Issue regulations to implement RPA.**	**Alternative 3** **Issue regulations to implement recommendation by TRT.**	**Alternative 4 (Preferred)** **Issue regulations to implement modified TRT recommendation.**
-Fish under existing State Fish and Game Codes and Take Reduction Plan regulations.	-Close area from Point Conception (34E27'N) north to 45EN, and west to 129EW, from August 15 to October 31, for a period of three years (2001 - 2003).	-Close area from 36E15'N north to 45EN, and west to 129E W, from August 15 to November 15, for a period of three years (2001 - 2003).	-Close area bounded by a line extending from shore at Point Sur (36º18.5'N) to the point 34º27'N 123º35'W, west to 129^{0}W, north to 45ºN, then east to where the 45ºN parallel reaches land, from August 15 to November 15, for a period of three years (2001 - 2003).
	-Close area south of Point Conception (34E27'N) and west to 120EW from August 15 to August 31, and again from January 1 to January 31, during a forecasted, or occurring, El Niño event.	-Require extenders of 60 feet or greater for all sets made north of Point Conception (34E27'N). -Increase observer coverage in the entire fishery or, at a minimum, in the northern zone. -Expand closure southward to Point Conception (34E27'N) if a leatherback turtle is observed taken north of 34E27'N. -Close area south of Point Conception (34E27'N) and west to 120EW from August 15 to August 31,and again from January 1 to January 31, during a forecasted, or occurring, El Niño event.	-Close area south of Point Conception (34E27'N) and west to 120EW from August 15 to August 31,and again from January 1 to January 31, during a forecasted, or occurring, El Niño event.

2.5. Alternatives Eliminated from Further Analysis

NMFS examined several strategies for reducing or eliminating leatherback and loggerhead sea turtle entanglements when developing measures to avoid the incidental take of sea turtles. NMFS searched for a strategy which would provide the most certainty in reducing or eliminating leatherback and loggerhead sea turtle entanglements upon implementation. These strategies included: 1) reducing fishing effort through gear modifications; 2) reducing fishing effort by decreasing the number of vessels; 3) increasing survival of entangled sea turtles; 4) implementing gear modifications to reduce interactions; and 5) changing fishing practices. These strategies were not considered further because NMFS could not be certain that singularly or together they would result in a significant reduction in the level of take and mortality of sea turtles. However, one or more of these strategies may be appropriate if there is new information or after further study to evaluate their effectiveness. A summary of these strategies is provided below.

2.5.1. Reduce Fishing Effort Using Gear Modifications

2.5.1.1. Reduce Net Length

This strategy would require that a revised maximum net length be established. Reducing the length of the net would reduce fishing effort and potentially reduce sea turtle and marine mammal entanglement. Most observed sets used nets between 900 and 1000 fathoms long. Some drift gillnet vessels would not be affected by this strategy since their nets are already shorter. If sea turtles were uniformly distributed, reducing the overall length of the net would be expected to reduce the number of sea turtle entanglements by decreasing the amount of gear in the water (e.g., a 50 percent reduction in sea turtle entanglements if net lengths were reduced by half). However, because sea turtles are not evenly distributed throughout the year and because they are dependent upon changing oceanographic conditions, NMFS determined that it could not reliably predict that this option would achieve the desired results, and therefore there remained a high likelihood that turtles would still be entangled.

2.5.1.2. Reduce Net Height

This strategy would require that a maximum number of meshes from the floatline to the leadline be established. The depth, or vertical length of drift nets varies considerably. The majority of nets are between 100 and 160 meshes in depth. Reducing the height of the net (fewer meshes) was expected to reduce the number of sea turtle entanglements by decreasing the amount of gear in the water. This approach was not chosen because there is insufficient information available to demonstrate a proportional reduction in take would occur as a result of reducing the height of the net. NMFS concluded there was still a high likelihood of having a sea turtle entanglement in areas with high concentrations of sea turtles.

2.5.2. Reducing Fishing Effort by Decreasing the Number of Vessels

2.5.2.1. Reduce Number of Vessels

Reducing the number of vessels that may fish would reduce the number of sets made each year and decrease the likelihood of sea turtle entanglements. However, based on observer data, the location and timing of effort affects the likelihood of sea turtle entanglements. If all remaining effort occurred in the areas where sea turtles are to concentrate, even though fewer boats would be fishing, there would likely be only minimal reductions in impact. Because this option does not reduce the number of sets made in areas with high concentrations of sea turtles, this strategy was not selected.

2.5.2.2. Institute Fishing Permit Buy-Back Program

At some of the calendar year 2000 Pacific Offshore Cetacean Take Reduction Plan skipper workshops, some fishermen suggested that NMFS implement a buy-back program. This option was not chosen since reducing the number of vessels that may fish (buy back the permits) and therefore, the number of sets made each year, would not restrict the location of the sets. If all remaining effort occurred in the areas where sea turtles appear to concentrate, even though fewer boats would be fishing, there would likely be minimal reductions in impact. Because this option does not reduce the number of sets made in areas with high concentrations of sea turtles, this strategy was not selected. In addition, to implement a buy-back program, there needs to be legal authority and appropriated funds.

2.5.3. Increase Survivability of Entangled Sea Turtles

2.5.3.1. Reduce Soak Time

This strategy would reduce the amount of time that gear can be deployed in the water column on any given day or on each set. It would reduce the amount of soak time of each set, and thus reduce fishing effort for each set. This may reduce sea turtle and marine mammal take if it was known at what time of night these animals become entangled in the nets. In addition, it would be easy to implement since no gear change is required, and would be equitable across the fleet. However, enforcement of this strategy would be difficult. A restriction on soak time could affect quantity and type of catch of target fish, thereby resulting in a negative economic impact.

NMFS considered requiring nets to be retrieved more frequently (decrease the soak time), such as at scheduled intervals (every hour, every two hours, etc.), to decrease the amount of time that a sea turtle might be entangled in the net, thereby increasing its chances of survival. However, the routine dive time for post-nesting female leatherbacks is 10 to 14.5 minutes (Eckert *et al*., 1997 *in* Lutz and Musick, 1997) and for subadult loggerheads is 19 to 30 minutes (Soma, 1985 *in* Lutz and Musick, 1997; Byles, 1988 *in* Lutz and Musick, 1997). This approach was not selected because NMFS does not know when, during a set, sea turtles are entangled. For example, if a sea turtle is entangled at the end of a dive, its ability to survive is greatly reduced because the turtle has already been underwater for a long time. Setting the nets can take approximately one hour. Retrieving net with no catch can take over two hours; nets with catch take longer. NMFS concluded that reducing the soak times to only a few minutes to correspond with sea turtle dive times was not feasible or practical and might not result in an

impact reduction.

2.5.3.2. Institute Sea Turtle Resuscitation Training

NMFS considered instituting sea turtle resuscitation training for vessel operators and requiring resuscitation of captured turtles as a means of avoiding the likelihood of jeopardizing the leatherback and loggerhead sea turtles. However, although providing mandatory sea turtle resuscitation training to vessel operators was realistic and reasonable, NMFS concluded that resuscitation would not always be practical when at sea due to cramped conditions on the vessel and that most entangled turtles, particularly larger leatherbacks, could not be practicably brought on board and resuscitated. Therefore, the impacts by the fishery would continue. In addition, NMFS does not know the survival rate of resuscitated turtles, and therefore any benefits achieved by this requirement are too speculative to use as a measure to ensure their survival. However, NMFS included this option as a term and condition of the Incidental Take Statement to minimize the impact of capture on those turtles that could be practicably resuscitated.

2.5.4. Gear Modifications

2.5.4.1. Reduce Mesh Size

Smaller mesh size might reduce the likelihood of sea turtle entanglements because turtle appendages would be less likely to become entangled in the smaller openings. However, because California Department of Fish and Game restricts targeting of shark or swordfish with nets less than 14 inches stretched mesh, and since observer data from the set gillnet halibut fishery indicate that 8 ½ inch mesh may still entangle sea turtles, NMFS did not pursue this option.

2.5.4.2. Decrease Percent Slack of the Net

This strategy would regulate the percent slack that could be used while fishing. Percent slack is the percentage of slack created in the net by meshes on the hanging line. The majority of slack percentages observed in the drift gillnet fishery were between 35% and 50% inclusive. Slack ratios are easily changed, at nominal cost, during the off season when fishers normally repair and recondition their nets for the following season. Making the net more taut could decrease the likelihood of a sea turtle entanglement by enabling the turtle to "bounce off" the net. However, NMFS concluded that turtles are still likely to become entangled in the large mesh and that any reductions accrued would be speculative and uncertain.

2.5.4.3. Sea Turtle Pingers

NMFS considered the use of acoustic deterrent devices (pingers) that would emit a signal that would be effective at possibly reducing the likelihood of a sea turtle entanglement since at one of the Pacific

Offshore Cetacean Take Reduction Plan Skipper workshops, participants suggested modifying the pinger already required under the PCTRP to include sound frequencies that would be more effective at reducing sea turtle entanglements. However, according to Lenhardt (1994), the maximal sensitivity in sea turtles generally occurs in the range from 100 to 800 Hz and that calculated in-water hearing thresholds within the useful range appear to be high (e.g., about 160 to 200 dB re 1 FPa). Based on this information, there is no evidence to suggest that sea turtles are capable of hearing the mid-frequency sound (10 kHz (± 2 kHz) at 132 dB (± 4 dB) re 1 FPa at 1 meter) that is emitted by the marine mammal pingers. Because there are no data available to support the use of pingers as a sea turtle deterrent, NMFS dismissed this option as a possible alternative.

2.5.4.4. Restrict Use of Lightsticks or Decklights

NMFS examined whether the use of lightsticks or decklights on sets caused a greater likelihood of sea turtle entanglement. NMFS determined that the use of lightsticks or decklights did not affect the entanglement rates of the different sea turtle species and that adding restrictions on the use of lightsticks or decklights was not likely to produce any reduction of expected impacts.

2.5.5. Fishing Practices

2.5.5.1. Lower Net in Water Column

Based on the assumption that sea turtle interactions occur more frequently at the surface and that sea turtles forage and migrate at shallow water depths, lowering the net in the water column, by lengthening the buoy lines, would reduce the number of interactions. However, based on information from Soma (1985) in Lutz and Musick (1997), routine dives of post-nesting female loggerheads are 9 - 22 meters (29.3 to 71.5 feet), and 50 - 84 meters (162.5 to 273 feet) for leatherbacks (Eckert *et al*., 1986 in Lutz and Musick, 1997). Using buoy lines of this length would not be feasible or practical. In addition, based on observer data, lowering the net does not appear to lower the entanglement rate.

2.5.5.2. Do Not Set in Green Water

At one of the skipper education workshops, a fisherman stated that setting in green water was more likely to entangle sea turtles. He suggested prohibiting sets in green water. This option was determined impractical to implement or enforce.

2.5.5.3. Change to Longline Gear

NMFS considered converting drift gillnet vessels to longline gear to reduce the number of sea turtle entanglements. Converting a vessel from drift gillnet to longline would be expensive and time consuming for each gillnet vessel owner. In some instances, vessels would be unsuitable for such a conversion. This strategy would probably preclude a significant number of existing fishers who cannot afford such a

conversion. Current California and Oregon state laws prohibit longline fishing within 200 nautical miles of their coasts. Therefore, only larger vessels would be able to fish that far offshore resulting in a significant impact on the fishery, which would be equivalent to shutting it down. Therefore, NMFS did not pursue this option further because NMFS expects that some vessels may switch to longline gear, on their own, if they think the fishery is economically viable. In addition, longline fleets fishing in the Pacific and Atlantic Oceans are dealing with sea turtle bycatch issues which means this alternative may not be the best solution.

2.5.5.4. Change to Harpoon Gear

NMFS considered converting drift gillnet vessels to harpoon gear to reduce the number of sea turtle entanglements. Harpoon conversion is relatively simple in comparison to converting to longlining. Many fishers already have the equipment required for harpooning and will use it to target swordfish if the ocean and weather conditions are right. The harpoon fishery is limited by the number of swordfish found at the surface and would be unable to support the number of fishers that would be displaced by a drift gillnet fishery closure. NMFS determined that the harpoon fishery occurs mostly in waters off of southern California during August and September. In addition, harpoon fishing is not practical or feasible in rough waters, such as those occurring in the waters north of Point Conception. Therefore, NMFS did not recommend converting drift gillnets to harpoon gear. Moreover, vessel operators could switch to harpooning full-time if they thought the fishery was economically viable.

3.0. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1. Status of Protected Marine Populations

3.1.1. Marine Mammals

The following is a brief presentation of information on the status of each marine mammal stock that has been observed incidentally taken in the CA/OR drift gillnet fishery for thresher shark and swordfish. Information is also provided on other sources of human-caused incidental taking. The presented information may be found in the U.S. Pacific Marine Mammal Stock Assessments (Forney *et al*., 2000).

Short-Finned Pilot Whale (Globicephala macrorhynchus). For the purposes of the stock assessments report (SAR), short-finned pilot whales in the Pacific U.S. Exclusive Economic Zone (EEZ) of Washington, Oregon, and California are considered one "stock." Short-finned pilot whales were once common off the coast of southern California. However, after a strong El Niño event in 1982-83, there have been few sightings between 1984 -1992, despite increased survey efforts. In 1993, six groups of short-finned pilot whales were again seen off California (Carretta *et al*. 1995 in Forney *et al*. 2000; Barlow and Gerrodette 1996 in Forney *et al*. 2000). The abundance of short-finned pilot whales in this region appears to be variable and may relate to oceanographic conditions. The 1991-96 weighted

average abundance estimate for California, Oregon and Washington waters based on ship surveys in 1991, 1993 and 1996, is 970 (CV=0.37) short-finned pilot whales (Barlow 1997 in Forney *et al*. 2000). Until the range of this population and the movements of animals in relation to environmental conditions are better documented, no inferences can be drawn regarding trends in abundance of short-finned pilot whales off California, Oregon and Washington.

The potential biological removal (PBR) level for this stock is calculated to equal 5.5 short-finned pilot whales per year. The average annual estimated mortality (1994-1998) for short-finned pilot whales in the CA/OR drift gillnet fishery is 3 (CV=0.96) animals. Historically, short-finned pilot whales were also taken incidental to the squid purse seine fishery off southern California. However, the level of this taking is unknown and no recent reports of mortality have been received. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, although recently, NMFS understands this fishery has been converted to longline gear.

Baird's Beaked Whale (Berardius bairdii) The SARs considered Baird's beaked whales in the Exclusive Economic Zone (EEZ) waters off the coasts of California, Oregon, and Washington as one stock. Baird's beaked whales are distributed throughout deep waters and along the contintental slopes of the North Pacific Ocean (Balcomb 1989 in Forney *et al*. 2000). Along the U.S. west coast, Baird's beaked whales have been seen primarily along the continental slope from late spring to early fall. They have been seen less frequently and are presumed to be farther offshore during the colder water months of November through April. Sightings of Baird's beaked whale have been rare, even during ship and aerial transect surveys. The best population estimate currently available is 379 animals (CV=0.23). The PBR for this stock is 3.1 animals per year. There was 1 observed Baird's beaked whale mortality in 1994, which was estimated to equal 6 animals that year for the entire CA/OR drift gillnet fleet. However, since the implementation of the Pacific Offshore Cetacean Take Reduction Plan (October 1997), mortality estimates for the CA/OR drift gillnet fishery are based on data collected after its implementation. This approach was recommended by the Pacific Scientific Review Group at their December 1999 meeting because the observer data showed that the overall cetacean entanglement rate had dropped considerably after the implementation of the plan. There have been no other Baird's beaked whales observed taken by the fishery. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, although recently, NMFS understands this fishery has been converted to longline gear.

Mesoplodont Beaked Whales (Mesoplodon spp.) Mesopodont beaked whales are distributed throughout deep waters and along the continental slopes of the North Pacific Ocean. At least 5 species in this genus have been recorded off the U.S. west coast, but due to the rarity of records and the difficulty in identifying these animals in the field, nearly no species-specific information is currently available. Insufficient sighting records exist to determine any possible spatial or seasonal patterns in the distribution of mesoplodont beaked whales. For these reasons, the SARs considered all mesoplodont beaked whales as one stock in the EEZ waters off the coasts of Washington, Oregon, and California.

The best available population estimate is 3,738 animals (CV=0.50). The estimated PBR for this group of species is 27 mesoplodont beaked whales per year. After the 1997 implementation of a Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of mesoplodont beaked whale entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this group of species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. This results in an average estimated annual mortality of zero mesoplodont beaked whales. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, although NMFS understands this fishery has been converted to longline.

Cuvier's Beaked Whale (Ziphius cavirostris) Cuvier's beaked whales are distributed widely throughout deep waters of all oceans (Heyning 1989 in Forney *et al*. 2000). Off the U.S. west coast, this species is the most commonly encountered beaked whale and there is no seasonal changes in distribution. The SARs considered the Cuvier's beaked whales in the EEZ waters off California, Oregon, and Washington as one stock. Sightings of Cuvier's beaked whales off the U.S. west coast have been infrequent. Based on the best available data, the best population estimate for this stock of Cuvier's beaked whale is 5,870 (CV=0.38) animals. The estimated PBR for this stock is 43 animals per year. After the 1997 implementation of a Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of Cuvier's beaked whale entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. This results in an average estimated annual mortality of zero Cuvier's beaked whales. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, although NMFS understands this fishery has been converted to longline.

Pygmy Sperm Whale (Kogia breviceps) Pygmy sperm whales are distributed throughout deep waters and along the continental slopes of the North Pacific and other ocean basins. Along the U.S. west coast, sightings of this species and of animals identified only as *Kogia* sp. have been rare. However, this is probably a reflection of behavior, rather than an indication of true rareness. Available data are insufficient to identify any seasonality in the distribution of pygmy sperm whales. For the purposes of the SARs, pygmy sperm whales found within the EEZ off the coasts of Washington, Oregon, and California are considered one stock. The best estimate of population abundance for this stock is 4,746 animals (CV=0.67) and its estimated PBR is 28 animals per year. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped

considerably (Barlow and Cameron 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of pygmy sperm whale entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. This results in an average estimated annual mortality of zero pygmy sperm whales. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, although NMFS understands this fishery has been converted to longline.

Sperm Whale (Physeter macrocephalus) The SARs consider sperm whales in the EEZ off the coasts of California, Oregon, and Washington as one stock. In addition, the SARs conclude that the most precise estimate of population abundance size for this population is 1,191 (CV=0.22) animals. The PBR calculated for this stock is 2.0 animals per year and the estimated average annual incidental mortality (1997-2000) in the CA/OR drift gillnet fishery is 1.3 animals. In the eastern North Pacific, sperm whales are widely distributed. Females and younger sperm whales tend to remain in tropical and temperate waters year-round, while in the summer, adult males move north to feed in the Gulf of Alaska, Bering Sea and in the waters around the Aleutian Islands. During the winter, sperm whales are generally distributed south of 40EN (Small and DeMaster, 1995). Off California, sperm whales are found year-round, with peak abundances from April through mid-June and from the end of August through mid-November (Forney *et al*. 1995), which suggests a northward migration in the spring and a southward migration in the fall (Gosho *et al*., 1984).

A study conducted in 1997 to estimate the breeding season abundance of sperm whales in the eastern temperate North Pacific (between 20EN-45EN, and west to 165EW) used passive acoustic listening devices to detect numbers of sperm whales, coupled by visual surveys. Barlow and Taylor (1998) found sperm whales to be uniformly distributed in the study area, with no north to south density gradient. Mesnick *et al*. (1999) recently analyzed the genetic relationships of animals in the eastern Pacific and found that the mtDNA and microsatellite DNA of animals sampled in the California Current is significantly different from animals sampled further offshore, although the line of delineation is unknown. Mesnick *et al*. (1999) also found that genetic differences appeared larger in an east-west direction than in a north-south direction. This is confirmed by tagging studies conducted by Rice (1974), who documented three whales tagged in San Francisco and later caught by whalers as far north as British Columbia. Based on differences in gene samples between sperm whales in the Gulf of California, and coastal California (Mesnick *et al*. 1999), the southern limit of the stock is probably the California-Mexico border.

Humpback Whale (Megaptera novaeangliae) The SARs consider humpback whales that migrate between the United States and Mexico as one stock (California/Oregon/Washington - Mexico stock). The most precise and least biased estimate of this stock's population abundance is 905 (CV=0.06) animals. The estimated PBR allocation for U.S. waters is 1.7 whales per year. One humpback whale was observed taken in the CA/OR drift gillnet fishery in 1994 and one animal in 1999. Both of these whales were released alive. Because the humpback whale is listed as an endangered species under the

ESA, the stock is classified as strategic in the SARs. Similar drift gillnet fisheries for swordfish and sharks occurs along the coast of Baja California, Mexico, and may take animals from the same population[1]. However, species-specific mortality information is unavailable. Strikes by ships have been implicated in the deaths of at least two humpback whales in California. Additional mortality probably goes unreported.

Calambokidis, *et al*. (1997) estimated the total North Pacific population of humpbacks to exceed 6,000; however, without knowing where some of the Mexican breeding stocks migrate, the current estimate is lower than this. Mark-recapture population estimates have increased from 1988-90 to 1997-98 at about 8% per year (Forney, *et al*., 2000). Based on photographic identification of individual animals, Urbán, *et al*. (1999) estimates the population size of the Mexican coastal stock to be 1,813 and the abundance of the Revillagigedo stock to be 914. Based on the results of photo-identification studies of humpbacks in their wintering areas, the current population estimate for the Central North Pacific stock is 4,005 (CV=0.095), with a minimum estimate of 3,698 whales. Using this same data, the most recent abundance estimate for the Western North Pacific stock of humpback whales is 394 (CV=0.084) animals, with a minimum estimate of 367 (Ferrero *et al*., 2000). Combining all three stocks yields a total abundance estimate of 5,304 (minimum 4,926) humpbacks in the North Pacific. This estimate does not include the Mexican breeding stock abundance estimates, because most of these animals are included in the estimates of the CA/OR/WA - Mexico feeding stock. Furthermore, population estimates for the entire North Pacific have increased substantially 1966 to the early 1990s, at 6-7% per year (Forney *et al.*, 2000).

Fin whale (Balaenoptera physalus) The SARs consider fin whales that migrate along California, Oregon, and Washington as one stock. Shipboard sighting surveys in the summer and autumn of 1991, 1993 and 1996 produced an estimate of 1,236 (CV=0.20) fin whales comprising the California, Oregon and Washington "stock," with a minimum estimate of 1,044 animals (Forney *et al*., 2000). An increasing trend between 1979-80 and 1993 is suggested by the available survey data, but it is not statistically significant (Barlow, 1997). The estimated PBR is 2.1 whales per year. One fin whale was observed taken in the CA/OR drift gillnet fishery in 1999. Because the fin whale is listed as an endangered species under the ESA, the stock is classified as strategic in the SARs. The local distribution of fin whales during much of the year is probably governed by prey availability.

Fin whales have a complex migratory behavior, occurring in any one season at many different latitudes, perhaps depending on their age or reproductive state as well as their "stock" affinity. Movements can be either inshore-offshore or north-south. In recent years, fin whales have been observed year-round off central and southern California, with peak numbers in the summer and fall. Peak numbers of fin whales have also been seen during the summer off Oregon and in summer and fall in the Gulf of Alaska

[1]More recent information indicates that the drift gillnet fishery in Mexico has converted to longline fishing gear.

and southeastern Bering Sea (*in* Perry *et al.*, 1999). Rice (1974) reported that several fin whales tagged from November to January off southern California were later killed by whalers in May to July off central California, Oregon, and British Columbia and in the Gulf of Alaska, suggesting possible southern California wintering areas and summering areas further north. Although fin whale abundance is lower in winter/spring off California, and higher in the Gulf of California, further research and surveys need to be conducted in order to determine whether fin whales found off southern and central California migrate to the Gulf of California for the winter (Forney *et al*., 2000).

Bottlenose dolphin - offshore stock (Tursiops truncatus) The SARs consider offshore bottlenose dolphins found in the waters off California, Oregon, and Washington as one stock. Bottlenose dolphins are distributed world-wide in tropical and warm-temperate waters. The best population abundance estimate for this stock is 956 (CV=0.14) offshore bottlenose dolphins (Barlow, 1997). The estimated PBR level for this stock is 8.5 animals a year. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of bottlenose dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The average annual estimated mortality (1997-2000) of this stock in the CA/OR drift gillnet fishery is 0.0 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although recently, NMFS understands this fishery has been converted to longline gear. However, species-specific mortality information is unavailable. This stock is not classified as strategic under the MMPA.

California sea lion (Zalophus californianus californianus) The U.S. California sea lion population is distributed between the U.S./Mexico border and extend northward into Canada. The population abundance estimate for this stock is between 204,000 to 214,000 animals and the estimated PBR is 6,591 sea lions per year. The mean annual takes of the California set gillnet fishery for halibut and angel shark is estimated to be 1,012 (0.4) animals per year. The mean annual mortality caused by the CA/OR drift gillnet fishery is estimated to be 1158 (0.23) animals per year. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. Earlier logbook information indicated that mortality of California sea lions also occurred in several California purse seine fisheries although more recent data do not show this trend. California sea lions are also injured by marine debris. The stock is not classified as "strategic" under the MMPA.

Common dolphins - short and long beaked (Delphinus delphis) and (Delphinus capensis) Common dolphins off California are classified into two stocks, the short-beaked California, Oregon, Washington stock and the long-beaked California stock. The best abundance estimates for these stocks is 373,573

(CV=0.19) short-beaked common dolphins and 32,239 (CV=0.18) long-beaked common dolphins with a PBR of 3,188 animals and 250 animals, respectively. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of these species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The average estimated annual mortality (1997-2000) for short-beaked common dolphins in the CA/OR drift gillnet fishery is 94.3 animals and for long-beaked common dolphins is 8.3 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. Common dolphins are also incidentally killed in the California near-shore set gillnet fishery for halibut, flounder, angel shark, yellowtail, white seabass, and white croaker.

Dall's porpoise (Phocoenoides dalli) Dall's porpoise are endemic to temperate waters of the North Pacific Ocean. Off the U.S. west coast, they are commonly seen in shelf, slope and offshore waters. Their distribution and abundance in this region varies considerably at both seasonal and inter-annual time scales as oceanographic conditions vary (Forney 1997; Forney and Barlow 1998). The SARs designate Dall's porpoise in California, Oregon, Washington as one stock. The best estimate of population abundance for this stock is 117,545 (CV=0.45) Dall's porpoise. The estimated PBR for this stock is 737 animals. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of Dall's porpoise entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The average estimated annual mortality (1997-2000) for Dall's porpoise in the CA/OR drift gillnet fishery is 5 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. This stock is not designated as "strategic" under the MMPA.

Northern right-whale dolphin (Lissodelphis borealis) Northern right whale dolphins are endemic to temperate waters of the North Pacific Ocean. Off the U.S. west coast, they have been seen primarily in shelf and slope waters with seasonal movements into the southern California bight. The SARs designate northern right whale dolphins found in the waters of California, Oregon, Washington as one stock. The estimated population abundance for this stock is 13,705 animals and the estimated PBR is 97 animals. After the 1997 implementation of the Take Reduction Plan, which included skipper

education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of northern right whale dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The average annual estimated mortality (1997-2000) for northern right whale dolphin in the CA/OR drift gillnet fishery is 23 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. This is not a strategic stock under the MMPA.

Northern elephant seal (Mirounga angustirostris) Northern elephant seals breed and give birth in California (U.S.) and Baja California (Mexico), primarily on offshore islands, from December to March. The U.S. breeding population of northern elephant seals is considered one stock in the SARs. The best estimate of population abundance for this stock is 84,000 animals with a PBR of 2,142 animals. The estimated average annual mortality (1997-2000) of northern elephant seals in the CA/OR drift gillnet fishery is 22 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. The set gillnet fishery in California also incidentally takes northern elephant seals, however, this fishery has diminished significantly in recent years. The stock is not considered "strategic" under the MMPA.

Pacific white-sided dolphin (Lagenorhynchus obliquidens) Pacific white-sided dolphins are endemic to temperate waters of the North Pacific Ocean, and are common both on the high seas and along the continental margins. Off the U.S. west coast, Pacific white-sided dolphins have been seen primarily in shelf and slope waters. The SARs consider the California, Oregon, and Washington populations as one stock. The population abundance estimate for this stock is 25,825 (CV=0.49) animals and the estimated PBR is 157 animals per year. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of Pacific white-sided dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The estimated average annual mortality (1997-2000) in the CA/OR drift gillnet fishery for this stock is 4 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. This is not a strategic stock under the MMPA.

Risso's dolphin (Grampus griseus) Risso's dolphins are distributed world-wide in tropical and warm-temperate waters. Off the U.S. West coast, Risso's dolphins are commonly seen on the shelf in the southern California bight and in slope and offshore waters of California, Oregon, and Washington. Risso's dolphins in California, Oregon, and Washington waters are considered as one stock in the SARs. The best estimate of population abundance for this stock is 16,483 animals with a PBR estimate of 105 animals per year. After the 1997 implementation of the Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron, 1999). However, because of inter-annual variability in entanglement rates and the relative rarity of Risso's dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this species. Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes are based only on 1997-2000 data. The average annual estimated mortality (1997-2000) for this stock is 3 animals. Similar drift gillnet fisheries for swordfish and sharks occur along the coast of Baja California, Mexico, and may take animals from the same population, although NMFS understands this fishery has recently been converted to longline gear. However, species-specific mortality information is unavailable. This stock is not considered strategic under the MMPA.

Steller sea lion (Eumetopias jubatus) Steller sea lions range along the North Pacific Ocean rim, from northern Japan, to a centered abundance and distribution in the Gulf of Alaska and the Aleutian Islands, south to California, with the southernmost rookery being Año Nuevo Island (37EN) (*in* NMFS, 1992). In 1997, NMFS reclassified Steller sea lions into two separate stocks within U.S. waters based on distributional data, population response data, and genotypic data: an eastern U.S. stock, which includes animals east of Cape Suckling, Alaska (144EW), and a western U.S. stock, which includes animals at and west of Cape Suckling. On May 5, 1997, the western U.S. stock was reclassified as endangered, while the eastern stock remained on the threatened species list (62 FR 24345). Steller sea lions are not known to migrate, but they do disperse widely during the breeding season. Males breeding in California appear to spend the non-breeding months (September - April) in Alaska and British Columbia, whereas animals marked at rookeries in Alaska have traveled to British Columbia (NMFS, 1992).

The most recent abundance estimate of the eastern stock of Steller sea lion is based on: 1) 1996 aerial surveys in Southeast Alaska (14,571 animals); 2) 1996 aerial and ground survey counts of California, Oregon, and Washington rookeries and major haulout sites (6,555 animals) and 3) 1994 aerial surveys of rookeries and haulouts in British Columbia (9,277 animals). Combining the total count for the three regions results in a minimum estimated abundance of 30,403 Steller sea lions in this eastern stock (Ferrero *et al*., 2000). Trends in Steller sea lion abundance for the three regions has been slightly variable over the past 2 decades. Steller sea lion numbers in California, especially southern and central California, have declined significantly, from 5,000-7,000 non-pups from 1927-1947, to 1,500-2,000 non-pups between 1980-1998. While overall counts of non-pups in northern California and Oregon have been relatively stable since the 1980s, counts of non-pups in Southeast Alaska and British

Columbia have increased by an average of 5.9% (1979-97) and 2.8% (1971-98), respectively. Overall, counts of non-pups at haulout trend sites (data from British Columbia include all sites) have increased from approximately 15,000 to over 20,000 eastern stock Steller sea lions from 1982-98 (*in* Ferrero *et al*., 2000). The PBR value for the eastern stock of Steller sea lions is 1,368 animals. There have been no observed takes of Steller sea lions by the CA/OR drift gillnet fishery since 1994. Therefore, the average 1997-2000 mean annual mortality is zero.

3.1.2. Sea Turtles

Numerous human-induced factors have adversely affected sea turtle populations in the North Pacific and resulted in their threatened or endangered status (HSTRT, 1992; Eckert, 1993; Wetherall *et al*., 1993, NMFS and USFWS, 1998a,b,c,d). For instance, on their nesting beaches, sea turtles are vulnerable to exploitation for their meat, eggs, hides, and other products for commercial and subsistence purposes. Coastal development, dredging, vessel traffic, erosion control, sand mining, vehicular beach traffic, and artificial beach lighting have resulted in degradation or destruction of sea turtle nesting, breeding and/or foraging habitats. Human-induced changes in natural predators' feeding behaviors may also contribute to increased predation on sea turtle nests and eggs. Chemical pollution may adversely affect sea turtles in their terrestrial or marine habitats. Fibropapilloma disease has increased in recent years and poses a threat to some sea turtle populations. Fibropapilloma tumors eventually grow large enough to obstruct vision, become extensive in the mouth and throat, or affect internal organs (Balazs, 1991). Sea turtles that encounter and ingest ocean debris (e.g., plastics) are known to be adversely affected. Finally, documented incidental capture and mortality by purse seines, gillnets, trawls, longline fisheries, and other types of fishing gear also adversely affect sea turtles. Currently, the relative effect of each of these sources of impact on sea turtles is difficult to assess. However, there are indications that there are an increasing number of Asian longline tuna vessels operating in the Pacific (NMFS/USFWS, 1998).

The following is a brief presentation of information on status of the sea turtle populations that have been observed incidentally taken in the CA/OR drift gillnet fishery for thresher shark and swordfish between 1990-2001.

Green Turtle (Chelonia mydas) Green turtles are listed as threatened, except for breeding populations found in Florida and the Pacific coast of Mexico, which are listed as endangered. The genus *Chelonia* is generally regarded as comprising two distinct subspecies, the eastern Pacific (so-called "black turtle," *C. m. agassizii*), which ranges from Baja California south to Peru and west to the Galapagos Islands, and the nominate *C. m. mydas* in the rest of the range. Green turtles are distinguished from other sea turtles by their smooth carapace with four pairs of lateral scutes, a single pair of prefrontal scutes, and a lower jaw-edge that is coarsely serrated. Adult green turtles have a light to dark brown carapace, sometimes shaded with olive, and can exceed one meter in carapace length and 100 kilograms (kg) in body mass.

Green turtles are declining virtually throughout the Pacific Ocean, with the possible exception of Hawaii, as a direct consequence of an historical combination of overexploitation and habitat loss (Eckert, 1993). They are a circumglobal and highly migratory species, nesting mainly in tropical and subtropical regions. Green turtles prefer waters that usually remain about 20EC in the coldest month; for example, during warm spells (e.g. El Niño), green turtles may be found considerably north of their normal distribution. The maximum recorded dive depth for an adult green turtle was 110 meters (Berkson, 1967, *in* Lutcavage and Lutz, 1997), while subadults routinely dive 20 meters for 9-23 minutes, with a maximum recorded dive of 66 minutes (Brill, *et al*., 1995, *in* Lutcavage and Lutz, 1997). Additionally, it is presumed that drift lines or surface current convergences are preferential zones due to increased densities of likely food items. In the Pacific, the only major (> 2,000 nesting females) populations of green turtles occur in Australia and Malaysia. Smaller colonies occur in the insular Pacific islands of Polynesia, Micronesia, and Melanesia (Wetherall *et al.*, 1993) and on six small sand islands at French Frigate Shoals, a long atoll situated in the middle of the Hawaiian Archipelago (Balazs, 1995).

The primary green turtle nesting grounds in the eastern Pacific are located in Michoacán, Mexico, and the Galapagos Islands, Ecuador (NMFS and USFWS, 1998a). Here, green turtles were widespread and abundant prior to commercial exploitation and uncontrolled subsistence harvest of nesters and eggs. More than 165,000 turtles were harvested from 1965 to 1977 in the Mexican Pacific. In the early 1970s nearly 100,000 eggs per night were collected from these nesting beaches. The nesting population at the two main nesting beaches in Michoacán (Colola, responsible for 70% of total green turtle nesting in Michoacán (Delagado and Alverado, 1999) and Maruata) decreased from 5,585 females in 1982 to 940 in 1984. Despite long-term protection of females and their eggs at these sites since 1990, the population continues to decline, and it is believed that adverse impacts (including incidental take in various coastal fisheries as well as illegal directed take at forage areas) continue to prevent recovery of endangered populations (P. Dutton, NMFS, personal communication, 1999). Although the poaching of adult black turtles is now nearly negligible, the black market for sea turtle eggs in Mexico has remained as brisk as before the ban (Delgado and Alvarado, 1999). In the 1990s, that number dropped to 60-100 per night, or about 800-1,000 turtles per year. During the 1998-99 season, based on a comparison of nest counts and egg collection data, an estimated 600 greens nested at Colola. Although only about 5% of the nests were poached at Colola during this season, approximately 50% of the nests at Maruata were poached, due to difficulties in providing protections due to political infighting (Delgado and Alvarado, 1999).

Tag returns of eastern Pacific green turtles (often reported as black turtles) establish that these turtles travel long distances between foraging and nesting grounds. In fact, 75 percent of tag recoveries from 1982-90 were from turtles that had traveled more than 1,000 kilometers from Michoacán, Mexico. Even though these turtles were found in coastal waters, the species is not confined to these areas, as indicated by 1990 sightings records from a NOAA research ship. Observers documented green turtles 1,000-2,000 statute miles from shore (Eckert, 1993). The east Pacific green is also the second-most sighted turtle in the east Pacific during tuna cruises; they are frequent along a north-south band from 15EN to 5ES along 90EW, and between the Galapagos Islands and Central American Coast (NMFS

and USFWS, 1998a). In a review of sea turtle sighting records from northern Baja California to Alaska, Stinson (1984, *in* NMFS and USFWS, 1998a) determined that the green turtle was the most commonly observed sea turtle on the U.S. Pacific Coast, with 62% reported in a band from southern California and southward. The northernmost reported resident population of green turtles occurs in San Diego Bay, where about 30-60 mature and immature turtles concentrate in the warm water effluent discharged by a power plant. These turtles appear to have originated from east Pacific nesting beaches, based on morphology and preliminary genetic analysis (NMFS and USFWS, 1998a). California stranding reports from 1990-99 indicate that the green turtle is the second most commonly found stranded sea turtle (48 total, averaging 4.8 annually) (J. Cordaro, NMFS, personal communication, April, 2000).

CA/OR Drift Gillnet Fishery

Under the NMFS's observer program between July 1990 and January 2001, 1 green turtle was observed incidentally entangled in the CA/OR drift gillnet fishery. The animal was released dead (NMFS unpublished data). According to Forney and Cameron (2000), the estimated mortality for the green turtle was 5 animals (CV=0.90). The green turtle encountered may have originated from a number of known proximal, or even distant, breeding colonies in the region. However the most likely candidates would include those from Hawaii (French Frigate Shoals) and the Pacific coast of Mexico population. This is based on limited genetic sampling conducted within the NMFS observer program for the CA/OR drift gillnet fishery (1 turtle originated from eastern Pacific stock - most likely Mexican nesting beach) (P. Dutton, NMFS, personal communication, January, 2000).

Leatherback Turtle (Dermochelys coriacea) The leatherback turtle is listed as an endangered species under the ESA throughout its range. Leatherbacks, the largest of the sea turtles, have a circumglobal distribution and commonly range farther north than other sea turtles, probably because of their ability to maintain warmer body temperature over longer time periods and the widely dispersed nature of their primary food source cnidarians (jellyfish, siphonophores) and tunicates (salps, pyrosomas) (Eckert, 1993). Adult leatherbacks are assumed to inhabit primarily open ocean waters. Leatherbacks have been reported on two occasions to dive to depths exceeding 1000 meters. However, the leatherback's routine dive depth and duration have been recorded between 50-84 meters and 4-14.5 minutes, respectively (Lutz and Musick, 1997). Primary threats to leatherbacks in the Pacific are the killing of nesting females and eggs at the nesting beaches and the incidental take in coastal and high seas fisheries (NMFS/USFWS 1998b).

In the eastern Pacific, leatherbacks have been sighted as far north as Alaska (NMFS/USFWS 1998b). However, this is considerably north of their expected range and occurrences in Alaskan waters are probably associated with warm water years or El Niño events. The occurrence of leatherbacks off the Pacific Northwest usually coincides with the arrival of albacore during late summer months. Leatherbacks are sometimes seen in coastal waters, but they are essentially pelagic and dive to great depths (NMFS, 1991). Current evidence suggests that adults migrate between temperate and tropical waters to optimize foraging and nesting (Eckert, 1990). However, specific leatherback foraging

grounds have not been identified (NMFS, 1991).

Nesting occurs on beaches from 40º North to 35º South latitude (Sternberg, 1981) and no nesting occurs on U.S. beaches. Until recently, about 50 percent of the global population of female leatherbacks nested along the Pacific coast of Mexico (NMFS/USFWS, 1998b). The Pacific coast of Mexico is generally regarded as the most important leatherback breeding ground in the world. Nesting is seasonal in Mexico, extending from November to February (Eckert, 1993). Pritchard (1982) estimated that 75,000 females nested annually in Michoacan, Guerrero, and Oaxaca, Mexico. Today these nesting populations are significantly reduced (NMFS/USFWS, 1998b). For instance, since 1986, a monitoring program at a major nesting beach in Mexiquillo, Mexico, has documented an approximate 90 percent decline in the number of leatherback nesters in the past decade (Sarti, 1996). Although the reason for the leatherback decline is unclear, the collection of eggs and incidental catch in the now-defunct high seas driftnet fishery in the 1980's are most likely contributing factors (Sarti *et al*., 1996).

Leatherback nesting also occurs in the western Pacific, including China, Southeast Asia, Indonesia, and Australia (NMFS/USFWS, 1998b) and limited nesting occurs on insular central and south Pacific islands. Nesting in the western Pacific peaks in May and June in China, June and July in Malaysia, and December and January in Queensland (Eckert, 1993). Leatherbacks are in serious decline at all major Pacific basin rookeries (NMFS/USFWS, 1998b).

The seasonal presence of adult females at major Pacific basin rookeries suggests that leatherbacks migrate between nesting and non-nesting areas (NMFS/USFWS, 1998b). Eastern Pacific migratory corridors probably exist along the western U.S. and Mexico west coasts. Stinson (1984) concluded that the leatherback was the most common sea turtle north of Mexico and noted that their appearance in southern California coincides with the summer arrival of the 18-20º C isotherms. Leatherbacks have been sighted as far north as Alaska on the U.S. west coast. Aerial surveys in California, Oregon, and Washington have shown that most leatherbacks occur in slope waters, while fewer occur over the continental shelf (Eckert, 1993). The data indicate that during the summer and fall when sea surface temperatures are highest, leatherbacks occur north of central California (Dohl *et al*., 1983; Brueggeman 1991 *in* Eckert, 1993). Leatherback sightings peak in August along the coast of California, which may reflect a southward movement of adults for winter breeding in Mexico (NMFS/USFWS, 1998b). Leatherbacks are the most frequently sighted marine turtle off the northern and central California coastline (Dohl *et al.*, 1983). From 1986 to 1991, 96 leatherbacks were sighted within 50 km of Monterey Bay, the majority of these sightings occurring in August (Starbird *et al*., 1993 in NMFS/USFWS, 1998b). Leatherback sea turtles have been observed incidentally taken in the CA/OR drift gillnet fishery.

CA/OR Drift Gillnet Fishery

Under the NMFS's observer program between July 1990 and January 2001, 23 leatherbacks were

observed incidentally entangled in the CA/OR drift gillnet fishery, 9 of which were released alive (one leatherback of unknown condition was also released (NMFS unpublished data)). All of the leatherbacks that were observed incidentally entangled in the CA/OR drift gillnet fishery during the period, except one, occurred in waters north of 34° latitude and during the months of September, October, December and January. Carapace length of leatherbacks observed entangled in the fishery ranged from 132 cm to 213 cm. Since these carapace lengths of leatherbacks were within the range of sizes for subadults (75-154 cm) and adult leatherbacks (>=154 cm), the leatherbacks entangled in the fishery were probably subadults and adults.

Loggerhead Turtle (Caretta caretta) Throughout its range, the loggerhead turtle is listed as a threatened species under the ESA. The loggerhead is a circumglobal species inhabiting continental shelves, bays, estuaries and lagoons in the subtropical, temperate and occasionally tropical waters (MMS, 1992; NMFS, 1991; Eckert, 1993). Juvenile and subadult loggerheads are omnivorous, foraging on pelagic crabs, molluscs, jellyfish, and vegetation captured at or near the surface (Eckert, 1993). The maximum recorded diving depth for loggerhead is 233 meters (Sakamoto *et al.*, 1990 *in* Eckert, 1993). Average carapace length for adult females is 90-95 cm (Dodd 1988, *in* Eckert, 1993). The primary threats to the loggerheads in the Pacific are incidental mortalities associated with commercial fisheries (NMFS and USFWS, 1998c).

Loggerheads were commonly taken in pelagic north Pacific driftnets, indicating that they inhabit open ocean areas of the Pacific (Gjernes *et al.,* 1990, Balazs and Weatherall, 1991 in NMFS and USFWS, 1998c). In the Pacific basin, nesting is restricted to the western region, primarily Japan and Australia (NMFS and USFWS 1998c); no nesting occurs on U.S. beaches. In the eastern Pacific, the largest known aggregations of loggerheads are of juveniles (mean shell length=60 cm) (Bartlett, 1989 *in* NMFS and USFWS, 1998c) off the west coast of Baja California, Mexico, some 10,000-12,000 km from the nearest significant nesting beaches in Japan and Australia. Estimates of abundance of these foraging populations have been as high as 300,000 loggerheads (Pitman, 1990; Bartlett, 1989 *in* NMFS and USFWS, 1998c) and sightings are usually confined to the summer months in the eastern Pacific, peaking in July-September off southern California and southwestern Baja California, Mexico (NMFS and USFWS, 1998c). Sakamoto *et al*. (1990) report that the maximum dive depth recorded for loggerhead turtles is 233 m.

Southern California is apparently the northern extent of its range (Stebbins, 1966, Stinson, 1984, Guess, 1981a,b in NMFS/USFWS, 1998c), however, in 1991 a loggerhead stranded dead in Alaska and occasional sightings occur off Washington (Eckert, 1993), although most sightings are from off California (Stinson, 1984). Most of the sightings in U.S. West Coast waters are of juveniles (20-60 cm shell length) (NMFS and USFWS, 1998c). Although life history information is limited, Pacific basin loggerheads' developmental habitats appear to be widely separated from rookery sites. One hypothesis is that west Pacific hatchlings may become entrained in the central ocean gyre, and ultimately drift south with the California Current to Mexico. Loggerhead turtles have been observed incidentally taken in the CA/OR drift gillnet fishery offshore southern California (south of San Clemente Island).

CA/OR Drift Gillnet Fishery

The NMFS's Southwest Region has had an observer program in the CA/OR drift gillnet fishery since July 1990. This program has been administered under the authority of sections 114 (prior to the 1994 MMPA amendments) and 118 (established by the 1994 amendments) of the MMPA to record incidental marine mammal taking, collect biological samples, and record other bycatch information. Between July 1990 and January 2001, fourteen loggerhead turtles and 3 unidentified hardshell turtles were observed incidentally entangled. The three unidentified hardshells were observed taken in 1993 off southern California, all on the same trip, but in different sets. Only one of these turtles was measured, at 43 centimeters, the average length of measured loggerheads captured incidentally in this fishery from 1990-2000, this turtle was most likely a loggerhead. In addition, all three turtles were caught in the same concentrated area that all loggerheads in the past 10 years have been caught by this fishery. They were also caught during an El Niño, which is the only time that loggerheads have been caught in this fishery since 1990, when the fishery was first observed by NMFS. Therefore, NMFS assumes the three unidentified hardshells were loggerheads. Twelve of these loggerheads were released alive (70%), 1 injured (6%), and 4 killed (24%) (NMFS unpublished data). All 17 of the "loggerhead" sea turtles that were observed incidentally entangled in the CA/OR drift gillnet fishery occurred in waters south of 34°27'N latitude (Point Conception, California) and during the months of June, July, August, October, and January. Juveniles found off California and Mexico measured between 20 and 80 centimeters (average 60 centimeters) in length (Bartlett, 1989 *in* Eckert, 1993). Average carapace length was 43.4 cm (range, 32 - 59 cm). Since carapace lengths of loggerheads entangled in the CA/OR drift gillnet fishery were within the range of sizes for juvenile loggerheads that annually occur off Baja California, the loggerheads entangled in the fishery were probably juveniles.

Olive Ridley Turtle (Lepidochelys olivacea) The olive ridley populations on the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened. They are the smallest living sea turtle, with an adult carapace length between 60 and 70 cm, and rarely weighing over 50 kg. They are olive or grayish green above, with a greenish white underpart, and adults are moderately sexually dimorphic (NMFS and USFWS, 1998d). These sea turtle species appear to forage throughout the eastern tropical Pacific Ocean, often in large groups, or flotillas or occasionally found entangled in scraps of net or other floating debris. In a three year study of communities associated with floating objects in the eastern tropical Pacific, Arenas and Hall (1992, *in* Eckert, 1993) found sea turtles, 75 percent of them olive ridleys, present in 15 percent of observations and suggested that flotsam may provide the turtles with food, shelter, and/or orientation cues in an otherwise featureless landscape. In addition, small crabs, barnacles and other marine life often reside on the debris and likely serve as food attractants to turtles. Thus, it is possible that young turtles move offshore and occupy areas of surface current convergences to find food and shelter among aggregated floating objects until they are large enough to recruit to the nearshore benthic feeding grounds of the adults. Olive ridleys feed on tunicates, salps, crustaceans, other invertebrates and small fish. Although they are generally thought to be surface feeders, olive ridleys have been caught in trawls at depths of 80-110 meters (NMFS and USFWS, 1998d) and a post-nesting female reportedly dove to a maximum depth of 290

meters. The average dive length for an adult female and male is reported to be 54.3 and 28.5 minutes, respectively (Plotkin, 1994, *in* Lutcavage and Lutz, 1997).

Olive ridley turtles are the most abundant sea turtle in the Pacific basin. However, although these turtles remain relatively widespread and abundant, most nest sites support only small or moderate-scale nesting, and most populations are known or thought to be depleted. Turtles begin to aggregate near the nesting beach two months before the nesting season, and most mating is generally assumed to occur in the vicinity of the nesting beaches, although copulating pairs have been reported over 100 km from the nearest nesting beach. The mean clutch size for females nesting on Mexican beaches is 105.3 eggs, while in Costa Rica, clutch size averages between 100 and 107 eggs (NMFS and USFWS, 1998d). Females generally lay two clutches of eggs per season in Costa Rica (Eckert, 1993). Data on the remigration intervals of olive ridleys are scarce.

In the eastern Pacific, nesting occurs all along the Mexico and Central American coast, with large nesting aggregations occurring at a few select beaches located in Mexico and Costa Rica. Where population densities are high enough, nesting takes place in synchronized aggregations known as *arribadas*. The largest known *arribadas* in the eastern Pacific is off the coast of Costa Rica (~475,000 - 650,000 females estimated nesting annually) and in southern Mexico (~200,000+ nests/year) (Eckert, 1993; NMFS and USFWS, 1998d). Historically, it was estimated that over 10 million olive ridleys inhabited the waters in the eastern Pacific off Mexico. However, human-induced mortality led to declines in this population. For example, 1 million olive ridleys were harvested in Mexico in 1968 (NMFS and USFWS, 1998d). Since this directed take of sea turtles in Mexico was closed in the early 1990s, the nesting populations in Mexico appear to be recovering, with females nesting in record numbers in recent years (Marquez *et al*., 1995). Annual nesting at the principal beach, Escobilla Beach, Oaxaca, Mexico, averaged 138,000 nests prior to the ban, and since the ban on harvest in 1990, annual nesting has increased to an average of 525,000 nests (Salazar *et al*., in press). The greatest single cause of olive ridley egg loss comes from the nesting activity of conspecifics on *arribada* beaches, where nesting turtles destroy eggs by inadvertently digging up previously laid nests or causing them to become contaminated by bacteria and other pathogens from rotting nests nearby. At a nesting site in Costa Rica, an estimated 0.2 percent of 11.5 million eggs laid during a single *arribada* produced hatchlings (NMFS and USFWS, 1998d).

In the western Pacific, olive ridley nesting is known to occur on the eastern and western coasts of Malaysia; however, the area has experienced a rapid decline in the past decade. For example, the highest density of nesting was reported to be in Terengganu, Malaysia, and at one time yielded 240,000 eggs (2,400 nests, with approximately 100 eggs per nest (Siow and Moll, 1982, *in* Eckert, 1993)), while only 187 nests were reported from the area in 1990 (Eckert, 1993).

While it is true that olive ridleys generally have a tropical range, individuals do occasionally venture north, some as far as the Gulf of Alaska. The postnesting migration routes of olive ridleys, tracked via satellite from Costa Rica, traversed thousands of kilometers of deep oceanic waters ranging from

Mexico to Peru and more than 3,000 kilometers out into the central Pacific (Plotkin *et al*., 1993). Stranding records from 1990-99 indicate that olive ridleys are rarely found off the coast of California, averaging 1.3 strandings annually (J. Cordaro, NMFS, personal communication, April, 2000).

Recent genetic information from 15 olive ridley samples taken in the Hawaii-based longline fishery indicate that 9 of the turtles originated from the eastern Pacific and 6 of the turtles were from the southwest or Indo-Pacific (i.e. Malaysia) (P. Dutton, NMFS, personal communication, 1999).

CA/OR Drift Gillnet Fishery

Under the NMFS's Observer Program between July 1990 and January 2001, 1 olive ridley turtle has been observed incidentally entangled in the CA/OR drift gillnet fishery. The animal was released alive (Cameron and Forney, 2000). The olive ridley taken in the CA/OR drift gillnet fishery was found to come from an eastern Pacific stock (i.e. Costa Rica or Mexico) (P. Dutton, NMFS, personal communication, January, 2000).

3.1.3. Seabirds

There have been few observations of seabirds incidentally taken in the CA/OR drift gillnet fishery. For example, during 1990, 1992, and 1994, only one seabird (unidentified) was observed taken in each of the years. In 2000, there were 16 northern fulmars observed entangled. Thirteen were released alive (81%), 2 were released dead (13%) and 1 was released injured (6%). During 1991, 1993, 1995, 1997, 1998, and 1999, no seabirds were observed taken.

3.1.4. Salmonids

In recent years, because of the critically low population sizes of some salmon stocks and threats to their continued existence, certain stocks in Washington, Oregon, and California have been listed as endangered or threatened species under the ESA. There have been no listed or non-listed salmon stocks observed taken by the CA/OR drift gillnet fishery.

3.2. Description of the CA/OR Drift Gillnet Fishery

Under section 118 of the MMPA, drift gillnet fishing that targets swordfish and thresher shark by vessels who land their catch in California ports, and the drift gillnet fishery that targets swordfish by vessels that land their catch in Oregon ports, are categorized together as one fishery. No Federal fishery management plan (FMP) is in place for either fishery, although the Pacific Fishery Management Council is in the process of developing a Highly Migratory Species (HMS) FMP which would include the CA/OR drift gillnet fishery. The first draft of the HMS FMP was released in February 2001, and subsequently, a revised draft was issued in May 2001. The final FMP is expected to be completed in April 2002.

3.2.1. California Drift Gillnet Fishery

Currently, the California drift gillnet fishery is managed by the California Department of Fish and Game and regulated by laws passed by the California legislature as specified in the California Fish and Game Code. This is a limited entry fishery and the number of permits are limited by statute. Fishers are required to possess a valid drift gillnet permit in order to fish. A general gill and trammel net permit is also required which is renewed annually and is transferable only under limited conditions. In addition, fishers are required to maintain and submit a logbook (§8026 Fish and Game Code and §106 of California Code of Regulations, Title 14) detailing their fishing activities.

The California drift gillnet fishery developed rapidly in the late 1970's off southern California. The fishery originally targeted common thresher shark, but swordfish and shortfin mako shark soon became important components of the catch. Today, the fishery operates primarily off California between San Diego and Cape Mendocino, mostly within 200 miles from shore (LMR, 1994), and swordfish constitutes the majority of the marketable catch. During years of El Niño events, the vessels have ranged northward off Oregon (LMR, 1994). The majority of the California drift gillnet total fishing effort is concentrated in the southern California bight.

At least 90% of California drift gillnet fishers form code groups; a code group is an association of individuals who communicate via radio, exchanging information on the location of target fish species, fishing conditions, presence and location of marine mammals and other pertinent information. In California there are approximately five major code groups, with seven to 15 vessels participating in each group. Code groups enable each vessel to find productive fishing locales and avoid unproductive fishing areas and rough sea conditions by reducing the amount of search time. This increases the profitability of the time spent fishing.
Vessel size in the California drift gillnet fishery currently ranges from 30-85 feet, with more than 40% of the vessels greater than 50 feet. Fishers use nets constructed from 3-strand twisted nylon, tied to form meshes. The meshes range from 16 to 22 inches stretched, and average 19 inches stretched. Although termed “gillnets”, the nets actually entangle fish, rather than trap them by the gills. Nets are also size selective; large fish such as swordfish get entangled while smaller fish pass through the mesh. Net length ranges from 750 to 1000 fathoms and averages 960 fathoms. The top of the net is attached to a float line by hanging lines laced through several meshes and tied at intervals of 8 to 24 inches. The number of meshes per hanging determines the slack or tautness of the net. The bottom of the net is attached to a weighted lead line. The number of meshes between the float line and the lead line is the depth of the net, which ranges from 100 to 150 meshes. Since the implementation of the Pacific Offshore Cetacean Take Reduction Plan, the float line must be at least 36 feet below the surface of the water to allow marine mammals to swim over the net (and small boats to pass over the net). The lines that attach the buoys to the floatline, and dictate the depth the net is fished, are referred to as buoy lines or extenders. Nets are often set perpendicular to currents, or across temperature, salinity or turbidity fronts. Nets are typically set in the evening, allowed to soak overnight, then retrieved in the morning. The average soak time is 10.5 hours. The vessel remains attached to one end of the net during the soak period, drifting

with the net.

Since 1982, California drift gillnet fishing seasons have become shorter, and area restrictions have increased in response to concerns for other fish species, marine mammals, and conflicts with recreational and harpoon fishers. At the present time, the California drift gillnet season is closed within 200 nautical miles (nm) of the coastline from February 1st through April 30th. From May 1st through August 14th, drift gillnets cannot be used in ocean waters within 75 nm from the mainland coastline between the westerly extension of Oregon-California boundary and the western extension of the U.S.-Mexico boundary. However, a permittee may land swordfish or thresher shark if the fish were taken in waters more than 75 nm from the mainland shore. From August 15th through January 31st, swordfish can be taken within 75 nm, pursuant to area restrictions specified in the California Fish and Game Code (sections 8575 and 8575.5). The majority of fishing effort takes place from October through December of each season.

Overall, fishing effort has declined since the mid 1980's. In the 1986/87 season, there were 11,000 sets (equivalent to days fished), while in the 1999/2000 and 2000/2001 season there were 2,634 and 1,936 sets, respectively. The decrease in effort coincides with increasing regulations and laws, and a decrease in the number of active permittees (Figure 5). Legislation passed in the early 1980's established the limited entry program for this fishery, with a maximum of 150 permits. Since the actual number of permittees at that time exceeded 150, new entrants were not allowed. However, an additional 35 permits, referred to as experimental swordfish permits, were established in 1984 for taking swordfish north of Point Arguello. In the 1986-87 season, there were over 210 active permittees (those who caught and landed fish) participating in the fishery, while in the 2000/2001 season, there were about 75 active permittees. Recently the 35 experimental swordfish permits were combined with the 150 permits. However, not all available permits have been re-issued (through attrition, retirement, death, etc.). Currently, there are between 126 and 136 eligible permittees. However, the number of vessels actually fishing "full-time" is estimated to be about 70 boats since a portion of the fleet only lands the minimum annual amount of fish (at least 2,500 pounds of swordfish, or 1,000 pounds of shark, or $1,000 of shark or swordfish) to maintain their drift gillnet permits. According to California Department of Fish and Game, 81 boats participated in the fishery during the calendar year 2000.

No new drift permits will be issued; current permits will only be issued to prior drift gillnet permittees who possess a general gill and trammel net permit (which has its own set of requirements), and who possessed a valid California drift gillnet permit, or a valid swordfish limited entry experimential fishery permit during the previous season (providing the permit was not revoked), and who landed at least 2,500 pounds of swordfish, or 1,000 pounds of shark, or landed shark or swordfish for which the permittee was paid $1,000. The fee for renewal is currently $330 (there is an additional fee to maintain the general gill and trammel net permit). Permits can be transferred, but only when: 1) the permittee has held the permit for 3 years; or 2) the permittee is injured or has a serious illness and hardship will result if the permit cannot be transferred; or 3) a marriage is dissolved and the permit is held as community

property; or 4) the permittee has died and surviving family wishes to transfer the permit. Permits may only be transferred to a person who holds a commercial fishing license and a general gill and trammel net permit. Finally, permits can be revoked or suspended by the director upon conviction for willful violation of California Fish and Game code.

Three general fishing areas for swordfish are identified along the California coast. They are segregated by latitude and occupy areas of similar bottom depths. The southern area is centered off San Diego and is characterized by relatively shallow water in depths of less than 1,000 fathoms. This area is within the southern California bight and fairly close to the coast. The central area off of San Francisco is in deep waters in depths of 1,500 to 2,000 fathoms, with the norther area off the California/Oregon border in moderate depths of 1,600 fathoms. The effects of cyclic warming and cooling periods have an important effect on swordfish catch distribution. During El Niño periods, swordfish are captured further north than during colder La Niña periods. For example, during the 1995 La Niña, no catches of swordfish were observed north of Cape Mendocino at 41^{o}N. The moderately strong El Niño of 1992 resulted in catches as far north as 46^{o}N.

Effort is initially concentrated in the southern portion of the fishing grounds, expanding to its full range by October before retreating back to the south because of the dissipation of oceanographic water temperature breaks which is caused by storm systems moving down from the north. The highest catch of swordfish occurs 15 to 150 kilometers off the California coast. Fishing effort within 15 kilometers of the coast or near the Channel Islands usually target pelagic sharks. In higher latitudes swordfish catch and effort tend to be further offshore.

California drift gillnet fishery landings for swordfish, common thresher shark, and mako shark vary from season to season. Swordfish comprise the majority of the catch in the fishery and demand the highest price per pound. In the past five years, drift gillnet landings of swordfish have ranged from 684 (1995) to 880 (1998) metric tons, at an average of 703 metric tons per year. Landings of common thresher shark have averaged 218 metric tons while mako shark have averaged 78 metric tons (PFMC, 2001). While swordfish, common thresher shark, and mako shark annually represent over 90% of the total landings by the California drift gillnet fishery, other species commonly sold include opah, bigeye thresher shark, louvar, and tunas (Hanan *et al*., 1993). Over the past five years, California's drift gillnet fishery has averaged $4.2 million in ex-vessel gross revenues from landings of swordfish, common thresher shark and mako shark (excluding the other species). The CA/OR drift gillnet fishery accounts for about 10 percent of the total swordfish landings in the United States by domestic vessels. About half of the swordfish landed commercially in California ports are landed by drift gillnet vessels (average landings for 1995-1999). Longline and harpoon vessels land a smaller percentage of the total swordfish landed in California ports, 42 and 6 percent, respectively (PFMC 2001). The number of longline vessels making swordfish landings in California has increased significantly in the past two years.

California's drift gillnet fishery not only provides jobs for skippers and their crew, but also contributes to the employment of persons in related industries, such as shipyards, fuel docks, dock facilities,

insurance companies, wholesale and retail fish markets, fish shippers, restaurants, and the trucking industry. In addition, California's consumers are provided with fresh, high-quality local seafood.

3.2.2. Oregon Drift Gillnet Fishery

Before 1995, drift gillnet vessels originating from California ports fished for swordfish off the coast of California and Oregon (outside 3 miles of the coast since 1987). Oregon did not benefit economically because no drift gillnet caught swordfish could be landed in the state prior to 1995. For these reasons, in 1995 a new developmental fishing program was enacted by the Oregon state legislature. This law allowed the Oregon Fish and Wildlife Commission to adopt regulations which allow the Oregon Department of Fish and Wildlife (ODFW) to implement a developmental gillnet fishing program. Consequently, in 1995 the ODFW issued (by lottery) ten "unlimited" landing permits which allowed gillnet fishers to land swordfish in Oregon ports. Another 44 "limited" delivery permits were issued which allowed fishers to make up to 5 deliveries in Oregon ports in 1995. Despite the issuance of 54 permits, only two swordfish landings were made in 1995. In the second year of the program, interest in the developmental permits decreased significantly. In 1996, only 15 applications for a swordfish developmental fisheries permit were received by ODFW. By lottery, ten permits were issued for "unlimited" swordfish landings; another five "limited" permits were issued (five deliveries only). In both years interest in the Oregon program from fishers who did not already have a California drift gillnet permit was low. For example, in 1995, only 20 out of 54 permittees did not already have California drift gillnet permits. In 1996, only 3 out of 15 permittees did not also have a California drift gillnet permit.

Potentially, the number of developmental fishing permits that could be issued by ODFW is currently unlimited. However, ODFW's current policy is that only ten permits with "unlimited" landing ability will be issued each year and interest in the program appears to have decreased during its second year since only two landings were made in 1995 and only 15 people applied for permits in 1996. Developmental fishing gillnet permits are not transferable. Several other terms and conditions apply to these permits such as only swordfish can be landed in Oregon ports. ODFW has the authority to stipulate additional conditions and currently require the use of "pingers" and minimum 36 feet length of extenders for boats that land swordfish in Oregon ports.

3.3 Description of the Southern California Recreational Fishery

Recreational fishing for large, migratory pelagic species began off southern California and Baja California, Mexico in the late 1800s. This fishery now operates year round with peaks in fishing activity during the spring and summer and lasting into the fall. The fleet is composed of privately owned vessels and charter vessels for hire that are also called commercial passenger fishing vessels (CPFV). The recreational fishery targets albacore, yellowfin, skipjack, bigeye and northern bluefin tunas, striped marlin, swordfish, dorado, and mako, blue and thresher sharks using hook-and-line gear. The California CFPV vessels conduct night fishing trips for blue and mako sharks during the spring and

summer and daytime trips for thresher sharks in coastal waters when supported by adequate passengers/client interest.

Recreational fishing activity is monitored and the catch and effort data collected by individual state agencies. Each state agency provides that information to the coastwide recreational fishery network data base (RecFIN) which includes data for all charter boats, party boats, and head boats, collectively called CPFV. In addition, NMFS conducts the telephone survey for the Marine Recreational Fishing Statistical Survey (MRFSS). MRFSS estimated catches of west coast species for the years 1981 to 1989 and 1993 to 1998. Additional recreational fishery information for billfish is conducted by the SWFSC that includes the Billfish Angler Survey and the Billfish Tagging Program.

3.3.1 Charter/Party Boat Fleet

The tropical tunas, billfish and sharks become available off southern California as they move seasonally eastward from oceanic waters and northward from Mexico. Albacore move into the coastal waters along the west coast from more temperate waters offshore. The timing and extent of the species appearance is dependent on seasonal development of environmental and oceanographic conditions such as water temperature, coastal upwelling, strength of the California Current, El Niño episodes and possibly longer decadal cycles. Albacore are one of the most important species caught by the west coast charter/party fleet.

The CPFV fleet offers short trips from one to two days and long-range trips of up to 15 days into Mexican waters. The fleet is made up about 300 vessels from about 8 to 40 meters in length and target large pelagic species when quantities occur within their range. The smaller and faster California sportfishers licensed to carry six passengers or less are called 6-packs. Six-pack vessels target tunas, billfish and other coastal pelagic species on one or two -day trips. These vessels are more likely to spend the extra time necessary to catch billfish if requested by their clientele. The larger CPFV vessels may carry 40 or more passengers and target albacore, bluefin, yellowfin, skipjack, dorado and coastal pelagic species on long-range trips into Mexico and shorter trips of one or two days within the Southern California Bight. Few CPFV vessels with more than six passengers will take the time necessary to catch billfish or pelagic sharks because it limits fishing activity of other passengers.

All California charter vessels are required to submit logbooks from each trip detailing the number of anglers and catch by species to their appropriate state agency. State agencies also conduct occasional angler interviews to supplement catch and effort data. The CPFV data indicate catches of shortfin mako; common thresher and blue sharks averaged 292, 90 and 2,835 respectively between 1990 and 1998. A specialized sector of this California fishery is the long-range and multi-day fleet that fishes extensively off Mexico. Mexico provides special permits, subject to payment of fees, certain port call requirements, and observer and reporting requirements. Mexican daily recreational catch (bag) limits are more conservative than CA Fish & Game limits. For most species, the daily bag limit is 5 fish, with a total daily limit of 10 fish. There are exceptions, however, and in the case of marlin, sailfish, swordfish,

and shark, the limit is one, and it counts as though an angler caught 5 of any other species within that angler's daily 10 fish limit.

The San Diego Bay long-range charter boat fleet is comprised of approximately 57 vessels. The fleet is based at three sport fishing landings: H&M Landing, with 26 boats; Point Loma Sport Fishing, with 13 boats; and Fisherman's Landing, with 18 boats (London Group 1999 *in* PFMC 2001). The typical fishing season is March through October. During the off-season (November to February), about 15 percent of the boats fish in more northerly waters and the remaining 85 percent remain in San Diego for repair and maintenance for the upcoming season. Approximately 544 persons are directly employed as crew members, in maintenance, dock workers, in administration, and in retail (London Group 1999 *in* PFMC 2001). Two-thirds are full-time employees and most are employed as crew. The number of crew per boat ranges from between 3 and 15 with a median of 8. Retail and administrative workers oversee the duties of booking fishing trips and running the local tackle and bait shops. During the off-season, only 1 or 2 crew members of the boats not operating on a full-time schedule stay employed to help with the repairs and maintenance of the boat. The other workers may find other jobs locally in San Diego but all reside in San Diego throughout the year.

A total of 154,567 fishers visited the three landings in San Diego Bay in 1998 (London Group 1999 *in* PFMC 2001). Approximately 66,355 fished in U.S. waters and the remaining 88,212 fished the waters off of Mexico. At H&M Landing, 39,000 fished in Mexican waters and 42,356 fished in U.S. waters. At Point Loma Sportfishing, 23,246 fished in Mexican waters and 13,947 fished in U.S. waters. At Fisherman's Landing, 25,966 fished in Mexican waters and 10,052 fished in U.S. waters.

The most recent survey of the San Diego Bay charter/party sport fishing industry concluded that in 1989, only 44 percent of persons who fished from San Diego Bay landings actually lived in San Diego County (National Marine Fisheries Service, Results of the Southern California Sportfish Economic Survey, 1991 *in* PFMC 2001). The remaining 56 percent came to San Diego from outside of the County. The number of fishers from outside of San Diego County has now grown to 80 percent, with Los Angeles the largest source (London Group 1999 *in* PFMC 2001).

The total economic activity occurring within San Diego Bay (Fisherman's Landing, Point Loma Sportfishing, and H&M Landing) in 1999 was 1,200 jobs, $25.3 million in earnings, $49 million in economic output making it a critically important industry to San Diego's economy (London Group 1999 *in* PFMC 2001). This type of information is currently unavailable for other fleets and areas.

3.3.2. Private Sport Fishing Fleet

The California recreational fishery for tuna, striped marlin and swordfish developed about the turn of the century. These large pelagics are prized by the recreational community although catches are insignificant compared to the commercial catch. Swordfish and striped marlin were listed as a game fish in 1931 and required a sport-fishing license issued by the CDFG. The California State legislature

banned the use of harpoons to take striped marlin in 1935 and further curtailed the sale and import of striped marlin in 1937 thus preserving that southern California fishery entirely for recreational anglers. Private boat anglers are not required to report their fishing activity or catch to state agencies. Catch data from the private sport boats (the rod and reel fishery) are obtained through occasional CDFG monitoring and the MRFSS.

Recreational anglers were allowed the use of hand-held harpoons to take swordfish until 1971. Catching swordfish with a rod-and-reel is difficult because they are usually not receptive to bait or artificial lures while finning at the surface. A few anglers now successfully target swordfish at night using techniques adapted from the East Coast that employ use of light-sticks. There is little opportunity for recreational fishing for marlins and swordfish north of San Francisco. Most striped marlin fishing is from privately owned boats based in local southern California marinas.

Many private boat owners also maintain Mexican fishing licenses and travel south looking for schools of tuna and billfish. Sport fishing boats will target tuna when they move into southern California and northern Baja California waters. The estimated number of private boats in southern California fishing large pelagic fish is 4,000 to 6,000 annually, although accurate census and economic information is currently unavailable for this fishery.

The rod-and-reel season for striped marlin and swordfish can begin as early as May and continue through November, although most fish are taken from July to October. Fishing locations are off San Francisco, Monterey and in the Southern California Bight from Santa Barbara, south and into Mexico. Many will fish the productive waters around the Coronado Islands (which are outside of the U.S. EEZ) for tuna, marlin, dorado and coastal pelagic species. A few private boat owners travel as far as Magdalena Bay and Cabo San Lucas, Baja California Sur in the fall and winter.

Fishing records from three Southern California sport fishing clubs (Balboa Angling Club, San Diego Marlin Club and the Tuna Club of Avalon) provide catches and size of catch for striped marlin and swordfish taken by their members. Reported swordfish catches totaled 577 and ranged from zero catch to a peak of 127 in 1978. Periods of greatest swordfish catch occurred between 1915 to 1930 and from 1969 to 1981. The increased catches starting during that period corresponds to a similar increase in landings from California's commercial harpoon fishery and may reflect a generally higher abundance in the southern California waters. Higher abundance may also be related to years following El Niño events (Coan et al. 1995 *in* PFMC 2001).

The mean whole weight of 522 recreationally caught swordfish recorded at the three Southern California sportfishing clubs was 121 kg (267 lbs.) between 1909 and 1998. The weight of swordfish taken in the recreational fishery has declined significantly for the period 1909 to 1996 (PFMC 2001).

Reported catches of striped marlin exceeds 38,900 and ranged from 273 fish per year in the 1990s to 761 fish per year during the 1980s. The period between 1955 and 1965 had some of the highest

catches in a single season, but the 1980s had more consistent catches. Total annual recreational striped marlin catch (kept and released - from 3 clubs) has declined from a peak of approximately 11,000 in 1963 to a low of about 180 in 2000. No year in the last decade saw a catch in excess of 400 fish. Nine or ten years in the decade of the 1980s yielded catches in excess of 400 fish. The time series of catches shows an apparently significant decline from a peak of about 1100 fish/year in 1963 to a low of about 180 in 2000.

The mean whole body weight of striped marlin weighed at the sportfishing clubs averaged 68 kg (150.1 lbs.) and ranged from 22 kg to over 180 kg (48 to over 400 lbs.) from 1903 to 1999. Early weight records possibly include a few blue marlin and/or swordfish incorrectly identified as striped marlin. The International Game Fish Association's all tackle record for striped marlin is 224 kg (494 lbs.) taken off New Zealand. Large striped marlin were more plentiful in the southern California bight during the 1920s although none in excess of 160 kg (350 lbs.) have been landed since the 1950s. The weight of striped marlin, like swordfish, declined significantly ($P=0.01$), $R^2 = 0.038$ for the period 1903 to 1999. Club records show the number of striped marlin released or tagged and released has increased from 20% to 50% in the 1980s to over 90% in the most recent years (PFMC 2001).

The only estimates of recreational fishing effort for marlin and swordfish come from the SWFSC's Billfish Angler Survey. That survey requests catch and fishing effort data from individual anglers for billfish and swordfish in the Pacific Ocean. Effort in southern California is primarily directed at striped marlin, and other billfish in Mexico. The Billfish Angler Survey began in 1969 and now provides a 31-year time series of angler catch rates in key locations throughout the Pacific. The current 1999 mean catch rate of 0.47 is equal to the prior five-year average of 0.47 (1994 to 1998). The highest reported catch rate (0.57) occurred during the first years of this survey (1969 to 1971). The lowest catch rates averaged 0.34 during the mid-1970s. The survey cannot separate effort directed specifically at swordfish from that directed to striped marlin. Effort estimates (catch per angler day) for swordfish are therefore very low. Anglers fishing in southern California (and northern Mexico) reported swordfish catches of 0 to 0.002 fish per day between 1990 and 1997.

Catch rates for striped marlin reported at the southern tip of Baja California Sur were 0.41 billfish per angler day. For southern California, Baja and Hawaii, the Angler Survey indicates the highest angler success for striped marlin off Baja. Baja California has always been a productive area for striped marlin. There appears no overall trend for the period although several periods of highs and lows are evident. For example, periods immediately following strong El Niño episodes are marked with greater variance between years. The effect of joint-venture longline fisheries operating near Baja California in the 1970s resulted in declining angler catch rates for striped marlin. Mexico enforced its EEZ in 1976 and restricted foreign longlines from fishing in its EEZ for two years. During that time, the angler catch rate for billfish in that area increased by almost 60%. A period of limited longlining that began in 1982 again was correlated with a decline in angler catch rates. Mexico canceled all longline permits to fish billfish and tuna within its EEZ in 1990.

Sport fishers are successful in targeting both the juvenile and adult forms of the shortfin mako and common thresher. The angler effort from private vessels in southern California has undergone an increase in popularity during the last decade. Recreational fishing effort directed for blue and shortfin mako sharks increased to 410,000 trips in 1989 and has remained high. Currently there are about 8 shark fishing tournaments annually.

The Southwest Fisheries Science Center's angler-based Billfish Tagging Program provides data on movement and geographic distribution patterns as well as indications of survivability. In 1999, 486 individual anglers and 158 captains reported tagging at least one billfish (Holts and Prescott 2000). In 1998 bluefin tuna was incorporated into the tagging program. Recapture data indicate that striped marlin and swordfish move extensively throughout the Pacific, but without specific patterns of migration. These trans-Pacific movements, whether nomadic wanderings or generally discursive, expose them to high-seas commercial and coastal recreational fisheries. Striped marlin tag releases total 20,503 with 327 recaptures giving a 1.6% rate of recapture. The majority of tagged striped marlin were released from Hawaii, southern California, and Baja California Sur. Recaptures indicate movement from southern California to Baja California, but little or no movement in the reverse direction. Striped marlin tagged off southern California and Baja California have been recaptured after making trans-Pacific crossings. There is no indication of direct movement from Hawaii to the west coast.

Cooperating billfish anglers and U.S. commercial fishermen have tagged a total of 494 broadbill swordfish. Recaptures total 15 for a return rate of 3.04%. The Southwest Fisheries Science Center, along with cooperating southern California billfish anglers and commercial fishers, tagged 17 swordfish in 1978 in an effort to identify movement patterns in the Southern California Bight. Six of those swordfish were recaptured within 35 days and none had moved more than 30 nautical miles. Swordfish tagged north of Hawaii on US longline vessels moved northeast toward the west coast and were recaptured by other commercial fishing vessels. One swordfish was recovered near San Clemente Island by a drift gillnet boat fishing swordfish.

4.0. ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

The impact of all major Federal actions must be considered prior to implementation to determine whether the action will significantly affect the quality of the human environment. In this section, an analysis of the environmental and socio-economic impacts of the alternatives considered in this environmental assessment is presented. NMFS has identified individual categories for purposes of measuring whether an alternative is expected to have a positive or negative effect on the environment to evaluate the impacts of the different alternatives developed in the Environmental Assessment. The identified categories attempt to quantify the biological, economic, and potential fishing conflicts as a method to evaluate which alternative would provide the most benefit to the environment and minimize the economic and potential conflicts to the California/Oregon drift gillnet fishery and other fisheries. The status quo, which is presented in the Description of the Affected Environment section, is used as the baseline to measure the effects of the proposed alternatives.

Because the pinniped populations for California sea lions (*Zalophus californianus*) and northern elephants seals (*Mirounga angustirostris*) are relatively large and growing on an annual basis as well as the fact that the mean annual takes by the CA/OR drift gillnet fishery is low compared to the potential biological removal levels (Forney *et al*., 2000), NMFS is not evaluating the effects of the different alternatives on these populations. In addition, NMFS is excluding northern fur seals (*Callorhinus ursinus*) and Guadalupe fur seals (*Arctocephalus townsendi*) since after observing more than 6,000 sets between July 1990 and January 31, 2001, representing an average of 15 percent observer coverage during this time period, NMFS has not observed a take of either one of these species (Julian, 1997; Julian and Beeson, 1998; Cameron and Forney, 1999; Cameron and Forney, 2000; Caretta, 2001). Therefore, NMFS does not expect there to be an interaction with these species in this fishery.

The short-term goal of the Marine Mammal Protection Act (MMPA) is to reduce the incidental take of marine mammal mortality and serious injury of strategic marine mammal stocks during commercial fishing operations to levels less than the potential biological removal within the first six months of the Pacific Offshore Cetacean Take Reduction Plan's (POCTRP) implementation, NMFS will evaluate the effects of the different alternatives for each of these strategic stocks. In addition, since the long-term goal of the POCTRP is to reduce the incidental mortality and serious injury of marine mammals incidentally taken in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate, taking into account the economics of the fishery, the availability of existing technology, and existing State or regional fishery management plans, NMFS will evaluate how effective the different options are at meeting this goal.

The effects of the different alternatives on northern right-whale dolphins (*Lissodelphis borealis*) and short-finned pilot whales (*Globicephala macrorhynchus*) are evaluated independently from the other non-strategic cetacean stocks since they are the only species in which the incidental mortality and serious injury is below PBR and greater than 10 percent of PBR. Since all the other cetaceans are below 10 percent PBR for all commercial fisheries, NMFS is evaluating the effects of the alternatives on the combined group of other cetaceans.

Because all the sea turtles are either listed as threatened or endangered, NMFS is evaluating the effects of the different alternatives on an individual species basis. NMFS is also evaluating the effects of the different alternatives on the catch of seabirds although there have been very few observed interactions since NMFS began observing the fishery. In addition to protected species, NMFS is evaluating the effects of the different alternatives on the catch of target and non-target fish species. Target species include swordfish, thresher shark and mako shark whereas non-target species include other billfish and blue shark. NMFS is also evaluating how the different alternatives may affect the ex-vessel gross revenues (number of swordfish landed), available fishing areas, and whether there might be an increase in vessel operating costs. In this analysis, NMFS does not have sufficient information to determine how the different alternatives are likely to affect the total fishery revenues and will use the ex-vessel gross revenue as an indicator of the impacts to the fishery based on the alternatives.

Other environmental factors that are evaluated in the environmental assessment are the effects each alternative may have on increasing or decreasing the likelihood of direct or indirect competition for fishery resources and gear conflicts. These types of effects may occur if an alternative causes an increase in the number of vessels fishing in a smaller area or if vessels may begin fishing in an area not previously fished before which causes and indirect effect on another fishery targeting the same or similar species. In addition, NMFS is evaluating whether an alternative is likely to cause an increase or decrease in the likelihood that vessels may be subject to adverse weather conditions, which may limit the number of available viable fishing days.

The regulations implementing the reasonable and prudent measure to require CA/OR drift gillnet vessel operators to learn about sea turtle biology and methods to reduce injury or mortality during fishing operations (resuscitation on comatose turtles), will be incorporated into the Pacific Offshore Cetacean Take Reduction Plan skipper education workshops. Therefore, the only costs incurred by the fishermen would be for travel and for the time necessary to attend the workshops. The workshops would be offered at several locations near the main drift gillnet fishing ports in California and Oregon (e.g., Portland, Moss Landing, Morro Bay, Santa Barbara, Los Angeles, San Diego), the cost for travel should be minimal. The skipper workshops would be offered during the early part of the fishing season when fishing effort targeting swordfish is minimal. In addition, there would be a workshop scheduled later in the fishing season for vessel operators that were unable to break an albacore or swordfish trip earlier in the season. This is based on reports from vessel operators at previously conducted NMFS take reduction plan skipper workshops, some larger boat operators that troll for albacore tuna, must break their fishing trip in order to attend the mandatory workshops. To minimize the possibility of this scenario, NMFS proposes to have "make-up" workshops towards the end of September and October for those vessel operators who may be fishing albacore tuna during the month of September or October. Therefore, the amount of fishing time expected to be lost should be minimal. Any travel costs to workshops should be offset by the reduction in marine mammal and sea turtle entanglements, and the subsequent reduction in costs due to net damage or loss.

The skipper workshops have been very successful at ensuring that the vessel operators understand their responsibilities under the MMPA and the terms and conditions of the Pacific Offshore Cetacean Take Reduction Plan. There has been a great acceptance and willingness to participate in these workshops which have been held annually since 1997. The vessel operators have provided NMFS with feedback and input on the implementation of the PCTRP which has resulted in modifications to the plan to allow for pingers to be deployed further away from the floatline and leadline and the development of a pinger which is able to remain permanently attached to the net.

Educating vessel operators about sea turtle rescue techniques is expected to reduce the likelihood of injury to captured sea turtles because the sea turtle will be released in a manner that minimizes the likelihood of further gear entanglement or entrapment. In addition, NMFS will provide instruction on treating comatose and lethargic turtles to increase the likelihood of survival of animals that have been captured in fishing gear. These methods include releasing sea turtles from the net as quickly and

carefully as possible to avoid injury or mortality and making this a higher priority than transferring catch from the net to the vessel. This includes not dropping sea turtles onto the deck. The workshops provide the opportunity for vessel operators to learn about these important skills in order to increase the likelihood of captured sea turtle surviving the event.

Table 2. Summary of the criteria to evaluate the effectiveness of the different options identified in the environmental assessment compared to the effects of the status quo (no action).

	Category	Description
Strategic Stocks	Fin Whale	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of fin whales.
	Humpback Whale	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of humpback whales.
	Sperm Whale	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of sperm whales.
	Steller Sea Lion	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of Steller sea lions.
Non-Strategic	Northern Right-whale Dolphin	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of northern right-whale dolphins.
	Short-finned Pilot Whale	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of short-finned pilot whales.
	Other Cetaceans	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of other cetaceans.
Sea Turtles	Green Sea Turtle	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of green sea turtles.
	Leatherback Sea Turtle	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of leatherback sea turtles.
	Loggerhead Sea Turtle	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of loggerhead sea turtles.
	Olive Ridley Sea Turtle	Does the alternative increase or decrease the likelihood of an incidental mortality or serious injury of olive ridley sea turtles.

	Category	Description
Fish	Swordfish	Does the alternative increase or decrease the likelihood of capturing swordfish.
	Other Billfish	Does the alternative increase or decrease the likelihood of capturing other billfish.
Sharks	Blue Shark	Does the alternative increase or decrease the likelihood of capturing blue sharks.
	Thresher Shark	Does the alternative increase or decrease the likelihood of capturing thresher sharks.
	Mako Shark	Does the alternative increase or decrease the likelihood of capturing mako sharks.
Birds	Seabirds	Does the alternative increase or decrease the likelihood of capturing seabirds.
Economic Impact	Ex-Vessel Gross revenue	Does the alternative increase or decrease the ex-vessel gross revenues.
	Cost to Vessel	Does the alternative increase or decrease the direct or indirect costs to the vessel.
Fishing Conflicts	Fishery Resources	Does the alternative increase or decrease the likelihood of direct or indirect competition of fishery resources.
	Gear Conflicts	Does the alternative increase or decrease the likelihood of causing gear conflicts with other fishing vessels.
	Weather Conflicts	Does the alternative increase or decrease the likelihood of fishing in areas with adverse weather conditions.

NMFS used landing receipts data to determine the reduction in gross revenues due to the implementation of the alternatives. Landing receipts are required by the California Department of Fish and Game for all fish landed in California under state code. The landing receipts include information about the type of fish landed, quantity of fish landed (pounds), port of landing, price paid per pound, gear type used, and fishing block where the majority of the fish was caught. In addition, the landing receipt indicates the year, month and date of landing. California Department of Fish and Game has divided the ocean waters off of California, Oregon, and Washington into fishing blocks. The blocks adjacent to the coastline are of various sizes because one or two sides of the block are along the contours of the coast and the offshore blocks tend to be larger.

Since 1994, the landing receipts have been of a scannable format. This has decreased the amount of time necessary to keypunch the information into the computer and has increased accuracy. The information on the landing receipt may be provided by the fishermen or the market. This could be anything from the fishermen verbally informing the market where most of the fish was caught, to writing the information on a piece of paper, or even the market assuming where the fish was caught based on dockside conversations. Fishermen are encouraged to provide accurate information on the landing receipts since the information may be used to establish restricted and limited entry fisheries. In addition, every fisherman who lands fish in California and who transports the fish or has the fish transported on his behalf prior to the required completion of a landing receipt, must fill out a transportation receipt at the time the fish are brought ashore or turned over to the person who will transport the fish.

Each business purchasing or transferring fish off boats must send their landing receipts every two weeks to the California Department of Fish and Game County Port Unit in which their business is located. Once the landing receipts are received by the Port Unit, they are reviewed for accuracy and edited if determined necessary. If no fishing area is reported on the landing receipt, the Port Unit may assign a general group code for where the fish was most likely caught based on the port of landing. NMFS recognizes that the fishing block code indicating where most of the fish was caught has limitations; nevertheless, for the purposes of estimating where the fish might have been caught and to determine an approximate ex-vessel gross revenue loss for each of the alternatives identified in the environmental assessment, NMFS believes that this information is the best information available to provide a reasonable estimate.

For purposes of estimating the reduction in ex-vessel gross revenues, NMFS used the fishing block information reported on the landing receipts. In addition, NMFS used the date of the closure as the cut-off day for the landings although landings made on the following day were likely caught during the closed time period. However, rather than excluding landings from the first few days of the closure and including landings from the few days after the closure, for simplicity and purposes of estimating the potential gross revenue loss, NMFS used the exact cut-off dates of the closure. This approach should provide a reasonable estimate of the gross revenue loss.

For Alternative 2, closure north of Point Conception from August 15 through October 31, NMFS sorted the data based on blocks less than (<) fishing code block 650, which is slightly above Point Conception, or blocks greater than (>) 1035, which is Santa Barbara County (Figures 6 and 8). NMFS then deleted the records that did not fall within the time and area closure.

For Alternative 3, closure north of line extending west of the shore at 36º15'N, from August 15 through November 15, NMFS sorted the data based on blocks <537, or equal to (=) 546, or =545, or blocks > 1036, which is Morro Bay County (Figures 7 and 8). NMFS then deleted the records that did not fall within the time and area closure.

For Alternative 4 (Preferred), closure north of the line extending from Point Sur (36º18.5'N) to the

point 34º27'N 123º35'W, NMFS sorted the data based on the following: less than or equal to (≤) 537, or =540, or =541, or =542, or =543, or =544, or =545, or =546, or =551, or =552, or =559, or =568, or >1036. This provides a staircase pattern of fishing code blocks moving diagonally away from the coast in a southwesterly direction similar to the angle of the closure line (Figures 7 and 8). NMFS then deleted the records that did not fall within the time and area closure.

For the Southern Closure, closure south of Point Conception (34º27'N) and east of the 120ºW, NMFS sorted the landing receipt data based on the following: >651 and <654, or >664 and <668, or >678 and <687, or >701 and <710, or >718 and <729, or >737 and <750, or >756 and <770, or >756 and <770, or >801 and <816, or >821 and <816, or >821 and <837, or >842 and <857, or >859 and <874, or >877 and <892, or = 897, or =916, or, or =1032 (San Diego County), or =1033 (Orange County), or =1034 (Los Angeles County) (Figure 6). NMFS then deleted the records that did not fall within the time and area closure.

4.1. Alternative 1: No Action Alternative

This Alternative is not considered viable because NMFS is required to implement the reasonable and prudent alternative developed in the biological opinion completed on the issuance of a 101(a)(5)(E) permit to authorize the incidental take of marine mammal species under the Endangered Species Act, or another reasonable and prudent alternative that is determined to be as effective. The reasonable and prudent alternative was developed to avoid the likelihood of jeopardizing the continued existence of leatherback and loggerhead sea turtle populations for the issuance of the permit to the CA/OR drift gillnet fishery. If a reasonable and prudent alternative is not implemented through regulations, then the fishery would not be authorized to have any incidental take of sea turtles or marine mammals listed under the ESA.

Currently, no regulations exist that will provide the level of protection necessary to reduce the likelihood of jeopardizing the continued existence of the leatherback or loggerhead sea turtle populations (during El Niño events). Since the fishery is managed by the State of California and Oregon, either these states or NMFS need to implement regulations to implement the reasonable and prudent alternative. The environmental consequences of not issuing regulations to reduce the level of take (mortality and injury) of leatherback and loggerhead sea turtles in the CA/OR drift gillnet fishery could be an irretrievable loss of animals that would adversely affect the future of the populations by preventing the survival and recovery of the species. If no new regulations were promulgated, there is the potential that the fishery would need to be closed because there would not be an exemption from incidental take prohibition under section 9 of the ESA. A closure would cause substantial socio-economic impacts to CA/OR drift gillnet fishery participants and related businesses.

4.2. Alternative 2: Issuance of Regulations to Implement the Reasonable and Prudent Alternative Developed in the Section 7 Consultation on the Issuance of the 101(a)(5)(E) Permit

This alternative is most consistent with the statutory requirements to implement the reasonable and prudent alternative to ensure that the CA/OR drift gillnet fishery is operating lawfully under the ESA and MMPA. Without the implementation of the reasonable and prudent alternative, the fishery will not have an exemption from the incidental take prohibition under section 9 of the ESA and would be subject to penalties for violating the provisions of the ESA. This alternative was developed in the biological opinion and is expected to avoid the likelihood of jeopardizing the continued existence of the leatherback and loggerhead sea turtle populations. In addition, by implementing this alternative, the fishery will be allowed to fish, although at a reduced level for vessels that historically fish north of Point Conception during the months of August, September, or October, and south of Point Conception from August 15 to August 31, and from January 1 to January 31.

4.2.1. Impacts to Marine Mammals

4.2.1.1. North of Point Conception Closure

The regulations would establish a time and area closure north of Point Conception which restricts CA/OR drift gillnet vessels from fishing in waters off of California and Oregon from Point Conception (34°27'N), north to 45°N, and west to 129°W, from August 15th to October 31st. Vessels would still be required to comply with existing State codes that regulate gear, equipment and fishing seasons as well as comply with Federal regulations which implement the Pacific Offshore Cetacean Take Reduction Plan (50 C.F.R. 229.31). During the time and area closure, vessels would be allowed to fish outside of the closed area (south of Point Conception to the Mexico border, north of 45°N, and west of 129°W). However, during El Niño years under this alternative, vessels would not be allowed to fish south of Point Conception and east of 120°W between August 15th and August 31st, and January 1st through January 31st.

These regulations are expected to result in a reduction in the number of marine mammal interactions. In addition, there could be a reduction in the number of fishing effort days as vessels already trolling for albacore may continue targeting albacore into the month of October until the they can begin setting drift gillnets to target swordfish in November. Furthermore, some participants may choose not to fish at all until sets can be made north of Point Conception (November 1). NMFS also expects that a number of vessels, especially vessels that homeport in southern California, will fish south of Point Conception until the fishery opens north of Point Conception. NMFS also expects that some vessels that do not historically fish south of Point Conception will move into this area until the closed area north of Point Conception opens in November. However, for the purposes of evaluating the effects of the proposed action, NMFS will assume that fishing effort that historically occurred north of Point Conception will shift to ocean waters off of California south of Point Conception.

According to observer data (July 1990 through December 2000), it appears that the cetacean entanglement rates south of Point Conception have been lower than the entanglement rates north of Point Conception during those months that the northern area will be closed to protect leatherback sea

turtles. The entanglement rate south of Point Conception during the months of the closure in the reasonable and prudent alternative is 0.038 (30 sets with entanglements and 758 sets without an entanglement) and the cetacean entanglement rate north of Point Conception during the months of the closure in the reasonable and prudent alternative is 0.083 (156 sets with entanglements and 1,708 sets without an entanglement). Since the implementation of the take reduction plan, the cetacean entanglement rate south of Point Conception during the months of the closure in the reasonable and prudent alternative is 0.007 (2 sets with entanglements and 284 sets without an entanglement) and the cetacean entanglement rate north of Point Conception during the months of the closure in the reasonable and prudent alternative is 0.032 (13 sets with entanglements and 395 sets without an entanglement). Therefore, if all the fishing effort shifted to the south of Point Conception, a reduction in the overall marine mammal entanglements would be expected.

Any effort shift resulting from the proposed time and area closure north of Point Conception to protect leatherback sea turtles would not likely affect the number of interactions with listed marine mammal stocks since most of these interactions occurred outside of the time and area closure. More specifically, there have been eight observed sperm whale interactions since the inception of the observer program in July 1990 through January 31, 2001. During this time period, 7 of the 8 sperm whale entanglements occurred outside of the time closure (November and December). There was only one sperm whale that was observed taken inside the closed time and area closure and that was during an El Niño event in 1993. Therefore, implementation of the reasonable and prudent alternative to close the fishery north of Point Conception from August 15 through October 31 may slightly decrease the likelihood of an interaction with a sperm whale.

In addition, there have only been two humpback whales observed taken by the fishery and both of these interactions occurred outside of the time and area closure (south of Point Conception during the months of August and November). Moreover, both of these observed takes were released alive without injury. In 1999, NMFS observed the first fin whale interaction with the CA/OR drift gillnet fishery in more than 6,000 sets. This also occurred south of Point Conception and during the month of November. Therefore, NMFS does not expect the implementation of the reasonable and prudent alternative to increase or decrease the likelihood of interactions with humpback whales or fin whales.

In the case of Steller sea lions, NMFS has observed only two animals entangled. One of these animals was observed south of Point Conception during the month of June and the other occurred during the month of September and north of Point Conception in ocean waters included in the time and area closure. Therefore, implementation of the reasonable and prudent alternative to close the fishery north of Point Conception from August 15 through October 31, may decrease the likelihood of an interaction with Steller sea lions, recognizing that the chances of an interaction are already low at less than 1 in 3,000 sets.

NMFS has observed 39 northern right-whale dolphins taken in 1,859 sets north of Point Conception during the proposed closed period, for a catch rate of 0.021 animals per set. South of Point

Conception, the catch rate is 0.0 animals per set (0 animals in 825 observed sets). This alternative is expected to decrease the likelihood of an interaction with northern right-whale dolphins if fishing effort that was previously made north of Point Conception shifts to south of Point Conception during the closure.

Short-finned pilot whales are taken at a rate of 0.006 animals per set (11 animals in 1,859 observed sets) north of Point Conception during the closed period. There has not been a short-finned pilot whale observed taken south of Point Conception during the closed period (0 animals in 825 sets). This alternative is expected to decrease the likelihood of an interaction with short-finned pilot whales if fishing effort that was previously made north of Point Conception shifts to south of Point Conception during the closure.

4.2.1.2. South of Point Conception Closure

During El Niño events, the reasonable and prudent alternative restricts fishing in waters off of California south of Point Conception (34°27'N) to the Mexico border and east of 120°W between August 15th and August 31st, and between January 1st through January 31st for CA/OR drift gillnet vessels. As stated above in the north of Point Conception closure, observer data (July 1990 through December 2000), indicate that the cetacean entanglement rates south of Point Conception are lower than the entanglement rates north of Point Conception during those months that the northern area will be closed to protect leatherback sea turtles. During the months of the southern closure in the reasonable and prudent alternative (El Niño events only), the entanglement rate is approximately 0.029 cetaceans per set (8 sets with entanglements and 263 sets without an entanglement).

During the August closure, NMFS would expect the implementation of the southern closure to cause a reduction in the number of marine mammals taken since there will be a reduction in the number of sets made by the fishery. The south of Point Conception closure in combination with the north of Point Conception closure will effectively eliminate fishing effort from August 15 to August 31, which is likely to cause a reduction in the number of cetacean entanglements. However, since there have not been observed entanglements of listed marine mammals (sperm whale, fin whale, or Steller sea lion) south of Point Conception during the month of August or January, NMFS does not expect the implementation of the reasonable and prudent alternative measure to restrict fishing activity south of Point Conception during an El Niño event to affect the take of these species. However, there may be a slight reduction in the likelihood of taking a humpback whale since there was one humpback whale observed taken and released alive south of Point Conception in August 1994.

There has been 1 northern right-whale dolphin observed entangled south of Point Conception during the closed period. If fishing effort historically made during this period is eliminated, NMFS expects the southern closure during August and January during El Niño years may slightly decrease the likelihood of entangling northern right-whale dolphins.

There has not been a short-finned pilot whale observed taken south of Point Conception during the closed period, so NMFS expects that the southern closure from August 15th through August 31st, and January 1st through January 31st will have no effect on the take of this species.

4.2.2. Impacts to Target and Non-target Fish

4.2.2.1. North of Point Conception Closure

The reasonable and prudent alternative establishes a time and area closure which restricts CA/OR drift gillnet vessels from fishing in waters off of California and Oregon from Point Conception (34°27'N), north to 45°N, and west to 129°W, from August 15th to October 31st. During the time and area closure, vessels are allowed to fish outside of the closed area (south of Point Conception to the Mexico border, north of 45°N, or west of 129°W). However, during El Niño years, vessels would not be allowed to fish south of Point Conception and east of 120°W from August 15th to August 31st under this alternative.

These regulations are expected to generate a reduction in the number of CA/OR drift gillnet fishing effort days made north of Point Conception. Some vessels that traditionally troll for albacore in this area are expected to continue targeting albacore through the month of October until they can begin setting drift gillnets to target swordfish in November. In addition, other participants may choose not to fish at all until sets may be made north of Point Conception.

NMFS further expects these regulations will lead to an increase in the number of fishing effort days south of Point Conception. A number of vessels that ordinarily fish north of Point Conception, especially vessels home-ported in southern California, will fish south of Point Conception until the fishery opens to the north. NMFS also expects that some vessels that do not historically fish south of Point Conception will move into the area until the closed area north of Point Conception opens in November. Fishing effort during calendar year 2000 in the proposed northern time/area closure was approximately 342 sets, while effort south of 34°27'N was approximately 474 sets (CDFG unpublished data).

Effects of the reasonable and prudent alternative on fish species were measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. It was assumed that all of the fishing effort previously made north of 34°27'N during the closure will shift to south of Point Conception during these months. Fish catch rates north of 34°27'N were compared to those south of 34°27'N during the months of August, September, and October, for the years 1990 through 2000 (NMFS unpublished data). NMFS has observed 1,859 sets in the proposed northern time/area closure, and 825 sets south of 34°27'N during these months.

Swordfish
The alternative is expected to decrease the likelihood of CA/OR drift gillnet fishing vessels catching

swordfish. The observed swordfish catch rate north of 34°27'N during August through October is 2.95 fish per set. South of 34°27'N the catch rate is 0.99 fish per set. Therefore, fewer swordfish are expected to be caught by the drift gillnet fishery during the closed months. As a result, vessels that normally fish north of Point Conception may decide to harpoon swordfish during the day if the fish are available, in addition to setting their nets at night. In this case, there might be an increase in amount of landings caught by harpoon.

Other Billfish
Striped marlin catch rates are higher in the south (0.14) than to the north (0.01 fish per set). Blue marlin catch is 0.02 fish per set in the south, and <0.01 fish per set to the north (1 blue marlin in 1,859 sets). Therefore, the alternative to close the fishery north of Point Conception from August 15th through October 31st is expected to increase the catch of other billfish by the CA/OR drift gillnet fishery.

Blue Shark
The reasonable and prudent alternative is expected to decrease the likelihood of catching blue sharks in the CA/OR drift gillnet fishery. Blue sharks are caught at a rate of 5.31 fish per set north of Point Conception and 2.7 fish per set south of there during the proposed closed months.

Thresher Shark
Drift gillnet vessels catch common thresher shark at a higher rate in the south (0.9 fish per set) than in the north (0.51 fish per set). Redistribution of fishing effort to south of 34°27'N during August, September, and October is expected to increase common thresher shark catches by the fishery during those months. Further, some vessels may elect to directly target common thresher shark using drift gillnets during this time period, producing even higher catch rates and landings for this species. The catch of bigeye thresher shark may also increase, as the catch rate in the south (0.16 fish per set) is higher than that to the north (0.08 fish per set), although observed bigeye thresher shark catch has been lower than average in the past several years (9-15 sharks per year with approximately 20% observer coverage).

Shortfin Mako Shark
Drift gillnet catch rates for shortfin mako shark are 0.46 fish per set north of Point Conception and 1.97 fish per set south of there. Therefore, this alternative is expected to produce higher shortfin mako shark catches during the closed months as fishing effort is shifted to south of Point Conception.

Essential Fish Habitat
This alternative is not expected to adversely affect essential fish habitat. Thus, consultation under 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act is not required.

4.2.2.2. South of Point Conception Closure

During El Niño events, the reasonable and prudent alternative prohibits fishing by CA/OR drift gillnet vessels in waters off of California south of Point Conception (34°27'N) to the Mexico border and east

of 120°W from August 15th to August 31st, and from January 1st to January 31st. Under this alternative, vessels are still allowed to fish outside of the closed area west of 120°W, or north of Point Conception after October 31st.

This alternative will lead to a reduction of fishing effort days south of Point Conception during El Niño years. Vessels that usually begin fishing south of Point Conception on August 15th will have the option of fishing west of 120°W, or delaying fishing operations until after August 31st. Some CA/OR drift gillnet vessels, especially the San Diego and Los Angeles small boat fleets, are not capable of fishing in the sea conditions encountered west of 120°W. Therefore, it is expected that these vessels will wait until after August 31st to when they can begin fishing east of 120°W. Further, those vessels that are able to fish west of 120°W may find it more economical to wait two more weeks, and begin fishing east of 120°W after August 31st than to pay the additional fuel costs necessary to reach the fishing grounds west of 120°W from August 15th to August 31st.

Closing the area south of Point Conception (34°27'N) to the Mexico border and east of 120°W from January 1st to January 31st will produce a further reduction in fishing effort days. Some effort may shift north of 34°27'N during January, but the amount is expected to be minimal since weather conditions north of Point Conception preclude most drift gillnet fishing during this month. Some vessels may fish west of 120°W in January, but this number is expected to be small since not all drift gillnet vessels are able to fish in weather conditions experienced in this area.

Effects of the reasonable and prudent alternative on fish species were measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. It was assumed that nearly all of the fishing effort regularly made south of Point Conception (34°27'N) to the Mexico border and east of 120°W from August 15th to August 31st, and from January 1st to January 31st would not be redistributed elsewhere. The reasonable and prudent alternative is expected to reduce the CA/OR drift gillnet fishery's catch of swordfish, striped marlin, blue marlin, blue shark, common thresher shark, bigeye thresher shark, and shortfin mako shark because drift gillnet fishing effort will be considerably reduced from August 15th to August 31st, and from January 1st to January 31st during El Niño years.

4.2.3. Impacts to Sea Turtles

4.2.3.1. North of Point Conception Closure

*Green Turtle*s

NMFS has only observed one green turtle in the CA/OR drift gillnet fishery which occurred in 1999. This animal was taken in the month of November and was released dead. This entanglement is considered an extremely rare and random event (1 turtle in 6,025 observed sets). The time and area closure north of Point Conception is not expected to increase the likelihood of an interaction with a green turtle since the time period of the closure does not include the month of November. Therefore, NMFS does not expect an increase in the number of vessels that typically fish in the area where the

green turtle was taken since vessels are able to choose whether to fish north of Point Conception or south of Point Conception during the month of November. Moreover, the observed take in 1999 appears to be related to unusual environmental conditions which are not expected to occur on an annual basis. Therefore, NMFS expects the capture of green turtles to be a rare event and any associated mortality of green turtles is not anticipated to occur every year. Based on past fishery performance, one green turtle was observed taken in eleven years. Implementing the measure of the reasonable and prudent alternative to close the waters north of Point Conception is not expected to increase the remote likelihood of a green turtle interaction. NMFS believes that the observed take of the green turtle was more likely the result of a rare overlap between the CA/OR drift gillnet fishery and the oceanographic conditions occurring during the time period of the entanglement rather than a likely occurrence of the fishery.

Leatherback Turtles

The time and area closure north of Point Conception (Figure 9) was developed to avoid the likelihood of jeopardizing the continued existence of leatherback sea turtles. Since NMFS began observing the fishery, there have been 23 observed entanglements, of which 91 percent have been taken north of Point Conception. However, the data do not indicate a specific area where there are more leatherbacks likely to be taken. There is not a large increase in leatherback turtle entanglement rates at Point Conception. The increase actually begins south of Point Conception since there have been two turtles observed taken south of Point Conception, but the most substantial increase in entanglement rates occurs north of 36º30'N. Based on the observer data, leatherback entanglement rates clearly change as a function of latitude.

This entanglement rate increase north of 36º30'N appears to correspond to the number of leatherback turtles in the area. Leatherback turtles are known to aggregate in the Monterey Bay with the highest density of sightings on the U.S. West Coast in August (Starbird, *et al*. 1993). In this area, north of Point Conception, a major upwelling begins in the spring, when the inverted bottom water is often 3ºto 5º C colder than the sun-warmed surface water it replaces. By summertime, seawater temperatures are relatively cold compared to the other areas in the same latitude and coastal upwelling generates high productivity, attracting species such as the leatherback, which can tolerate and may favor the highly productive cool coastal waters. Leatherbacks caught in the drift gillnet fishery off central and northern California most probably originated from offshore portions of 13-15º C isotherms pushed in-shore in the late summer (Stinson, 1984, *in* Eckert, 1993). All the observed leatherback takes occurred from September to January, with approximately 60% of the captures occurring in October. The leatherbacks were found in waters with an average monthly sea surface temperature of between 10 to 17.5º C. The majority of leatherbacks were found in areas of coastal upwelling and some were found on distinct temperature breaks. Only five of the turtles were measured, all between 132 to 160 cm (sub-adults and adults). The rest were most likely too large to be brought on board and measured; therefore, they were probably adults.

Samples from two of the 23 leatherbacks taken in the CA/OR drift gillnet fishery were genetically analyzed and found to be representative of nesting turtles from western Pacific beaches (i.e. Malaysia,

Indonesia, Solomon Islands). Similarly, all samples taken from stranded leatherbacks on the California coast have indicated representation from western Pacific nesting beaches (Dutton, *et al*., in press, personal communication, March, 2000). Moreover, two leatherbacks tagged off of Monterey, California in early September 2000 appear to be headed towards western Pacific nesting beaches. One of the historically observed leatherback turtles taken far offshore of California was caught in the area where the tagged leatherback traveled.

The reasonable and prudent alternative is expected to reduce the likelihood of the CA/OR drift gillnet fishery causing a serious injury or mortality of leatherback turtles. This is based on data that indicate 78 percent of the leatherbacks observed taken in the past occurred during the time and area of the closure. Therefore, based on the information in the biological opinion, NMFS expects that the likelihood of the CA/OR drift gillnet fishery taking a leatherback turtle is significantly reduced to where the continued operation of the fishery will not jeopardize the continued existence of the species. This time and area closure is expected to provide protection to leatherbacks that aggregate in Monterey Bay during the summer and then depart in early fall to possibly migrate to western pacific nesting beaches.

Loggerhead Turtles

The time and area closure north of Point Conception which restricts CA/OR drift gillnet vessels from fishing in waters off of California and Oregon from Point Conception (34°27'N), north to 45°N, and west to 129°W, from August 15th to October 31st, is not expected to increase the likelihood of an interaction with a loggerhead turtle. This expectation is based on observer data that indicate that loggerhead sea turtles have only been taken by the CA/OR drift gillnet fishery south of Point Conception during El Niño events. Therefore, the implementation of the measure under the reasonable prudent alternative to close the ocean waters north of Point Conception is not likely to affect the number of loggerhead sea turtle interactions since the area south of Point Conception would be closed during an El Niño event preventing vessels from fishing south.

Olive Ridley Turtles

Although the olive ridley is widely regarded as the most abundant sea turtle in the world, they are very rarely caught in the CA/OR drift gillnet fishery, probably because the olive ridley prefers tropical and warm temperate waters. Of all sea turtle strandings in California from 1990-99, the olive ridley was the sea turtle most rarely found (J. Cordaro, NMFS, personal communication, May, 2000). The first olive ridley turtle was observed taken by the CA/OR drift gillnet fishery in November 1999, north of Point Conception. The animal was released alive with no injuries. This entanglement is considered an extremely rare and random event (1 turtle in 6,025 observed sets) and the likelihood of such an event is not expected to increase with the implementation of the measure under the reasonable and prudent measure to close the CA/OR drift gillnet fishery north of Point Conception.

Compared to other sea turtles, olive ridleys are the second deepest divers, after leatherbacks, and have been found captured in bottom trawls 80 to 110 meters deep (Plotkin, 1994 *in* Lutcavage and Lutz, 1997) and feeding on crabs at 300 meters deep (Landis, 1965 *in* NMFS and USFWS, 1998). Utilizing a wide range of foraging habitats, they are known to feed in deep water, pelagic habitats and in

relatively shallow benthic waters, on a variety of crabs, jellyfish, tunicates, etc. They are also known to associate with flotsam in the water, perhaps feeding on associated fish and invertebrates (Pitman, 1992 *in* NMFS and USFWS, 1998). With such a wide variety of foraging and behavioral habits, it is difficult to evaluate whether there is a specific cause for the interaction to occur. Therefore, NMFS believes that the observed take of the olive ridley was more the result of unusual oceanographic conditions and its rare co-occurrence with the fishery and will not be affected by the implementation of the measure under the reasonable and prudent alternative.

4.2.3.2. South of Point Conception Closure

Green Turtles

The measure under the reasonable and prudent alternative that restricts fishing by CA/OR drift gillnet vessels in waters off of California south of Point Conception (34°27'N) to the Mexico border and east of 120°W between August 15th and August 31st, and between January 1st through January 31st during an El Niño event, is not expected to increase the likelihood of a green sea turtle take in the CA/OR drift gillnet fishery. The reason for this expectation is that NMFS has only observed one green turtle in the CA/OR drift gillnet fishery which took place in November 1999. NMFS considers this entanglement as an extremely rare and random event (1 turtle in 6,025 observed sets). The time and area closure south of Point Conception is not expected to increase the likelihood of an interaction with a green turtle since the closure time period does not include the month of November.

Leatherback Turtles

The time and area closure south of Point Conception during August 15th through 31st and January 1st through 31st is not expected to increase the likelihood of a leatherback interaction since there have been no observed leatherbacks taken during this time period south of Point Conception. There have only been two leatherback turtles that have occurred south of Point Conception. One of them occurred in December 1999, during the unusual oceanographic event, near Santa Catalina Island and the other event took place in January, more than 200 nm from shore, and is almost on the closure line (approximately 8 nm south) since the recorded position was 34°18.9'N 121°47'W and Point Conception is 34°27.0'N. Therefore, the implementation of the measure to close fishing operations south of Point Conception out to the 120°W longitude will not increase the likelihood of an interaction.

Loggerhead Turtles

The measure under the reasonable and prudent alternative to close the fishery south of Point Conception out to the 120°W (Figure 10) was developed to avoid the likelihood of CA/OR drift gillnet fishery from jeopardizing the continued existence of the loggerhead sea turtle populations. NMFS anticipates that the CA/OR drift gillnet fishery will not take any loggerheads during non-El Niño years since loggerheads have not been observed taken in non-El Niño years (based on observer data from 1990-2000). The observed incidental take of loggerhead turtles by the CA/OR drift gillnet fishery is infrequent, although they were the second most common sea turtle species caught since the fishery has been observed by NMFS. This may be due in part because loggerheads are rarely seen in the eastern Pacific north of Baja California, Mexico. Loggerhead occurrence in the CA/OR drift gillnet fishery is

probably associated with the northward extension of Transition Zone waters along the North American coast during El Niño events. The large aggregations of juveniles off Baja California have been observed foraging on dense concentrations of the pelagic red crab, *Pleuronocodes planipes* (Pitman, 1990).

Three unidentified turtles were observed taken in 1993 off southern California, all on the same trip, but in different sets. Only one of these sea turtles was measured, and at 43 centimeters, the average length of measured loggerheads captured incidentally in this fishery from 1990-2001, this turtle was most likely a loggerhead. In addition, all three turtles were caught in the same concentrated area that all loggerheads in the past 11 years have been caught by this fishery. They were also caught during an El Niño, which is the only time that loggerheads have been caught in this fishery since July 1990, when the fishery was first observed by NMFS. Assuming these three unidentified turtles are loggerhead turtles, there have been a total of 17 loggerhead turtles observed during the past 11 years. Four of these events took place during the month of July, three of which occurred when the fishery was allowed to fish inside 75 nautical miles during this time period. Another turtle was observed taken during the month of June. However, since the fishery is now closed inside 75 nautical miles until August 15th and there is minimal fishing effort during the months of June, July, and the first part of August, NMFS does not expect there to be many loggerhead turtles taken outside of the time period identified in the August and January closure. Therefore, NMFS expects that the closure south of Point Conception in August and January will reduce the incidental mortality and serious injury to a level that will avoid the likelihood of jeopardizing the continued existence of the loggerhead sea turtle populations.

Olive Ridley Turtles

The closure to restrict fishing operations south of Point Conception during August 15th through 31st and January 1st through 31st is not expected to have an affect on the likelihood of an interaction with a olive ridley sea turtle. There has only been one olive ridley observed and this event took place during November 1999, during an unusual oceanographic event. Therefore, since the time and area closure does not include the month of the observed olive ridley take, and the take did not occur during an El Niño event, NMFS does not anticipate a change in the take rate. Moreover, with only one interaction in 6,025 sets, this is a very rare and unlikely event.

4.2.4. Impacts to Seabirds

4.2.4.1. North of Point Conception Closure

The closure north of Point Conception is expected to slightly reduce the likelihood of northern fulmars being taken incidental to the CA/OR drift gillnet fishery. In 2000, NMFS observed for the first time northern fulmars entangled while picking at the net webbing during net retrieval in waters north of Point Conception. From August 15 through October 31, there were 4 northern fulmars observed caught in the gear. One of these was released alive, 2 were released dead and 1 was released injured. Otherwise, NMFS has not observed this type of behavior during previous years. The entanglement rate for northern fulmars north of Point Conception during the time period of the closure (August 15 through October 31) is 0.002 northern fulmars per set (4 northern fulmars in 1,859 observed sets). If

all the fishing effort that has occurred north of Point Conception moves south to ocean waters south of Point Conception, NMFS expects that the likelihood of an interaction with northern fulmars would be reduced.

In addition to the northern fulmars, there have been four unidentified birds recorded by onboard observers. Two of these occurred in the closed area north of Point Conception giving an entanglement rate of 0.001 unidentified birds per set (2 unidentified bird in 1,859 observed sets), and none occurred south of 34°27'N during this time period. Based on this information, NMFS does not expect an interaction with an unidentified seabird if the fishing effort is shifted to south of Point conception.

4.2.4.2. South of Point Conception Closure

The limited number of observed incidental takes of seabirds have occurred north of Point Conception. The vessels that typically fish south of Point Conception in August are not expected to venture north of Point Conception since the vessels are not equipped to handle the heavy northwesterly gales that are encountered off of Point Conception or the change of climatic and meteorological conditions. In January, vessels fish in southern California because there are no longer sufficient oceanic water temperature breaks north of Point Conception that provide suitable fishing conditions for catching swordfish and the weather conditions are usually poor. NMFS does not expect vessels to fish north of Point Conception during the month of January. Therefore, the closure south of Point Conception is not expected to increase or decrease the likelihood of an interaction with seabirds.

4.2.5. Socio-Economic Impacts

4.2.5.1. North of Point Conception Closure

Feasibility
Vessels are able to determine whether they are fishing north or south of the 34°27'N using the global positioning system and plotters to determine the vessel locations. Vessels fishing south of Point Conception are not likely to fish north of Point Conception and then travel south to Santa Barbara to land fish. This circumstance is caused by the prevailing northwesterly winds, large swells, and choppy wind waves which persist at Point Conception, discouraging and inhibiting vessels from routinely traveling north around the point. Typically, once a vessel reaches the northern offshore fishing grounds (off Crescent City, Moss Landing, or Morro Bay) during a fishing season, it will not move further south unless water temperatures or weather conditions change significantly. Traveling northward is more difficult and time consuming because vessels must travel against the currents, winds, and waves. In addition, traveling into the weather causes vessels to consume more fuel.

Economic Impact
Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically occurs north of Point Conception between August 15th through October 31st did not relocate, the north of Point conception closure could cause a loss of $712,000 in ex-vessel gross revenues. This is a

worst case scenario since many of the vessels will decide to fish in areas that are still open to drift gillnet fishing under this alternative. Table 3 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, generated during the time and area closure (August 15th through October 31st), using the past four years of landing receipt data from 1997-2000 (CDFG unpublished data).

Table 3. Ex-vessel gross revenue based on fishing area recorded on landing receipts for the period between August 15 through October 31, 1997-2000, in ocean waters north of Point Conception[1]

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000) [2]	81.50	6,477.10	64,049.00	83,536.20	906,682.30	133,658.50
Annual Average (lbs)	20.38	1,619.28	16,012.25	20,884.05	226,670.58	33,414.63
Average Price	$ 2.00	$ 3.18	$ 1.06	$ 0.41	$ 2.84	$ 1.13
Value (1997-2000)	$ 163.00	$20,577.75	$ 67,868.18	$34,466.90	$2,574,167.73	$150,824.44
Annual Average	$ 40.75	$ 5,144.44	$ 16,967.04	$ 8,616.73	$ 643,541.93	$ 37,706.11
Total Gross revenues	$2,848,068.00					
Annual Revenues (Avg)	$712,017.00					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the range of impacts of the different alternatives, it is also possible to analyze the change in gross revenues assuming that all of the fishing effort that historically occurred north of Point Conception will shift to the south of Point Conception. However, NMFS believes that many of the vessels that typically troll for albacore will extend their albacore fishing season later into the year (September/October) if the catch rates remain profitable in an effort to avoid drift gillnet fishing south of Point Conception. In addition, other vessels may choose not to fish altogether during the closed months. Nevertheless, if all the vessels were to fish south of Point Conception, NMFS would expect a reduction in overall fishing revenues since the catch rates for many of the target species are lower in ocean waters south of Point Conception.

Based on the landing receipt data, swordfish accounts for 90% of the ex-vessel gross revenues during this time period. Therefore, for purposes of determining the impacts of this alternative, NMFS is using swordfish as an indicator. More specifically, the catch rate for swordfish for this time period north of Point Conception is 2.945 compared to south of Point Conception at 0.999. Therefore, NMFS would expect vessels that normally fish north of Point Conception during this time period would experience a reduction in the catch of swordfish with the implementation of this alternative during this time period. However, this estimate is based on the swordfish catch rates remaining constant even with an increase in the number of vessels fishing south of Point Conception. Of course, there is the possibility that the catch rate will decrease because of the increase in fishing effort in the southern California bight. However, assuming that the catch rate south of Point Conception remains the same, NMFS estimates the ex-vessel gross revenues for swordfish for the vessels that normally fish north of Point Conception will be approximately $215,000, which would be a 66% percent reduction in ex-vessel gross revenues

for fishing boats that historically fish north of Point Conception during this time period. However, if the fleet chooses to target thresher shark in addition to swordfish south of Point Conception the total gross revenue loss may be slightly less since the catch rate for thresher shark is higher south of Point Conception but the price per pound is lower than swordfish.

In addition to the reduction in swordfish gross revenue caused by the decrease in the swordfish catch rate south of Point Conception, there may be additional operating costs for vessels that historically fish north of Point Conception during this time period. Many of the vessel owners who fish north of Point Conception live in coastal communities near where they home port their vessel. Therefore, these vessel operators may incur additional fuel costs to travel to and from their home port to the open ocean waters south of Point Conception. This cost would vary depending on the distance vessels would need to travel. In addition, there may be higher operating costs for these vessels when fishing south of Point Conception because there are more fair weather days to fish. Typically, north of Point Conception, weather conditions may prevent vessels from leaving port for several days at a time. South of Point Conception, these vessels are more likely to be able to fish more days since there are more fair weather days. This increase in the number of fishing days may cause an increase in fuel costs that otherwise would not have been incurred by the vessel fishing north of Point Conception because the vessel would have remained in port. Conversely, because vessels have the potential to fish more days south of Point Conception, the lower catch rate and reduction in ex-vessel gross revenues may be offset by the increase in the number of fishing days compared to north of Point Conception.

Fishing Conflicts

Increasing the number of drift gillnet vessels fishing south of Point Conception is likely to cause an increase in direct competition for desirable oceanographic conditions (water temperature breaks) and fishery resources. This may cause a decrease in the observed catch rate since there would likely be more fishing vessels in the area. In addition, NMFS and the State of California have received letters and telephone calls from various recreational fishery organizations expressing concern about increasing the number of commercial drift gillnet vessels operating in ocean waters south of Point Conception because of the potential increase of striped marlin bycatch. Although the larger drift gillnet vessels that typically fish north of Point Conception are more likely to fish further offshore and in areas that recreational vessels do not normally fish, the concern is that these vessels will intercept the striped marlin as they move inshore.

The small six-pack vessels and private sport fishing vessels may see a reduction in the striped marlin catch rate if all the drift net vessels that normally fish north of Point Conception move south during the time and area closure. However, the majority of the CPFV fleet target other species besides striped marlin and many of the vessels fish in Mexican waters since during normal oceanographic temperature years, there are not many striped marlin off southern California, and sportfishing vessels are more likely to fish in Mexican waters. The impact of the CA/OR drift gillnet fishery shifting south of Point Conception during the months of September and October is likely to increase the number of striped marlin caught by the fishery. However, NMFS is not able to quantify whether this will have an adverse economic impact to the recreational fishery since many of the vessels target other species besides marlin

and the likelihood of the drift gillnet fishery depleting the marlin stock in southern California is remote. In addition, vessels targeting marlin may choose to obtain Mexican permits and fish south of the border which may further diminish the possible effect of an increased number of drift gillnet vessels fishing in southern California. If there is an increase in the number of drift gillnet vessels fishing south of Point Conception, NMFS would not expect an immediate decrease, if any, in the number of recreational fishery participants targeting marlin because the effect of drift gillnet vessels fishing in the area would need to be realized by the fishery participants before they would change their fishing behavior.

Weather conditions

Another indirect effect of restricting fishing activity by drift gillnet fishing vessels to south of Point Conception from August 15th through October 31st is that the vessels that typically fish north of Point Conception may choose to fish in more adverse weather conditions because they may try to fish near the closed area (34º27'N latitude line). This area around Point Conception marks an abrupt change in climatic and meteorological conditions which causes the areas to often be subjected to heavy northwesterly gales and strong offshore gusts. Moreover, vessels fishing in this area must fish further offshore in open water conditions in which there is not a port nearby to seek shelter if weather conditions should change quickly.

4.2.5.2. South of Point Conception Closure

Feasibility

Restricting vessels from fishing in ocean waters south of Point conception during an El Niño event is feasible since vessels have global positioning satellite systems and plotters aboard the vessels that would allow them to determine their exact location. In addition, vessels are not likely to fish south of Point Conception and then travel north to Morro Bay to land fish. This situation is caused by the prevailing northwesterly winds, large swells, and choppy wind waves persisting at Point Conception, which discourage and inhibit vessels from routinely traveling north around the point. Traveling north is more difficult and time consuming because vessels must travel against the currents, winds, and waves. In addition, U.S. vessels are not permitted to fish or land fish in Mexico. The likelihood of a vessel fishing outside of the 120ºW would depend on the size of the vessel and the weather conditions. Typically, during the month of January, strong low pressure systems move into the Southern California Bight from Alaska. These strong weather systems will even discourage larger vessels from leaving port, especially if the fishing conditions offshore are marginal.

Economic Impact

Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically occurs south of Point Conception during El Niño events between August 15th through August 31st and January 1st through January 31st did not relocate, the closure south of Point Conception could cause a loss of approximately $438,688 in ex-vessel gross revenues. This is a worst case scenario since some of the vessels will decide to fish in areas that are still open to drift gillnet fishing under this alternative. Table 4 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, for the time and area closure, using California Department of Fish and Game landing receipt data from

1997-2000.

Table 4. Ex-vessel gross revenues based on fishing area recorded on landing receipts for the period between August 15 through August 31, and January 1 through January 31, 1997-2000, in ocean waters south of Point Conception east of 120°W[1].

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000) [2]	-	6,214.50	66,102.39	193,708.80	379,174.50	142,936.50
Annual Average (lbs)	-	1,553.63	16,525.60	48,427.20	94,793.63	35,734.13
Average Price	$ -	$ 4.08	$ 1.07	$ 0.42	$ 3.64	$ 1.37
Value (1997-2000)	$ -	$25,324.09	$70,857.02	$80,981.94	$1,381,074.43	$196,437.96
Annual Average	$ -	$ 6,331.02	$17,714.25	$20,245.48	$ 345,268.61	$ 49,109.49
Total Gross revenues	$1,754,675.44					
Annual Revenues (Avg)	$ 438,668.86					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the impacts of this alternative, it is also possible to analyze the change in gross revenues by assuming that the vessels that typically fish north of Point Conception during August (15th through 31st) will fish outside of 120°W longitude and therefore would not be affected by this closure during the month of August. However, during the month of January, NMFS is uncertain how many of these vessels may choose to fish outside of 120°W because of the adverse weather conditions that typically occur during that time of year offshore. More likely, NMFS expects these larger vessels that historically fish off San Diego during January will choose to call it quits at the end of December.

The smaller vessels that typically fish off of San Diego during the month of August at 9-mile and 20-mile banks are not expected to fish during August between the 15th and the 31st. The reason for this expectation is that these vessels are not likely to fish outside of the 120°W because of the distance from shore and the offshore weather conditions. However, some of the small vessels that home port in Santa Barbara or Los Angeles may choose to fish outside of the 120°W. The Los Angeles boats would move up the coast and work out of the Santa Barbara port for convenience. These vessels may choose to target thresher shark inside the Santa Barbara Channel. Therefore, the reduction in ex-vessel gross revenues may be lower than projected. However, these vessels are not as likely to fish in this area during the month of January because historically swordfish catch tends to be greater in the warmer water off the coast of San Diego. Therefore, NMFS does not expect much fishing effort to occur south of Point Conception outside of the 120°W by these smaller vessels.

In addition to the reduction in swordfish revenue caused by the inability of vessels to fish inside the 120°W, there may be additional operating costs for vessels that choose to fish outside of the closed area during this time period because of the increased distance the vessels would need to travel.

Fishing Conflicts
The southern closure during El Niño events is not likely to cause an increase in direct competition for desirable oceanographic conditions (water temperature breaks) and fishery resources because many of the vessels are expected to choose not to fish outside of the 120°W. In addition, the southern closure is not expected to conflict with the recreational striped marlin fishery since the commercial drift gillnet vessels would not be allowed to fish inside the 120°W.

Weather conditions
The closure south of Point Conception may increase the likelihood of vessels fishing in more adverse weather conditions since some vessels may try to fish outside the 120°W. This area, especially around Point Conception, is more likely to be subjected to heavy northwesterly gales and strong offshore gusts. Moreover, vessels fishing in this area must fish further offshore in open water conditions in which there is not a port nearby to seek shelter if weather conditions should change quickly.

4.3. Alternative 3: Issuance of Regulations to Implement Take Reduction Team Recommendation

This alternative was developed by the Pacific Offshore Cetacean Take Reduction Team (TRT) at the May 8-10, 2001, meeting that was held in Monterey, California at the Monterey Bay National Marine Sanctuary office. Because the TRT has been involved with reducing the incidental mortality and serious injury of marine mammals in the development of the Pacific Offshore Cetacean Take Reduction Plan, the TRT recognized the need to examine whether there might be other possible strategies that could be implemented that would provide the same level of protection for leatherback and loggerhead sea turtles. The TRT focused on strategies that could be employed to reduce the incidental entanglement of leatherback sea turtles rather than loggerhead sea turtles because loggerheads were not expected to be adversely affected during the upcoming fishing season (May 2001 through January 31, 2002) since an El Niño event was not predicted and the limited amount of time available at the meeting. Therefore, in the absence of a specific recommendation to address the south of Point Conception closure, NMFS is including the south of Point Conception closure as it is stated in the biological opinion.

After three days of discussion, the TRT reached a consensus and recommended that NMFS evaluate whether a modified closure to what has been identified in the reasonable and prudent alternative of the biological opinion would be more effective. In addition, the TRT recommended lowering the net in the water column in an effort to make the measure as effective as the reasonable and prudent alternative in the biological opinion. Provided that the modified time and area closure is determined to be as effective as the reasonable and prudent alternative in the biological opinion, the scientists, fishermen, and environmental organizations agreed that the developed strategy should be considered by NMFS for implementation since it was expected to have a reduced economic impact to the fishery. In making this recommendation, the TRT understood that the underlying purpose of the TRT is to provide NMFS with recommendations on strategies to reduce the incidental mortality and serious injury of marine mammals, not necessarily on other protected species issues. Nevertheless, the TRT strongly urged NMFS to consider input from the TRT in the future on issues that may have a nexus to the work of the TRT. The

TRT would like NMFS to evaluate the future role of the TRT that might enable the TRT to take a broader, multi-species approach in addressing bycatch. By taking this type of approach, the TRT felt that they could play an important role in helping to reduce the economic hardships that now face the fleet as a result of the implementation of the reasonable and prudent alternative in the biological opinion for loggerhead and leatherback turtles and provide important solutions to difficult bycatch issues.

4.3.1. Impacts to Marine Mammals

4.3.1.1. Northern Closure

This alternative would establish an area closure north of 36°15'N latitude, south of 45°N, and east of 129°W from August 15 through November 15. In addition, all vessels fishing north of Point Conception would be required to fish their nets at a depth of at least 60 feet (10 fathoms). To ensure that the incidental take of leatherback turtles was not exceeded, the area closure would expand southward to a line west of Point Conception if a leatherback turtle was observed taken in a drift gillnet set. This expanded closure would remain in effect until such time that the projected total takes no longer exceed 3 leatherback turtles through the end of the first year, 6 leatherback turtles through the end of the second year, and 9 leatherback turtles through the end of the third year.

With the implementation of this alternative, NMFS expects that many of the larger vessels may choose to continue trolling for albacore tuna in northern waters during the month of October, if fishing conditions remain suitable, which might cause a reduction in the number of marine mammals taken. This alternative allows vessels to fish on and around Davidson Seamount which is a productive fishing area. In addition, this alternative would allow vessels to land fish in either Moss Landing, Monterey, or Morro Bay, California. Moreover, this alternative allows vessels to fish for swordfish north of Point Conception. For purposes of evaluating the effects of the alternative, NMFS will assume that fishing effort that historically occurred north of the 36°15'N during this time period will shift south of the closed area, but still remain north of Point Conception (34°27'N).

According to observer data (July 1990 through January 2001), the proposed TRT closure north of 36°15'N has an overall cetacean entanglement rate of 0.075 animals per set (111 animals/1,474 observed sets north of 36°15'N), whereas the area between the line extending west of Point Conception (34°27'N) to the 129°W, north to 36°15'N has an overall cetacean entanglement rate of 0.177 (156 animals/882 observed sets in this area). Based on this information, shifting fishing effort to this area between the latitude of Point Conception and 36°15'N suggests that there might be a two-fold increase in the number of cetacean entanglements, if the benefits of the take reduction plan are not considered. However, since the implementation of the take reduction plan, the entanglement rates have decreased to 0.047 animals per set (20 animals/425 observed sets) north of 36°15'N, and 0.084 (32 animals/383 observed sets) in the area between the line extending west of Point Conception (34°27'N) to the 129°W, north to 36°15'N.

The effect of the closure north of 36°15'N from August 15 through November 15, is expected to have

a beneficial affect on listed marine mammal species since some of the interactions occurred inside the time and area closure. Specifically, there have been eight observed sperm whale interaction since the inception of the observer program (July 1990 through January 31, 2001). Four of those interactions occurred inside the time and area closure of this alternative. Therefore, there could be a 50 percent reduction in the number of sperm whale interactions with the implementation of this alternative, if the benefits of the take reduction plan are not considered. Since the implementation of the take reduction plan, there has only been one observed sperm whale interaction. This entanglement occurred outside of the time and area closure. In addition, this interaction occurred in a set that was not in full compliance with the take reduction plan. Therefore, it is uncertain whether the entanglement resulted from chance or because the net was not in full compliance.

This northern closure under this alternative is not expected to affect the interaction rate of humpback whales since both humpback whales that were observed taken by the CA/OR drift gillnet fishery occurred south of Point Conception. In addition, this northern closure is not expected to have an affect on the entanglement rate of fin whales for the same reason since there has only been one fin whale interaction and that occurred south of Point Conception during the month of November. Therefore, NMFS does not expect the northern closure under this alternative to increase or decrease the likelihood of interactions with humpback whales or fin whales.

For Steller sea lions, NMFS has observed only two animals. One of these animals was observed south of Point Conception during the month of June and the other occurred during the month of September north of 36°15'N. Therefore, this northern area closure to close the fishery north of 36°15'N from August 15 through November 15 may decrease the likelihood of an interaction with Steller sea lions, recognizing that the chances of an interaction are already low at less than 1 in 3,000 sets. In addition, no Steller sea lions have been observed since the implementation of the take reduction plan.

NMFS has observed 19 northern right-whale dolphins taken in 1,474 sets north of 36°15'N from August 15 through November 15, for a catch rate of 0.013 animals per set. Between 36°15'N and Point Conception the catch rate is 0.031 animals per set (27 animals in 882 observed sets). This alternative is expected to increase the likelihood of an interaction with northern right-whale dolphins if fishing effort that was previously made north of 36°15'N from August 15 through November 15 shifts to between 36°15'N and Point Conception during the closure.

Short-finned pilot whales are taken at a rate of 0.004 animals per set (6 animals in 1,474 observed sets) north of 36°15'N during the closed period. There have been 5 short-finned pilot whales observed taken in 882 sets south of 36°15'N but north of Point Conception during the closed period (0.006 animals per set). This alternative is expected to slightly increase the likelihood of an interaction with short-finned pilot whales if fishing effort that was previously made north of 36°15'N shifts to between 36°15'N and Point Conception during the closure. However, since implementation of the TRP, there has not been a short-finned pilot whale observed taken by the fishery.

4.3.1.2. Lowering the Net to 60 Feet

Based on observer data, increasing the length of the extenders to lower the top of the net to 60 feet is expected to reduce the likelihood of an entanglement with marine mammal species. The entanglement rate for marine mammals for sets greater than 60 feet is about a third less than the rate compared to sets which use extenders of 36 feet in length.

4.3.1.3. South of Point Conception Closure

In the absence of a recommendation from the TRT regarding the south of Point Conception closure during an El Niño event, NMFS is including the measure as it is stated in the reasonable and prudent alternative. Therefore, under the reasonable and prudent alternative, fishing effort would be restricted during El Niño events off of California south of Point Conception (34º27'N) to the Mexico border and east of 120ºW between August 15 and August 31, and between January 1 through January 31 for CA/OR drift gillnet vessels. During an El Niño event, under this alternative, fishing effort could still occur in the area between Point Conception and the line extending west from 36º15'N. For purposes of evaluating the impacts of this measure, NMFS will assume that the fishing effort that occurred during the closed time period will not shift north of Point Conception or outside the 120ºW since the smaller boats would not be able to fish in these waters and the larger boats would already be fishing north of Point Conception in the absence of this measure.

During the August closure, NMFS expects there would be a reduction in the number of marine mammal interactions since NMFS expects a reduction of the number of sets made during this time period. Although vessels can fish in ocean waters north of Point Conception and south of 36º15'N under this alternative, NMFS does not expect many vessels to fish in this area. The reason for this is that most larger vessels are fishing albacore tuna during this time period and the smaller vessels are unable to fish in potentially heavier seas that exist north of Point Conception or outside the 120^0 W. In addition, historically, there is very little fishing effort that occurs north of Point Conception during the month of August.

Restricting fishing effort south of Point Conception during an El Niño event during the month of January should reduce the number of marine mammal interactions since only three percent of the fishing effort occurs during the month of January north of Point Conception. Therefore, closing the fishery south of Point Conception during the month of January could reduce the fishing effort during this time period by 97 percent. This reduction in fishing effort is expected to cause a reduction in the number of marine mammal interactions during the month of January. There have been no observed entanglements of listed marine mammals (sperm whale, fin whale, or Steller sea lion) south of Point Conception during the month of August or January. Therefore, NMFS does not expect the closure south of Point Conception during an El Niño event to affect the take of these species. However, there may be a slight reduction in the likelihood of taking a humpback whale since there was one humpback whale observed taken and released alive south of Point Conception in 1994.

There has been 1 northern right-whale dolphin observed entangled south of Point Conception during the closed period . If fishing effort historically made during this period is eliminated, NMFS expects the

southern closure during August and January during El Niño years may slightly decrease the likelihood of entangling northern right-whale dolphins.

There has not been a short-finned pilot whale observed taken south of Point Conception during the closed period, so NMFS expects that the southern closure from August 15th through August 31st, and January 1st through January 31st will have no effect on the take of this species.

4.3.2. Impacts to Target and Non-target Fish

4.3.2.1. Northern Closure

This alternative would establish an area closure north of 36º15'N latitude, south of 45ºN, and east of 129ºW from August 15 through November 15. In addition, all vessels fishing north of Point Conception would be required to fish their nets at a depth of at least 60 feet (10 fathoms). For purposes of evaluating the effects of the alternative, NMFS will assume that fishing effort that previously occurred north of the 36º15'N during this time period will shift south of the closed area, but still remain north of Point Conception (34º27'N). The impacts of this alternative on fish species is measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. Fish catch rates north of 36º15'N (northern closed area) were compared to those between 34º27'N and 36º15'N (northern open area) from August 15 through November 15, for the years 1990 through 2000 (NMFS unpublished data). NMFS has observed 1,474 sets in the proposed northern time/area closure, and 882 sets between 34º27'N and 36º15'N during this period.

Swordfish
The alternative, without the lowering of the net, is expected to have no effect on CA/OR drift gillnet fishing vessels' likelihood of catching swordfish. The observed swordfish catch rate north of 36º15'N from August 15 through November 15 is 3.08 fish per set and between 34º27'N and 36º15'N the catch rate is 3.09 fish per set.

Other Billfish
Striped marlin catch rates are similar in the northern closed area (0.008) and in the northern open area (0.005 fish per set). Blue marlin catch is 0.001 fish per set in the closed area (1 blue marlin in 1,474 sets), and 0.0 fish per set in the northern open area. This alternative is not expected to significantly change the catch of other billfish by the CA/OR drift gillnet fishery since they are rarely caught north of Point Conception.

Blue Shark
This alternative, without the lowering of the net, is expected to increase the likelihood of catching blue sharks in the CA/OR drift gillnet fishery. Blue sharks are caught at a rate of 4.41 fish per set in the proposed closed area and 5.89 fish per set in the open area.

Thresher Shark

Drift gillnet vessels catch common thresher shark at a higher rate in the northern open area (0.63 fish per set) than in the northern closed area (0.47 fish per set). Therefore, redistribution of fishing effort to between 34º27'N and 36º15'N, without the lowering of the net, is expected to increase common thresher shark catches by the fishery. Further, some vessels may elect to directly target common thresher shark using drift gillnets during this time period, producing even higher catch rates and landings for this species. The catch of bigeye thresher shark may decrease, as the catch rate in the open area (0.05 fish per set) is higher than that to the north (approximately 0.10 fish per set), although observed bigeye thresher shark catch has been lower than average in the past several years (9-15 sharks per year with approximately 20% observer coverage).

Shortfin Mako Shark
Drift gillnet catch rates for shortfin mako shark are 0.41 fish per set north of 36º15'N and 0.44 fish per set between 34º27'N and 36º15'N. This alternative is not expected to significantly affect shortfin mako shark catches during the closed period.

4.3.2.2. Lowering the Net to 60 Feet

This alternative would require that extender lengths in the area north of the line extending due west of Point Conception be increased to a minimum of 60 feet. The impacts of this alternative on fish species are measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. NMFS has observed very few sets at 60 feet or greater, so species descriptions and habitat utilization are primarily used to assess the effects of this alternative.

Swordfish
This alternative is expected to decrease CA/OR drift gillnet fishing vessels' likelihood of catching swordfish. NMFS has observed over 6,000 sets in this fishery from July 1990 through January 31, 2001, and nearly all of these sets used extenders of 36 feet or less (NMFS unpublished data). NMFS believes that if swordfish catch rates were higher at 60 feet or deeper, a substantial portion of the observed sets would have been at this depth. Moreover, even if catch rates at 60 feet or greater are equivalent to those at 36 feet or less, NMFS expects a decrease in the likelihood of catching swordfish because of the difficulty of deploying and hauling gear at this depth (anecdotal information). Fewer sets would be made, thereby decreasing swordfish catch in the fishery.

Other Billfish
Lowering the net to 60 feet is expected to reduce the likelihood of catching other billfish by the CA/OR drift gillnet fishery since both blue marlin and striped marlin primarily occupy oceanic, near surface waters (Eschmeyer, 1983). Furthermore, NMFS longline observer data shows that these marlin species are caught most frequently on the shallowest hooks of a set (NMFS unpublished data).

Blue Shark
Blue sharks are often found close to or at the surface in temperate waters (Compagno, 1984). Lowering the net to 60 feet or greater is expected to decrease the likelihood of catching blue sharks in

the CA/OR drift gillnet fishery.

Thresher Shark
Common thresher sharks primarily occupy near surface waters (Eschmeyer, 1983), so fishing at a greater depth is expected to reduce the likelihood of catching this species. The likelihood of catching bigeye thresher sharks may increase due to their utilization of deeper waters (Compagno, 1984).

Shortfin Mako Shark
This species occupies epipelagic waters from the surface to at least 152m depth. This alternative can not be expected to increase or decrease the likelihood of catching shortfin mako sharks in the CA/OR drift gillnet fishery.

4.3.2.3. South of Point Conception Closure

During El Niño events, this alternative prohibits fishing by CA/OR drift gillnet vessels in waters off of California south of a line extending west of Point Conception (34°27'N) to the Mexico border and east of 120°W from August 15th to August 31st, and from January 1st to January 31st. Under this alternative, vessels are still allowed to fish outside of the closed area west of 120°W, or north of Point Conception (south of the 36°15'N) before November 15th, and anywhere north of Point Conception during the month of January.

This alternative will lead to a reduction of fishing effort days south of Point Conception during El Niño years. Vessels that usually begin fishing south of Point Conception on August 15th will have the option of fishing west of 120°W, or delaying fishing operations until after August 31st. Some CA/OR drift gillnet vessels, especially the San Diego and Los Angeles small boat fleets, are not capable of fishing in the sea conditions encountered west of 120°W or north of Point Conception. Therefore, it is expected that these vessels will wait until after August 31st to begin fishing east of 120°W. Furthermore, those vessels that are able to fish west of 120°W may find it more economical to wait two more weeks and begin fishing east of 120°W after August 31st than to pay the additional fuel costs necessary to reach the fishing grounds west of 120°W from August 15th to August 31st.

Closing the area south of Point Conception (34°27'N) to the Mexico border and east of 120°W from January 1st to January 31st will produce a further reduction in fishing effort days. Some effort may shift north of 34°27'N during January, but the amount is expected to be minimal since weather conditions north of Point Conception preclude most drift gillnet fishing during this month. Some vessels may fish west of 120°W in January, but this number is expected to be
small since not all drift gillnet vessels are able to fish in weather conditions experienced in this area.

Effects of this alternative on fish species were measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. It was assumed that nearly all of the fishing effort regularly made south of Point Conception (34°27'N) to the Mexico border and east of 120°W from August 15th to August 31st, and from January 1st to January 31st would not be

redistributed elsewhere. This alternative is expected to reduce the CA/OR drift gillnet fishery's catch of swordfish, striped marlin, blue marlin, blue shark, common thresher shark, bigeye thresher shark, and shortfin mako shark because drift gillnet fishing effort will be considerably reduced from August 15th to August 31st, and from January 1st to January 31st during El Niño years.

This alternative is not expected to adversely affect Essential Fish Habitat.

4.3.3. Impacts to Sea Turtles

4.3.3.1. Northern Closure

Green Turtles
NMFS has only observed one green turtle in the CA/OR drift gillnet fishery. This observation took place in 1999 during the month of November. The animal was released dead. This entanglement is considered an extremely rare and random event (1 turtle in 6,025 observed sets). The animal was observed on November 3, 1999, at 34°31'N and 121°45'W. Therefore, assuming that the number of vessels that normally would be fishing north of 36°15'N are fishing south of the 36°15'N line and north of Point Conception (34°27'N), there is a slightly greater chance that an interaction might occur. However, NMFS considers the likelihood of an interaction with a green turtle as very remote based on historical observer data. In addition, the observed take in 1999 appears to be related to unusual environmental conditions which are not expected to occur on an annual basis.

Leatherback Turtles
The time and area closure north of 36°15'N from August 15 through November 15, developed by the TRT is expected to reduce the likelihood of leatherback interactions (Figure 11). This premise of the time and area closure is based on the reasonable and prudent alternative developed by NMFS in the biological opinion. To address the concerns by the fishing industry representatives on the TRT that the north of Point of Conception closure would adversely affect their swordfish catch rates, the TRT tried to develop another strategy that might be as effective at reducing the likelihood of an interaction with a leatherback sea turtle. Primarily, the fishing industry expressed concern of the inability to fish north of Point Conception, which is considered some of the best fishing grounds off the coast of California. The fishing industry representatives suggested moving the closed area from north of Point Conception to north of Point Piños (36°30'N), which is at the southern end of Monterey Bay, to open up the ability to fish on Davidson Seamount and Sur Canyon. To account for the leatherback turtles that would no longer be included by the closure north of Point Conception, the fishing industry representatives suggested extending the closure to November 15, which would add two historical leatherbacks that were not previously included in the August 15 through October 31 closure. However, after reviewing the observer data, the TRT determined that there were two leatherback turtles taken just below the 36°30'N latitude and therefore recommended that the line be moved south to the 36°15'N line.

According to analysis completed by the Southwest Fisheries Science Center (unpublished 2001), there is not a large shift in leatherback turtle entanglement rates at Point Conception since the increase begins

south of Point Conception. However, the most substantial increase in entanglement rates occurs north of 36°30'N. Because the leatherback entanglement rate north of 36°30'N is so much higher, it is feasible that extending the time/area closure until November 15 will compensate for moving the boundary further north from Point Conception to 36°15'N. Leatherback entanglement rates clearly change as a function of latitude. Rates of entanglement are zero in the south, increase to intermediate values between 33°30'N and 36°30'N, and increase again north of 36°30'N. However, there is no statistically significant evidence that increasing extender lengths (beyond the current length of 36 feet) will reduce entanglement of leatherback turtles. There is some (non-significant) indication that extender lengths of less than 30 feet or greater than 60 feet might have had higher leatherback entanglement rates, but this difference is not statistically significant and could have occurred by chance alone. Therefore, leatherback entanglement rates do not vary significantly with extender length, although there is some indication that entanglement rates might be lower for extender lengths in the range of 30 to 60 feet.

Based upon upon the above information, the alternative to restrict fishing north of 36°15'N and lower the net to 60 feet as suggested by the TRT does not appear to provide the same level of protection to leatherback turtles as the reasonable and prudent alternative developed by NMFS since the lowering of the net cannot guarantee a further reduction in the number of leatherback turtle takes.

Loggerhead Turtles
The time and area closure north of 36°15'N, west to 129°W, north to 45°N, then east to land, from August 15 through November 15, is not expected to cause an increase or decrease in the likelihood of an interaction with loggerhead turtles since there have been no loggerhead turtles observed taken by the CA/OR drift gillnet fishery north of Point Conception. Vessels that normally fish north of Point Conception are expected to continue to fish north of Point Conception in the area between Point Conception and 36°15'N. Therefore, NMFS does not expect an increase in vessel activity south of Point Conception. For these reasons, the implementation of the measure to restrict fishing activity north of 36°15'N is not likely to affect the number of loggerhead sea turtle interactions.

Olive Ridley Turtles
The first olive ridley turtle observed taken by the CA/OR drift gillnet fishery occurred on November 25, 1999. The animal was released alive with no injuries. This entanglement is considered an extremely rare and random event (1 turtle in 6,025 observed sets) and the likelihood of such an event is not expected to increase with the implementation of the measure to close the area north of 36°15'N from August 15 through November 15. Moreover, the entanglement occurred south of Point Conception. NMFS expects that vessels that normally fish north of Point Conception will continue to fish north of Point Conception in the area between Point Conception and 36°15'N. Therefore, NMFS does not expect an increase in fishing vessel activity south of Point Conception. For this reason, the implementation of the measure to restrict fishing activity north of 36°15'N is not likely to increase or decrease the likelihood of an olive ridley turtle interaction.

4.3.3.2. Lowering the Net to 60 Feet

Green Turtles

Since only one green turtle has been observed taken in the CA/OR drift gillnet fishery, NMFS considers this event as an extremely rare and random occurrence (1 turtle in 6,025 observed sets). The animal was observed on November 3, 1999, at 34º31'N and 121º45'W, just north of Point Conception. The turtle was observed taken in a set that had 36 feet extenders. Based on only one animal, NMFS is not able to evaluate whether lowering the net to 60 feet would increase or decrease the likelihood of an interaction. However, because subadults routinely dive 20 meters for 9-23 minutes (Brill *et al*., 1995, *in* Lutcavage and Lutz, 1996), lowering the net to 60 feet may not cause a reduction in entanglements. Regardless, NMFS considers the likelihood of an interaction with a green turtle as very remote based on historical observer data.

Leatherback Turtles

In addition to the proposed closure of ocean waters north of 36º15'N, west to 129ºW, north to 45ºN, and then east to shore, from August 15 through November 15, the TRT determined that this would not provide the same level of protection (17 leatherbacks within the time and area closure) as the reasonable and prudent alternative identified in the biological opinion (18 leatherbacks within the time and area closure). Therefore, based on observer data and preliminary dive data from the tagged leatherback turtles in Monterey Bay, the TRT suggested lowering the net to 60 feet in an effort to decrease the likelihood of an interaction occurring. According to preliminary dive data provided by Peter Dutton by teleconference at the TRT Monterey meeting, the dives of leatherbacks appear to be V-shaped in deep water and U-shaped in shallow waters (near nesting beaches). The leatherbacks appear to routinely dive to depths of 20 meters when migrating (swimming) and occasionally to deeper depths of 150 meters. These deeper dives are speculated to be associated with foraging bouts.

Because of the uncertainty of the effectiveness of lowering the net to 60 feet, members of the TRT requested to include a trigger in the recommendation that would cause the closure to move southward to Point Conception, the line identified in the biological opinion, if a leatherback turtle was observed during any set. In addition to moving the closure line south to Point Conception, the time period of the closure would remain from August 15 through November 15 as long as the projected total takes no longer exceed 3 leatherback turtles through the end of the first year, 6 leatherbacks through the end of the second year, and 9 leatherbacks through the end of the third year. These values were calculated by determining what level of take was exempt from the section 9 prohibition under the Incidental Take Statement in the biological opinion.

Based on observer data collected between 1990-2000, lowering the net to 60 feet on sets made north of Point Conception does not appear to have the desired effect of reducing the likelihood of leatherback interactions. Accordingly, there is no statistically significant evidence that increasing extender lengths (beyond the current length of 36 feet) will reduce entanglement of leatherback turtles. There is some (non-significant) indication that extender lengths of less than 30 feet or greater than 60

feet might have had higher leatherback entanglement rates. Leatherback entanglement rates do not vary significantly with extender length. There is some indication that entanglement rates might be lower for extender lengths in the range of 30 to 60 feet. However, this difference is not statistically significant and could have been by chance alone (NMFS unpublished data). Therefore, at this time, data do not support longer extenders as a strategy for reducing leatherback turtle entanglements.

Loggerhead Turtles
Since there have been no loggerhead turtles observed taken by the CA/OR drift gillnet fishery north of Point Conception, NMFS does not expect the lowering of the net to at least 60 feet north of Point Conception will increase or decrease the likelihood of an interaction with loggerhead turtles. Nevertheless, based on observer data, there does not appear to be statistically significant evidence that increasing extender lengths (beyond the current length of 36 feet) will reduce the entanglement of loggerhead turtles. There is some (non-significant) indication that extender lengths of less than 30 feet or greater than 60 feet might have had higher loggerhead entanglement rates. There is some indication that entanglement rates might be lower for extender lengths in the range of 45 to 60 feet. However, this difference is not statistically significant and could have occurred by chance alone.

Olive Ridley Turtles
With only one observed interaction with an olive ridley turtle, NMFS is not able to evaluate the effects of requiring extenders of at least 60 feet. However, because the observed interaction occurred south of Point Conception and the lowering of the net requirement applies only to sets made north of Point Conception, NMFS does not expect the requirement to have an affect on the likelihood of an olive ridley turtle entanglement.

4.3.3.3. South of Point Conception Closure

Since the TRT did not have an opportunity to discuss the south of Point Conception closure, NMFS has included the south of Point Conception closure as it appears in the reasonable and prudent alternative as the recommended approach by the TRT to address the incidental mortality of loggerhead turtles. Therefore, according to the reasonable and prudent alternative in the biological opinion, CA/OR drift gillnet vessels would be restricted from fishing in waters off of California south of Point Conception (34º27'N) to the Mexico border and east of the 120ºW between August 15 and August 31, and between January 1 and January 31 during an El Niño event.

Green Turtles
Based on observer data, NMFS has only observed one green turtle taken in the CA/OR drift gillnet fishery which took place in November 1999. NMFS considers this entanglement as a rare and random event (1 green turtle in 6,025 observed sets). The time and area closure south of Point Conception is not expected to increase the likelihood of an interaction with a green turtle since the closure time period does not include the month of November. In addition, the green turtle was observed taken just north of Point Conception at 34º31'N and outside of the 120ºW at 121º45'W. Therefore, NMFS does not expect the closure south of Point Conception to increase the likelihood of a green turtle interaction.

Leatherback Turtles

The time and area closure south of Point Conception during August 15th through 31st) and January 1st through 31st is not expected to increase the likelihood of a leatherback interaction since there have been no leatherbacks observed taken by the CA/OR drift gillnet fishery during these time periods south of Point Conception. There have only been two leatherback turtles that have occurred south of Point Conception. One of the them occurred in December 1999, and the other event took place in January outside of the 120°W line. Therefore, the implementation of the measure to close fishing operations south of Point Conception east of 120°W longitude will not increase the likelihood of an interaction.

Loggerhead Turtles

The measure under the reasonable and prudent alternative to close the fishery south of Point Conception east of the 120°W (Figure 10) was developed solely for the purpose of avoiding the likelihood of the CA/OR drift gillnet fishery jeopardizing the continued existence of the loggerhead sea turtle population. Based on observer data (July 1990-January 2001), NMFS anticipates that the CA/OR drift gillnet fishery will not take any loggerheads during non-El Niño years since loggerheads have only been observed during El Niño years. Although the observed incidental take of loggerhead turtles by the CA/OR drift gillnet fishery is infrequent, they were the second most common sea turtle species caught since the fishery has been observed by NMFS. This may be due in part because loggerheads are rarely seen in the eastern Pacific north of Baja California, Mexico. Loggerhead occurrence in the CA/OR drift gillnet fishery is probably associated with the northward extension of Transition Zone waters along the North American coast during El Niño events. The large aggregations of juveniles off Baja California have been observed foraging on dense concentrations of the pelagic red crab, *Pleuronocodes planipes* (Pitman, 1990).

Three unidentified turtles were observed taken in 1993 off southern California, all on the same trip, but in different sets. Only one of these sea turtles was measured, and at 43 centimeters, the average length of measured loggerheads captured incidentally in this fishery from 1990-2001, this turtle was most likely a loggerhead. In addition, all three turtles were caught in the same concentrated area that all loggerheads in the past 11 years have been caught by this fishery. They were also caught during an El Niño event, which is the only time that loggerheads have been caught in this fishery since July 1990, when the fishery was first observed by NMFS. Assuming these three unidentified turtles are loggerhead turtles, there have been a total of 17 loggerhead turtles observed during the past 11 years.

Four of these events took place during the month of July, three of which occurred when the fishery was allowed to fish inside 75 nautical miles during this time period. Another turtle was observed taken during the month of June. However, since the fishery is now closed inside 75 nautical miles until August 15th and there is minimal fishing effort during the months of June, July, and the first part of August, NMFS does not expect there to be many loggerhead turtles taken outside of the time period identified in the August and January closure. Therefore, NMFS expects that the closure south of Point Conception in August and January will reduce the incidental mortality and serious injury to a level that will not jeopardize the continued existence of the loggerhead sea turtle populations.

Olive Ridley Turtles
The closure to restrict fishing operations south of Point Conception during August 15th through the 31st and January 1st through the 31st is not expected to have an effect on the likelihood of an interaction with a olive ridley sea turtle since there has only been one olive ridley observed taken by the fishery. This event took place during November 1999, which is outside of the proposed closure. Therefore, since the closure does not include the month of the observed olive ridley take, and the take did not occur during an El Niño event, NMFS does not anticipate a change in the take rate. Moreover, with only once interaction (1 in 6,025 sets), the likelihood of an interaction with an olive ridley turtle is a rare and unlikely event.

4.3.4. Impacts to Seabirds

4.3.4.1. Northern Closure
The northern closure (36º15'N) may slightly increase the likelihood of northern fulmars being taken incidental to the CA/OR drift gillnet fishery. However, in general, the CA/OR drift gillnet fishery does not have much of a history having an incidental take of seabirds. In 2000, NMFS observed northern fulmars picking at the net webbing during net retrieval. From August 15 through November 15, there were 11 northern fulmars observed caught in the gear. Eight of these were released alive (73%), 2 were released dead (18%) and 1 was released injured (9%). Otherwise, NMFS has not observed this type of behavior during previous years. The entanglement rate for northern fulmars south of 36º15'N is 0.012 northern fulmars per set (11 northern fulmars in 882 observed sets) and the entanglement rate in the closed area north of the "line" is zero northern fulmars per set. If all the fishing effort that has occurred north of the 36º15'N moves south, there is a greater likelihood that there will be a slight increase in the number of northern fulmars caught incidentally to the fishery.

In addition to the northern fulmars, there have been a couple of unidentified birds recorded by onboard observers. Two of these occurred in the closed area north of 36º15'N giving an entanglement rate of 0.001 unidentified birds per set (2 unidentified bird in 1,474 observed sets), and none occurred south of 36º15'N during this time period. Based on this information, the likelihood of an unidentified seabird interaction is not expected to change if the fishing effort north of the 36º15'N moved into this area off central California.

4.3.4.2. Lowering the Net to 60 Feet

The depth of the net is not expected to increase or decrease the likelihood of an interaction of seabirds since the northern fulmars were observed feeding on organisms on the net webbing at the surface during net retrieval. Therefore, the depth of the net is not affecting the likelihood of an interaction with the fishing gear.

4.3.4.3. South of Point Conception Closure

The limited number of observed incidental takes of seabirds have occurred north of Point Conception. Therefore, the south of Point Conception closure is not expected to increase or decrease the likelihood of an interaction with a seabird. The vessels that typically fish south of Point Conception in August are not expected to venture north of Point Conception since the vessels are not equipped to handle the heavy northwesterly gales that are encountered off of Point Conception or the change of climatic and meteorological conditions. In January, vessels fish in southern California waters because there are no longer sufficient oceanic water temperature breaks north of Point Conception that provide suitable fishing conditions for catching swordfish. In addition, the weather conditions are usually poor. Therefore, vessels are not expected to fish north of Point Conception during the month of January.

4.3.5. Socio-Economic Impacts

4.3.5.1. Northern Closure

Feasibility

Restricting vessels from fishing in ocean waters north of a line extending along the 36°15'N latitude is feasible since vessels can easily determine their location and know whether they are fishing to the north of the line or to the south of the line. Commercial fishermen who land fish in California and who transport the fish or have the fish transported on their behalf prior to the required completion of a landing receipt are required to complete a transportation receipt at the time the fish are brought aboard. The transportation receipt includes information about where the fish were caught.

Economic Impact

Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically occurs north of the 36°15'N latitude from August 15th through November 15th did not relocate, the north of 36°15'N latitude closure could cause a loss of $605,064 in ex-vessel gross revenues. This is a worst case scenario since many of the vessels will decide to fish in the area open to fishing under this alternative. Table 5 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, during the time and area closure (August 15th through November 15th), using California Department of Fish and Game landing receipt data from 1997-2000.

Table 5. Ex-vessel gross revenue and pounds based on fishing area recorded on landing receipts[1] for the period between August 15th and November 15th, 1997-2000, in ocean waters north of 36°15'N.

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000) [2]	81.5	4,108.6	53,847.7	61,537.2	84,2056.5	139,012.5
Annual Average (lbs)	20.375	1,027.15	13,461.925	15,384.3	210,514.125	34,753.125
Average Price	$ 2.00	$ 2.94	$ 0.97	$ 0.38	$ 2.60	$ 1.01
Value (1997-2000)	$ 163.00	$12,077.30	$ 52,456.27	$23,478.81	$2,192,356.05	$ 139,724.68
Annual Average	$ 40.75	$ 3,019.32	$ 13,114.07	$ 5,869.70	$ 548,089.01	$ 34,931.17

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Total Gross revenues	$ 2,420,256.10					
Annual Revenues (Avg)	$ 605,064.03					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the impacts of this alternative, it is also possible to analyze the change in gross revenues assuming that all of the fishing effort that historically occurred north of 36°15'N will shift south, but will remain above Point Conception. In response to this closure, some larger vessels may choose to continue trolling for albacore later into the season (September/October) if the catch rates remain profitable before shifting their effort to the south of the 36°15'N latitude.

Based on the landing receipt data, swordfish accounts for 90% of the ex-vessel gross revenues during this time period. Therefore, for purposes of determining the impacts of this alternative, NMFS is using swordfish as an indicator. More specifically, the catch rate for swordfish for this time period north of 36°15'N is 3.076 compared to south of 36°15'N at 3.085. In this case, the swordfish catch rate south of 36°15'N is slightly higher than in the northern closed area. Therefore, NMFS does not expect to have a reduction in the catch of swordfish with the implementation of this alternative during this time period. However, this conclusion is based on the swordfish catch rates remaining constant even with a potential increase in the number vessels fishing in the open area between Point Conception and the 36°15N latitude. There is the possibility that the catch rate will decrease because of the increase in fishing effort in the open area. Assuming the catch rate remains the same, NMFS estimates that the ex-vessel gross revenues for swordfish catch will not change under this alternative.

NMFS does not expect there to substantial additional operating costs for vessels that historically fish north of 36°15'N since many of these vessels typically fish in this area south of 36°15'N during the season. However, there are a few boats that generally fish out of Oregon ports or northern California ports such as Crescent City, Fort Bragg, and Bodega Bay that may have to change their operating procedures and travel south earlier in the season. In addition, some of the larger vessels that troll for albacore may also have to move down the coast earlier in the season. Typically, these vessels will finish their last albacore trip in Oregon and Washington and then begin targeting swordfish in the northern waters using a drift gillnet and then begin moving down the coast in November. The vessels that home port in Santa Cruz, Moss Landing, Monterey, or Morro Bay typically operate in ocean waters near these ports during this time of year and will not be affected as much by the proposed closure under this alternative.

Fishing Conflicts

Increasing the number of drift gillnet vessels fishing south of 36°15'N along the escarpment is expected to slightly increase the direct competition for setting their gear on desirable oceanographic conditions (water temperature breaks) and possibly on the available swordfish. This direct competition may cause a slight decrease in the observed catch rate since there would likely to be more fishing vessels in the

area. Under this alternative, allowing the vessels to fish north of Point Conception and south of the 36°15'N latitude should eliminate the concern expressed by various recreational fishery organizations about the potential increase in the number of commercial drift gillnet vessels operating in ocean waters south of Point Conception and the potential increase in striped marlin bycatch. This determination is based on the assumption that vessels that normally fish north of Point Conception will continue to fish north of Point Conception in the open area. This means that there is not an expected change in the number of striped marlin that the drift gillnet fleet already takes. Therefore, this alternative should not adversely affect the economics of the recreational fishery in southern California.

Weather conditions
Under this alternative, drift gillnet fishing vessels are less likely to fish in potentially more adverse weather conditions because they are not as likely to fish in the area of Point Conception.

4.3.5.2. South of Point Conception Closure

Feasibility
Restricting vessels from fishing in ocean waters south of Point conception during an El Niño event is feasible since vessels are able to determine their exact location with the global positioning satellite systems and plotters the vessels have onboard. In addition, vessels are not likely to fish south of Point Conception and then travel north to Morro Bay to land fish. This situation is caused by the prevailing northwesterly winds, large swells, and choppy wind waves persisting at Point Conception, which discourage and inhibit vessels from routinely traveling north around the point. Traveling north is more difficult and time consuming because vessels must travel against the currents, winds, and waves. In addition, U.S. vessels are not permitted to fish or land fish in Mexico. Typically, during the month of January, strong low pressure systems move into the Southern California Bight from Alaska. These strong weather systems will even discourage larger vessels from leaving port, especially if the fishing conditions offshore are marginal.

Economic Impact
Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically occurs south of Point Conception during El Niño events inside the 120°W longitude during the closure period between August 15th through August 31st and January 1st through January 31st did not relocate, the closure south of Point Conception could cause a loss of approximately $438,688 in ex-vessel gross revenues. This is a worst case scenario since some vessels will fish in areas that are still open to fishing under this alternative. Table 6 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, for the time and area closure, using the past four years of California Department of Fish and Game landing receipt data from 1997-2000.

Table 6. Ex-vessel gross revenue based on fishing area recorded on landing receipts for the period between August 15 through August 31, and January 1 through January 31, 1997-2000, in ocean waters south of Point Conception east of 120°W[1].

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000) [2]	-	6,214.50	66,102.39	193,708.80	379,174.50	142,936.50
Annual Average (lbs)	-	1,553.63	16,525.60	48,427.20	94,793.63	35,734.13
Average Price	$ -	$ 4.08	$ 1.07	$ 0.42	$ 3.64	$ 1.37
Value (1997-2000)	$ -	$25,324.09	$70,857.02	$80,981.94	$1,381,074.43	$196,437.96
Annual Average	$ -	$ 6,331.02	$17,714.25	$20,245.48	$ 345,268.61	$ 49,109.49
Total Gross revenues	$1,754,675.44					
Annual Revenues (Avg)	$ 438,668.86					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the impacts of this alternative, it is also possible to analyze the change in gross revenues assuming that the vessels that typically fish north of Point Conception during August (15th through 31st) will continue to fish north of Point conception or outside of 120°W longitude and therefore would not be affected by this closure during the month of August. However, during the month of January, NMFS is uncertain how many of these vessels may choose to fish outside of 120°W because of the adverse weather conditions that typically occur during that time of year offshore. More likely, NMFS expects these larger vessels that historically fish off San Diego during January will choose to not to fish after December unless the oceanographic conditions are exceptional. Another factor that might determine whether these vessels will fish during the month of January is how well they did during the rest of the season.

The smaller vessels that typically fish off of San Diego during the month of August at 9-mile and 20-mile bank are not expected to fish during August between the 15th and the 31st. The reason for this expectation is that these vessels are not likely to fish outside of 120°W because of the distance from shore and the offshore weather conditions. However, some of the small vessels that home port in Santa Barbara or Los Angeles may choose to fish outside of the 120°W. The Los Angeles boats would move up the coast and work out of the Santa Barbara port for convenience. These vessels may choose to target thresher shark inside the Santa Barbara Channel. Therefore, the reduction in ex-vessel gross revenue may be lower than projected. However, these vessels are not as likely to fish in this area during the month of January because historically swordfish catch tends to be greater in the warmer water off the coast of San Diego. Therefore, NMFS does not expect much fishing effort to occur south of Point Conception outside of 120°W by these smaller vessels. In addition to the reduction in swordfish revenue caused by the inability of vessels to fish inside 120°W, there may be additional operating costs for larger vessels that choose to fish outside of the closed area during this time period because of the increased distance the vessels would need to travel.

Fishing Conflicts
The southern closure during El Niño events is not likely to cause an increase in direct competition for desirable oceanographic conditions (water temperature breaks) and fishery resources because many of the vessels are expected to decide not to fish outside of 120°W. In addition, the southern closure is not expected to conflict with the recreational striped marlin fishery since the commercial drift gillnet vessels would not be allowed to fish inside 120°W.

Weather conditions
The closure south of Point Conception may increase the likelihood of vessels fishing in more adverse weather conditions since some vessels may try to fish outside 120°W. This area, especially around Point Conception, is more likely to be subjected to heavy northwesterly gales and strong offshore gusts. Moreover, vessels fishing in this area must fish further offshore in open water conditions in which there is not a port nearby to seek shelter if weather conditions should change quickly.

4.4. Alternative 4: Issuance of Regulations to Implement Modified Take Reduction Team Recommendation (Preferred Alternative)

This alternative is based on the recommendation from the TRT and recent satellite telemetry tracking data obtained from two leatherback sea turtles that were tagged in Monterey Bay in September 2000. In an effort to minimize the economic impact of the time and area closures, this alternative was developed to provide access to the productive fishing grounds north of Point Conception, which is consistent with the intent of the TRT, and to provide at least an equal, if not greater, level of protection for leatherback and loggerhead sea turtles.

NMFS modified the recommendation from the TRT to ensure that the measure would provide at least the same level of protection for leatherback sea turtles as the reasonable and prudent alternative in the biological opinion. This alternative is based on the recommendation from the TRT to allow the fishery to fish north of Point Conception and upon recent satellite telemetry tracking data obtained from two leatherback sea turtles that were tagged in Monterey Bay in September 2000. Based on this data, NMFS proposes to retain the time closure (August 15 through November 15) suggested by the TRT and to enlarge the closed area proposed by the TRT. Although the TRT recommended the 36°15'N latitude as the southern boundary of the closed area, NMFS is proposing to use Point Sur (36°18.5'N) as the southern boundary because it is a prominent and recognizable landmark. In addition, 36°15'N is approximately only three miles south of Point Sur. Therefore, there is not much difference choosing Point Sur rather than 36°15'N, which is an unnamed point.

Instead of using a line west of 36°15'N, as recommended by the TRT, this alternative uses a line from Point Sur (36°18.5'N) to 34°27'N 123°35'W. From this point, the closed area continues west to 129°W, north to 45°N, then east to the point where 45°N meets land. The diagonal line from Point Sur to 34°27'N 123°35'W was developed by plotting the leatherback satellite tracking data and keeping the southernmost turtle trajectory north of the diagonal line (Figure 4). The reason for this precautionary approach is to protect the potential migratory corridor of leatherbacks departing Monterey Bay to the

western Pacific nesting beaches as suggested by these two satellite tracks. NMFS hopes to learn more about this migratory corridor through additional satellite tag attachments scheduled to take place this summer/fall in Monterey Bay. With additional data, NMFS is expected to better define the migratory corridor route and apply this knowledge to minimize the potential impact of commercial fisheries on leatherbacks.

This alternative allows vessels to fish the southern edge of the Davidson Seamount which is a productive fishing area and allows these vessels to land fish in either Moss Landing, Monterey, or Morro Bay, California. This alternative allows vessels to fish for swordfish north of Point Conception. In addition, this alternative does not include the lowering of the net to at least 60 feet as recommended by the TRT since observer data (1990-2000) do not suggest that the lengthening of extenders to 60 feet would result in a definite decrease in leatherback interactions. This alternative also has removed the "trigger" language identified by the TRT to extend the area closure in a southerly direction to Point Conception if a leatherback was observed since NMFS does not consider this extra precaution necessary with this alternative.

4.4.1. Impacts to Marine Mammals

4.4.1.1. Northern Closure

This alternative establishes a time and area closure north of the line from Point Sur (36°18.5'N) to 34°27'N 123°35'W, west to 129°W, north to 45°N, then east to the point where the 45°N parallel intersects land. Vessels would still be required to comply with existing State codes that regulate gear, equipment and fishing seasons as well as comply with Federal regulations which implement the Pacific Offshore Cetacean Take Reduction Plan (50 C.F.R. 229.31). This alternative may result in reduction in the number of marine mammal interactions since there may be a reduction in the number of fishing effort days as larger vessels already trolling for albacore in northern waters continue targeting albacore into October, if possible. However, for purposes of evaluating the effects of the alternative, NMFS will assume that fishing effort that historically occurred north of the "line" during this time period will shift south of the closed area, but still remain north of Point Conception.

In general, the entanglement rate for cetaceans is higher in the north open area (north of Point Conception and south of the line extending from Point Sur to 34°27'N 123°35'W). Using observer data from July 1990 through January 2001, the entanglement rate north of the "line" between August 15 and November 15 for cetaceans is 0.083 animals per set (151 observed cetaceans/1,825 observed sets). Conversely, the entanglement rate for ocean water south of the "line" during this time period for cetaceans is 0.192 animals per set (102 observed cetaceans/531 sets). Based on this information, there could be a higher cetacean entanglement rate during this time period if fishing effort shifted to this open area. However, since the implementation of the take reduction plan, the entanglement rates have decreased to 0.055 animals per set (25 animals/456 observed sets) in the closed area, and 0.10 (27 animals/270 observed sets) in the open area north of Point Conception.

The affect of the closure north of the "line" from August 15 through November 15, is expected to have a beneficial effect on listed marine mammal species since some of the interactions between listed species occurred inside the time and area closure. Specifically, there have been eight observed sperm whale interactions since the inception of the observer program (July 1990 through January 2001). Four of those interactions occurred inside the time and area closure of this alternative and none of them occurred within the "open triangle". Therefore, there could be a 50 percent reduction in the number of sperm whale interactions with the implementation of this alternative, if the benefits of the take reduction plan are not considered. Since the implementation of the take reduction plan, there has only been one observed sperm whale interaction. This entanglement occurred outside of the time and area closure. In addition, this interaction occurred in a set that was not in full compliance with the take reduction plan. Therefore, it is uncertain whether the entanglement resulted from chance or because the net was not in full compliance.

This northern closure is not expected to have an affect on the interaction rate of humpback whales since both humpback whales that were observed taken by the CA/OR drift gillnet fishery occurred south of Point Conception. In addition, this northern closure is not expected to have an effect on the entanglement rate of fin whales for the same reason since there has only been one fin whale interaction and that occurred south of Point Conception during the month of November. These determinations are based on the assumption that there will not be an increase in the number of vessels fishing south of Point Conception since the vessels that have historically fished north of Point Conception will now fish in the open area north of Point Conception. Therefore, NMFS does not expect the northern closure under this alternative to increase or decrease the likelihood of interactions with humpback whales or fin whales.

For Steller sea lions, NMFS has observed only two animals taken. One of these animals was observed south of Point Conception during the month of June and the other occurred during the month of September north of the "line". Therefore, this northern area closure from August 15 through November 15 may decrease the likelihood of an interaction with a Steller sea lion, recognizing that the chances of an interaction are already low (less than 1 in 3,000 sets). In addition, there have been no Steller sea lions observed since the implementation of the take reduction plan.

NMFS has observed 28 northern right whale dolphins taken in 1,825 in the northern closed area from August 15 through November 15, for a catch rate of 0.015 animals per set. The catch rate is 0.034 animals per set (18 animals in 531 observed sets) in the open area north of Point Conception. This alternative is expected to increase the likelihood of an interaction with northern right whale dolphins if fishing effort that was previously made in the closed area from August 15 through November 15 shifts to the open area north of Point Conception during the closure.

Short-finned pilot whale are taken at a rate of 0.004 animals per set (8 animals in 1,825 observed sets) in the northern closed area. There have been 3 short-finned pilot whale observed taken in 531 sets in the open area north of Point Conception (0.006 animals per set). This alternative is expected to slightly increase the likelihood of an interaction with short-finned pilot whales if fishing effort that was previously

made in the northern closed area shifts to the open area north of Point Conception during the closure. However, since implementation of the TRP, there has not been a short-finned pilot whale observed taken by the fishery.

4.4.1.2. South of Point Conception Closure

This alternative uses the south of Point Conception closure identified in the reasonable and prudent alternative. Under this alternative, fishing effort would be restricted during El Niño events off of California south of Point Conception (34º27'N) to the Mexico border and east of 120ºW between August 15 and August 31, and between January 1 through January 31 for CA/OR drift gillnet vessels. During an El Niño event, under this alternative, fishing effort could still occur in the area between Point Conception and the line extending from Point Sur to 34º27'N 123º35'W. For purposes of evaluating the impacts of this measure, NMFS assumes that the fishing effort that occurred during the closed time period will not shift north of Point Conception or outside of 120ºW since the smaller boats would not be able to fish in these waters and the larger boats would already be fishing north of Point Conception in the open area if this measure was not in place.

During the August closure, NMFS expects there would be a reduction in the number of marine mammal interactions since NMFS expects a reduction of the number of sets made during this time period. Although vessels can fish in ocean waters north of Point Conception and south of the line extending from Point Sur (36º18.5'N) to 34º27'N 123º35'W under this alternative, NMFS does not expect many vessels to fish in this area. The reason for this is that most larger vessels are fishing albacore tuna during this time period and the smaller vessels are unable to fish in potentially heavier seas that exist north of Point Conception or outside of 120^0W. In addition, historically, there is very little fishing effort that occurs north of Point Conception during the month of August.

Restricting fishing effort south of Point Conception during an El Niño event during the month of January should reduce the number of marine mammal interactions since only three percent of the fishing effort occurs during the month of January north of Point Conception. Therefore, closing the fishery south of Point Conception during the month of January may reduce the fishing effort during this time period by 97 percent. This reduction in fishing effort is expected to cause a reduction in the number of marine mammal interactions during the month of January. There have been no observed entanglements of listed marine mammals (sperm whale, fin whale, or Steller sea lion) south of Point Conception during the month of August or January. Therefore, NMFS does not expect the closure south of Point Conception during an El Niño event to affect the take of these species. However, there may be a slight reduction in the likelihood of taking a humpback whale since there was one humpback whale observed taken and released alive south of Point Conception in 1994.

There has been 1 northern right-whale dolphin observed entangled south of Point Conception during the closed period. If fishing effort historically made during this period is eliminated, NMFS expects the southern closure during August and January during El Niño years may slightly decrease the likelihood of entangling northern right-whale dolphins.

There has not been a short-finned pilot whale observed taken south of Point Conception during the closed period, so NMFS expects that the southern closure from August 15th through August 31st, and January 1st through January 31st will have no effect on the take of this species.

4.4.2. Impacts to Target and Non-target Fish

4.4.2.1. Northern Closure

This alternative would establish an area closure bounded by a line drawn from Point Sur (36°18.5'N) to the point 34°27'N 123°35', then continuing west to 129^{0}W, north to 45°N, then east to where the 45°N parallel reaches land from August 15 through November 15. This alternative is expected to see a reduction in the number of fishing effort days as larger vessels already trolling for albacore in northern waters are expected to continue targeting albacore into October and November, if possible. For purposes of evaluating the impacts of the alternative, NMFS assumes that fishing effort that previously occurred in the closed area during this time period will shift south of the closed area, but still remain north of Point Conception (34°27'N). Impacts of this alternative on fish species were measured by determining whether the alternative would increase or decrease the likelihood of capturing each species. Fish catch rates in the northern closed area were compared to those in the open area north of Point Conception from August 15 through November 15, for the years 1990 through 2000 (NMFS unpublished data). NMFS has observed 1,825 sets in the proposed northern time/area closure, and 531 sets in the open area during this period.

Swordfish
The alternative is expected to have no effect on CA/OR drift gillnet fishing vessels' possibility of catching swordfish. The observed swordfish catch in the closed area from August 15 through November 15 is 3.07 fish per set. The catch rate is 3.12 swordfish per set in the open area

Other Billfish
Striped marlin catch rates are similar in the northern closed area (0.008) and in the open area (0.004 fish per set). Blue marlin catch is 0.001 fish per set in the closed area (1 blue marlin in 1,474 sets), and zero fish per set in the northern open area. This alternative is not expected to significantly change the catch of other billfish by the CA/OR drift gillnet fishery since they are rarely caught north of Point Conception.

Blue Shark
This alternative is expected to increase the likelihood of catching blue sharks in the CA/OR drift gillnet fishery. Blue sharks are caught at a rate of 4.64 fish per set in the proposed closed area and 6.09 fish per set in the open area.

Thresher Shark
Drift gillnet vessels catch common thresher shark at a higher rate in the open area (1.03 fish per set) than in the northern closed area (0.38 fish per set). Therefore, redistribution of fishing effort southward

is expected to increase common thresher shark catches by the fishery. Furthermore, some vessels may elect to directly target common thresher shark using drift gillnets during this time period, producing even higher catch rates and landings for this species. The catch of bigeye thresher shark is expected to decrease, as the catch rate in the open area (0.02 fish per set) is lower than that to the north (approximately 0.10 fish per set), although observed bigeye thresher shark catch has been lower than average in the past several years (9-15 sharks per year with approximately 20% observer coverage).

Shortfin Mako Shark
Drift gillnet catch rates for shortfin mako shark are 0.42 fish per set in the closed area and 0.43 fish per set in the open area. Therefore, this alternative is not expected to significantly affect shortfin mako shark catches during the closed period.

Essential Fish Habitat
This alternative is not expected to adversely affect Essential Fish Habitat.

4.4.2.2. South of Point Conception Closure

During El Niño events, the reasonable and prudent alternative prohibits fishing by CA/OR drift gillnet vessels in waters off of California south of Point Conception (34°27'N) to the Mexico border and east of 120°W from August 15th to August 31st, and from January 1st to January 31st. Under this alternative, vessels are still allowed to fish outside of the closed area west of 120°W, or north of Point Conception south of the line from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W or anywhere north of Point Conception after November 15th.

This alternative will lead to a reduction of fishing effort days south of Point Conception during El Niño years. Vessels that usually begin fishing south of Point Conception on August 15th will have the option of fishing west of 120°W, or delaying fishing operations until after August 31st. Some CA/OR drift gillnet vessels, especially the San Diego and Los Angeles small boat fleets, are not capable of fishing in the sea conditions encountered west of 120°W or north of Point Conception. Therefore, it is expected that these vessels will wait until after August 31st to begin fishing east of 120°W. Furthermore, the vessels that are able to fish west of 120°W may find it more economical to wait two more weeks and begin fishing east of 120°W after August 31st than to pay the additional fuel costs necessary to reach the fishing grounds west of 120°W from August 15th to August 31st.

Closing the area south of Point Conception (34°27'N) to the Mexico border and east of 120°W from January 1st to January 31st will produce a further reduction in fishing effort days. Some effort may shift north of 34°27'N during January, but the amount is expected to be minimal since weather conditions north of Point Conception preclude most drift gillnet fishing during this month. Some vessels may fish west of 120°W in January, but this number is expected to be
small since not all drift gillnet vessels are able to fish in weather conditions experienced in this area.

Effects of the reasonable and prudent alternative on fish species were measured by determining whether

the alternative would increase or decrease the likelihood of capturing each species. It was assumed that nearly all of the fishing effort regularly made south of Point Conception (34°27'N) to the Mexico border and east of 120°W from August 15th to August 31st, and from January 1st to January 31st would not be redistributed elsewhere. The southern closure is expected to reduce the CA/OR drift gillnet fishery's catch of swordfish, striped marlin, blue marlin, blue shark, common thresher shark, bigeye thresher shark, and shortfin mako shark because drift gillnet fishing effort will be considerably reduced from August 15th to August 31st, and from January 1st to January 31st during El Niño years.

4.4.3. Impacts to Sea Turtles

4.4.3.1. Northern Closure

Green Turtles
NMFS has only observed one green turtle taken in the CA/OR drift gillnet fishery. This observation took place in 1999, during the month of November. The animal was released dead. This entanglement is considered an extremely rare and random event (1 turtle in 6,025 observed sets). The animal was observed on November 3, 1999, at 34°31'N 121°45'W. Therefore, assuming that the number of vessels that normally would be fishing north of the "line" are fishing south of the "line" and north of Point Conception (34°27'N), there is a slightly greater chance that an interaction might occur. However, NMFS considers the likelihood of an interaction with a green turtle as very remote based on historical observer data.

Leatherback Turtles
The modified TRT time and area closure north of the "line" extending from Point Sur to 34°27'N 123°35'W (Figure 12) is expected to reduce the likelihood of leatherback interactions. In addition, this alternative provides additional protection to the potential leatherback turtle migratory corridor to travel from Monterey Bay, California to western Pacific nesting beaches. This closed area is based on observer data that indicate there is not a large increase in leatherback turtle entanglement rates at Point Conception. Instead, the most substantial increase in entanglement rates occurs north of 36°30'N (NMFS unpublished data). Extending the time and area closure to November 15 from October 31 is expected to compensate for moving the boundary further north since the leatherback entanglement rate north of 36°30'N is significantly higher. Leatherback entanglement rates clearly change as a function of latitude.

Using observer data (July 1990 through January 2001), the time and area closure identified in this alternative includes 18 of the 23 leatherbacks, which is the same level of protection provided by the reasonable and prudent alternative in the biological opinion. By comparing the number of leatherback turtles entangled during this time period, NMFS has determined that this alternative would provide the same level of protection for leatherback turtles as the alternative identified in the biological opinion. This conclusion is based on observer data that indicate the calculated entanglement rate from 32°N through 33°30'N (Mexico border to Santa Catalina Island) is 0.0004 leatherbacks per set (1 observed leatherback in 2,717 observed sets), and that the entanglement rate from 33°30'N to 35°N

(approximately Santa Catalina Island to Point Conception) is 0.003 leatherbacks per set (2 observed leatherbacks in 647 observed sets), and from 35ºN to 36º30'N (approximately Point Conception to Point Piños) is 0.004 leatherbacks per set (4 observed leatherbacks in 919 observed sets). For comparison purposes, the entanglement rate from 36º30'N (Point Piños) to 38ºN (Point Reyes) is 0.018 leatherback turtles per set (8 observed leatherbacks in 434 observed sets). Therefore, allowing vessels to fish north of Point Conception in the area south of the line extending from Point Sur to 34º27'N 123º35'W is not expected to significantly increase the likelihood of an interaction with a leatherback since the entanglement rate from approximately Santa Catalina Island to Point Conception is relatively low at 0.003 leatherbacks per set and the area north of Point Conception is 0.004 leatherbacks per set. For this reason, the likelihood of an entanglement is almost the same whether vessels are fishing in the area north of Point Conception, south of the "line" extending from Point Sur to 34º27'N 123º35'W, or fishing south of Point Conception between Santa Catalina Island and Point Conception.

More importantly, this alternative provides additional protection to leatherback turtles that may be departing Monterey Bay, California to migrate to their nesting beaches in the western Pacific. This premise is based on two leatherback turtles that were tagged by NMFS with satellite transmitters in Monterey Bay during September 2000. Shortly after these turtles were tagged, they moved away from the coast of California in a southwesterly direction. This alternative potentially provides additional protection to migrating leatherback turtles that are moving out of the area. NMFS understands that this potential migratory corridor is based on only two leatherback turtles. However, NMFS intends to attach additional satellite tags to leatherbacks this upcoming season when they are found in the Monterey Bay area (July through September). With this additional information, NMFS hopes to better define the migratory route that leatherbacks use to travel from the west coast of North America to the western Pacific nesting beaches.

This alternative removed the "trigger" language that was included in the TRT recommendation to extend the area closure in a southerly direction to Point Conception if a leatherback was observed since NMFS does not consider this extra precaution necessary based on the entanglement rate data and because the alternative already provides the same, if not greater, protection for leatherback turtles than the reasonable and prudent alternative in the biological opinion.

Loggerhead Turtles

The time and area closure north of the line that extends from Point Sur (36º18.5'N) to 34º27'N 123º35'W is not expected to affect the likelihood of an interaction with loggerhead turtles since there have been no loggerhead turtles observed taken by the CA/OR drift gillnet fishery north of Point Conception. In addition, vessels that normally fish north of Point Conception during this time of year are expected to continue to fish north of Point Conception and south of the "line" in the "triangle". Therefore, NMFS does not expect an increase in vessel activity south of Point Conception. For these reasons, the implementation of the measure to restrict fishing activity north of the line extending from Point Sur to 34º27'N 123º35'W is not expected to affect the number of loggerhead sea turtle

interactions.

Olive Ridley Turtles
The only olive ridley sea turtle that NMFS has observed taken by the CA/OR drift gillnet fishery occurred south of Point Conception on November 25, 1999. NMFS considers this a rare and random event (1 olive ridley in 6,025 observed sets). In addition, NMFS expects that the vessels that normally fish north of Point Conception will continue to fish north of Point Conception in the area between Point Conception and south of the line extending from Point Sur to 34°27'N 123°35'W. Therefore, NMFS does not expect an increase in fishing activity south of Point Conception. Moreover, the entanglement occurred during a time in which the northern area time and area closure would not be in effect. For these reasons, NMFS does not expect the implementation of a closure north of the line extending from Point Sur to 34°27'N 123°35'W to increase or decrease the likelihood of an olive ridley interaction.

4.4.3.2. South of Point Conception Closure

Green Turtles
The measure under this alternative, which is the same as the reasonable and prudent alternative in the biological opinion, restricts fishing by CA/OR drift gillnet vessels in waters off of California south of Point Conception (34°27'N) to the Mexico border and east of 120°W between August 15th and August 31st, and between January 1st through January 31st during an El Niño event, is not expected to increase the likelihood of a green sea turtle in the CA/OR drift gillnet fishery. The reason for this expectation is that NMFS has only observed one green turtle taken in the CA/OR drift gillnet fishery which took place in November 1999. NMFS considers this entanglement as a rare and random event (1 turtle in 6,025 observed sets). The time and area closure south of Point Conception is not expected to increase the likelihood of an interaction with a green turtle since the closure time period does not include the month of November.

Leatherback Turtles
The time and area closure south of Point Conception during August 15th through 31st and January 1st through 31st is not expected to increase the likelihood of a leatherback interaction since there have been no leatherbacks observed taken during this time period south of Point Conception. There have only been two leatherback turtles that have occurred south of Point Conception. One of them occurred in December 1999, during the unusual oceanographic conditions, near Santa Catalina Island, and the other event took place in January, more than 200 nm from shore, and is almost on the line (approximately 8 nm south) since the recorded position was 34°18.9'N 121°47'W and Point Conception is 34°27.0'N. Therefore, the implementation of the measure to close fishing operations south of Point Conception out to the 120°W longitude will not increase the likelihood of an interaction with leatherback turtles.

Loggerhead Turtles
The measure to close the fishery south of Point Conception out to 120°W was developed to avoid the likelihood of CA/OR drift gillnet fishery jeopardizing the continued existence of the loggerhead sea turtle

(Figure 10). NMFS anticipates that the CA/OR drift gillnet fishery will not take any loggerheads during non-El Niño years since loggerheads have not been observed taken in non-El Niño years (based on observer data from 1990-2001). The observed incidental take of loggerhead turtles by the CA/OR drift gillnet fishery is infrequent, although they are the second most common sea turtle species caught since the fishery has been observed by NMFS. This may be due in part because loggerheads are rarely seen in the eastern Pacific north of Baja California, Mexico. Loggerhead occurrence in the CA/OR drift gillnet fishery is probably associated with the northward extension of Transition Zone waters along the North American coast during El Niño events. The large aggregations of juveniles off Baja California have been observed foraging on dense concentrations of the pelagic red crab, *Pleuronocodes planipes* (Pitman, 1990).

Three unidentified turtles were observed taken in 1993 off southern California, all on the same trip, but in different sets. Only one of these sea turtles was measured, and at 43 centimeters, the average length of measured loggerheads captured incidentally in this fishery from 1990-2001, this turtle was most likely a loggerhead. In addition, all three turtles were caught in the same concentrated area that all loggerheads in the past 11 years have been caught by this fishery. They were also caught during an El Niño, which is the only time that loggerheads have been caught in this fishery since July 1990, when the fishery was first observed by NMFS. Assuming these three unidentified turtles are loggerhead turtles, there have been a total of 17 loggerhead turtles observed taken during the past 11 years. Four of these events took place during the month of July, three of which occurred when the fishery was allowed to fish inside 75 nautical miles during this time period. Another turtle was observed taken during the month of June. However, since the fishery is closed inside 75 nautical miles until August 15th and there is minimal fishing effort during the months of June, July, and the first part of August, NMFS does not expect there to be many loggerhead turtles taken outside of the time period identified in the August and January closure. Therefore, NMFS expects that the closure south of Point Conception in August and January will reduce the incidental mortality and serious injury to a level that will avoid the likelihood of jeopardizing the continued existence of the loggerhead sea turtle populations.

Olive Ridley Turtles

The closure to restrict fishing operations south of Point Conception during August 15th through 31st and January 1st through 31st is not expected to have an affect on the likelihood of an interaction with a olive ridley sea turtle. There has only been one olive ridley observed and this event took place during November 1999, during an unusual oceanographic event. Therefore, since the time and area closure does not include the month of the observed olive ridley take, and the take did not occur during an El Niño event, NMFS does not anticipate a change in the take rate. Moreover, with only one interaction (1 in 6,025 sets), this is a very rare and unlikely event.

4.4.4. Impacts to Seabirds

4.4.4.1. Northern Closure

The northern closure may slightly increase the likelihood of northern fulmars being taken incidental to

the CA/OR drift gillnet fishery. However, in general, the CA/OR drift gillnet fishery does not incidentally take seabirds. In 2000, NMFS observed northern fulmars picking at the net webbing during net retrieval. From August 15 through November 15, there were 11 northern fulmars observed caught in the gear. Eight of these were released alive, 2 were released dead and 1 was released injured. Otherwise, NMFS has not observed this type of behavior during previous years. The entanglement rate for northern fulmars inside the "triangle" is 0.021 northern fulmars per set and the entanglement rate in the closed area north of the "line" is zero northern fulmars per set. If all the fishing effort that has occurred north of the "line" moves south, there is a likelihood that there will be a slight increase in the number of northern fulmars caught incidentally to the fishery.

In addition to the northern fulmars, there have been a couple of unidentified birds recorded by onboard observers. Two of these occurred in the closed area north of the line extending from Point Sur to 34º27'N 123º35'W for an entanglement rate of 0.001 unidentified birds per set (1 unidentified bird in 1,825 observed sets), and 1 occurred in the triangle north of Point Conception, for an entanglement rate of 0.002 unidentified seabird per set (1 unidentified bird in 531 observed sets). Based on this information, the likelihood of a seabird interaction might increase slightly if the fishing effort north of the line extending from Point Sur to 34º27'N 123º'35'W moved into this area off central California.

4.4.4.2. South of Point Conception Closure

The limited number of observed incidental takes of seabirds have occurred north of Point Conception. Therefore, the south of Point Conception closure is not expected to increase or decrease the likelihood of an interaction with a seabird. The vessels that typically fish south of Point Conception in August do not venture north of Point Conception since the vessels are not equipped to handle the heavy northwesterly gales that are encountered off it or the change of climatic and meteorological conditions experienced off the point. In January, vessels fish in southern California because there are no longer sufficient oceanic water temperature breaks north of Point Conception that will provide suitable fishing conditions for catching swordfish and the weather conditions are usually poor. Therefore, vessels are not expected to fish north of Point Conception during the month of January.

4.4.5. Socio-Economic Impacts

4.4.5.1. Northern Closure

Feasibility
Restricting vessels from fishing in ocean waters north of a line extending from Point Sur (36º18.5N) to the point 34º27'N 123º35'W is feasible since vessels can determine their location using the global positioning satellite system and know whether they are fishing to the north of the line or to the south of the line.

Economic Impact
Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically

occurs north of the line extending from Point Sur (36º18.5N) to the point 34º27'N 123º35'W during the time period between August 15th through November 15th did not relocate, the closure under this alternative could cause a loss of $640,818 in ex-vessel gross revenues. This is a worst case scenario since many of vessels will decide to fish in areas that are still open to drift gillnet fishing under this alternative. Table 7 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, during the time and area closure (August 15th through November 15th), using the past four years of California Department of Fish and Game landing receipt data from 1997-2000.

Table 7. Ex-vessel gross revenue and pounds based on fishing area recorded on landing receipts[1] for the time period between August 15th and November 15th, 1997-2000, in ocean waters north of the line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000)[2]	81.50	4,745.60	55,453.70	68,159.20	884,184.40	140,303.50
Annual Average (lbs)	20.38	1,186.40	13,863.43	17,039.80	221,046.10	35,075.88
Average Price	$ 2.00	$ 2.90	$ 0.98	$ 0.38	$ 2.63	$ 1.02
Value (1997-2000)	$163.00	$13,773.36	$54,131.76	$26,033.49	$2,326,156.40	$143,015.59
Annual Average	$ 40.75	$ 3,443.34	$13,532.94	$ 6,508.37	$ 581,539.10	$ 35,753.90
Total Gross revenues	$ 2,563,273.60					
Annual Revenues (Avg)	$ 640,818.40					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the impacts of this alternative, it is also possible to analyze the change in gross revenues assuming that all of the fishing effort that historically occurred north of the line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W will shift south or east of the line, but still remain above Point Conception. In response to this closure, some larger vessels may choose to continue trolling for albacore later into the season (September/October) if the catch rates remain profitable before shifting their effort to the area south of the line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W.

Based on the landing receipt data, swordfish accounts for 90% of the ex-vessel gross revenues during this time period. Therefore, for purposes of determining the impacts of this alternative, NMFS is using swordfish as an indicator. More specifically, the catch rate for swordfish for this time period north of line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W is 3.068 fish per set compared to south of line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W at 3.117 swordfish per set. In this case, the swordfish catch rate south of line extending from Point Sur (36º18.5'N) to the point 34º27'N 123º35'W is slightly higher than in the northern closed area. Therefore, NMFS does not expect a reduction in the catch of swordfish with the implementation of this alternative during this time period. However, this conclusion is based on the assumption that the swordfish catch rates remain constant even with a potential increase in the number of vessels fishing in the open area between Point Conception and the line extending from Point Sur (36º18.5'N) to the point

34°27'N 123°35'W. There is the possibility that the catch rate will decrease because of the increase in fishing effort in the open area. Assuming the catch rate remains the same, NMFS estimates that the ex-vessel gross revenues for swordfish catch will not change under this alternative.

NMFS does not expect there to be substantial additional operating costs for vessels that historically fish north of the line extending from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W since many of these vessels typically fish in this area south of the line during the season. However, there are a few boats that generally fish out of Oregon ports or northern California ports such as Crescent City, Fort Bragg, and Bodega Bay that may have to change their operating procedures and travel south earlier in the season. In addition, some of the larger vessels that troll for albacore may also have to move down the coast earlier in the season. Typically, these vessels will finish their last albacore trip in Oregon and Washington and then begin targeting swordfish in the northern waters using a drift gillnet and then begin moving down the coast in November. The vessels that home port in Santa Cruz, Moss Landing, Monterey, or Morro Bay typically operate in ocean waters near these ports during this time of year and will not be affected as much by the proposed closure under this alternative.

Fishing Conflicts
Increasing the number of drift gillnet vessels fishing south of the line extending from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W along the escarpment is expected to potentially increase slightly the direct competition for setting their gear on desirable oceanographic conditions (water temperature breaks) and possibly on the available swordfish stocks. This direct competition may cause a slight decrease in the observed catch rate since there would likely be more fishing vessels in the area. Under this alternative, allowing the vessels to fish north of Point Conception and south of the line extending from Point Sur (36°18.5'N) to the point 34°27'N 123°35'W should eliminate the concern expressed by various recreational fishery organizations about the potential increase in the number of commercial drift gillnet vessels operating in ocean waters south of Point Conception and the potential increase in striped marlin bycatch. This determination is based on the assumption that vessels that normally fish north of Point Conception will continue to fish north of Point Conception in the open area. This means that there is not an expected change in the number of striped marlin that the drift gillnet fleet already takes. Therefore, this alternative should not adversely affect the economics of the recreational fishery in southern California.

Weather conditions
Under this alternative, drift gillnet fishing vessels would be able to choose whether to fish in potentially more adverse weather conditions near Point Conception or closer to shore along the escarpment of central California.

4.4.5.2. South of Point Conception Closure

Feasibility
Restricting vessels from fishing in ocean waters south of Point Conception during an El Niño event is feasible since vessels are able to determine their location by using the global positions satellite

navigational system on board the vessel. In addition, vessels are not likely to fish south of Point Conception and then travel north to Morro Bay to land fish. This situation is caused by the prevailing northwesterly winds, large swells, and choppy wind waves persisting at Point Conception, which discourage and inhibit vessels from routinely traveling north around the point. Traveling north is more difficult and time consuming because vessels must travel against the currents, winds, and waves. In addition, U.S. vessels are not permitted to fish or land fish in Mexico. Typically, during the month of January, strong low pressure systems move into the Southern California Bight from Alaska. These strong weather systems will even discourage larger vessels from leaving port, especially if the fishing conditions offshore are marginal.

Economic Impact

Based on landing receipt information, NMFS has estimated that if all the fishing effort that typically occurs south of Point Conception during El Niño inside the 120°W longitude during the closure period between August 15th through August 31st and January 1st through January 31st events did not relocate, the closure south of Point Conception could cause a loss of approximately $438,688 in ex-vessel gross revenues. This is a worst case scenario since some of the vessels will decide to fish in areas that are still open to drift gillnet fishing under this alternative. Table 8 provides estimates of the average ex-vessel gross revenues and pounds landed, by species, for the time and area closure, using the past four years of California Department of Fish and Game landing receipt data from 1997-2000.

Table 8. Ex-vessel gross revenue based on fishing area recorded on landing receipts for the period between August 15 through August 31, and January 1 through January 31, 1997-2000, in ocean waters south of Point Conception east of 120°W[1].

	Blue	Louvar	Mako	Opah	Swordfish	Thresher
Pounds (1997-2000) [2]	-	6,214.50	66,102.39	193,708.80	379,174.50	142,936.50
Annual Average (lbs)	-	1,553.63	16,525.60	48,427.20	94,793.63	35,734.13
Average Price	$ -	$ 4.08	$ 1.07	$ 0.42	$ 3.64	$ 1.37
Value (1997-2000)	$ -	$25,324.09	$70,857.02	$80,981.94	$1,381,074.43	$196,437.96
Annual Average	$ -	$ 6,331.02	$17,714.25	$20,245.48	$ 345,268.61	$ 49,109.49
Total Gross revenues	$1,754,675.44					
Annual Revenues (Avg)	$ 438,668.86					

[1] California Department of Fish and Game unpublished data.

[2] Pounds are dressed weight.

For purposes of analyzing the impacts of this alternative, it is also possible to analyze the change in gross revenues assuming that the vessels that typically fish north of Point Conception during August (15th through 31st) will continue to fish north of Point conception or outside of 120°W longitude and therefore would not be affected by this closure during the month of August. However, during the month of January, NMFS is uncertain how many of these vessels may choose to fish outside of 120°W because of the adverse weather conditions that typically occur during that time of year offshore. More likely, NMFS expects these larger vessels that historically fish off San Diego during January will choose not to fish after December unless the oceanographic conditions are exceptional. Another factor that might determine whether these vessels will fish during the month of January is how well they did during the rest of the season.

The smaller vessels that typically fish off of San Diego during the month of August at 9-mile and 20-mile bank are not expected to fish during August between the 15th and the 31st. The reason for this expectation is that these vessels are not likely to fish outside of 120°W because of the distance from shore and the offshore weather conditions. However, some of the small vessels that home port in Santa Barbara or Los Angeles may choose to fish outside of 120°W. The Los Angeles boats would move up the coast and work out of the Santa Barbara port for convenience. These vessels may choose to target thresher shark inside the Santa Barbara Channel. Therefore, the reduction in ex-vessel gross revenue may be lower than projected. However, these vessels are not as likely to fish in this area during the month of January because historically swordfish catch tends to be greater in the warmer water off the coast of San Diego. Therefore, NMFS does not expect much fishing effort to occur south of Point Conception outside of 120°W by these smaller vessels. In addition to the reduction in swordfish revenue caused by the inability of vessels to fish inside of 120°W, there may be additional operating costs for larger vessels that choose to fish outside of the closed area during this time period because of the increased distance the vessels would need to travel.

Fishing Conflicts
The southern closure during El Niño events is not likely to cause an increase in direct competition for desirable oceanographic conditions (water temperature breaks) and fishery resources because many of the vessels are expected to choose not to fish outside of 120ºW. In addition, the southern closure is not expected to conflict with the recreational striped marlin fishery since the commercial drift gillnet vessels would not be allowed to fish inside of 120ºW.

Weather conditions
The closure south of Point Conception may increase the likelihood of vessels fishing in more adverse weather conditions since some vessels may try to fish outside of 120ºW. This area, especially around Point Conception, is more likely to be subjected to heavy northwesterly gales and strong offshore gusts. Moreover, vessels fishing in this area must fish further offshore in open water conditions in which there is not a port nearby to seek shelter if weather conditions should change quickly.

4.5. Comparison of Alternatives

To evaluate which alternative would provide the most benefit to the environment and minimize the economic and potential conflicts to the California/Oregon drift gillnet fishery and other fisheries, NMFS attempts to compare and summarize the biological, economic, and potential fishing conflicts, using the status quo as the baseline to measure the effects of the alternatives.

4.5.1. Impacts to Marine Mammals

4.5.1.1. Northern Closures

Recognizing that the northern closure alternatives were developed to avoid the likelihood of the CA/OR drift gillnet fishery jeopardizing the continued existence of the leatherback sea turtle population, NMFS does not expect the different northern closures to significantly reduce or increase the incidental mortality and serious injury of marine mammals. Table 9 summarizes the expected impacts of the northern closure alternatives that were analyzed. Based on observer data collected from July 1990 through January 2001, NMFS does not expect any of the alternatives to have an affect on the incidental take of fin whales or humpback whales since these interactions are rare events and have not historically occurred during the time periods of the northern time and area closures. However, Alternative 3 and 4 are expected to cause a significant decrease in the likelihood of an interaction with sperm whales since 4 of the 8 interactions that have been observed occurred in the time and area closure identified in these alternatives. Alternative 2 is expected to cause a slight reduction because one of the observed interactions occurred within the time and area closure identified in this alternative. For Steller sea lions, there might be a slight reduction by Alternative 2, 3 and 4 since there was one observed Steller sea lion incidentally taken during the time and area closures identified in these alternatives. However, NMFS has only observed two Steller sea lion entanglements since the inception of the observer program and the likelihood of an interaction is considered low.

For non-strategic marine mammal stocks, NMFS expects that Alternative 2 will decrease the likelihood of an interaction since the entanglement rate north of Point Conception is higher than the entanglement rate south of Point Conception. Alternative 3 and 4 is expected to increase the likelihood of an interaction with a non-strategic marine mammal stock since NMFS assumes the fishing effort that has historically occurred north of the closed area may shift into the open area that is north of Point Conception and this area has a higher entanglement rate for these species. For some species such as the common dolphin, the entanglement rate is twice as high. However, because the incidental mortality and serious injury for this stock is well below PBR, NMFS does not believe that if there is an increase in the number of entanglements, that there will be a significant adverse impact. For species such as the short-finned pilot whale, the entanglement rate is only slightly higher under Alternative 3 and 4, and is not expected to significantly affect the incidental take rate. Under Alternative 3 and 4, there is the potential that the incidental take of northern right whale dolphins may increase compared to Alternative 2.

Table 9. Summary comparing the impacts of the different northern area alternatives on marine mammals.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Strategic Stocks	Fin Whale		No Effect	No Effect	No Effect
	Humpback Whale		No Effect	No Effect	No Effect
	Sperm Whale		Slight Decrease	Decrease	Decrease
	Steller Sea Lion		Slight Decrease	Slight Decrease	Slight Decrease
Non-Strategic	Northern Right Whale Dolphin		Decrease	Increase	Increase
	Short-finned Pilot Whale		Decrease	Slight Increase	Slight Increase
	Other Cetaceans		Decrease	Increase	Increase

4.5.1.2. Southern Closures

Since Alternative 2, 3 and 4 include the same southern closure of south of Point Conception (34º27'N) to the Mexico border and east of 120ºW, the impacts of the three alternatives are expected to be similar. Based on observer data from July 1990 through January 2001, NMFS does not expect the south of Point Conception closure to have an affect on the incidental take of fin whales, sperm whales,

or Steller sea lions (Table 10). The reason for this expectation is because there have been no observed takes of these strategic stocks during the time and area closure identified in these alternatives. However, there may be a slight decrease in the likelihood of an interaction with a humpback whale since there was one humpback whale that was observed taken inside the time and area closure.

For non-strategic marine mammal stocks, the south of Point Conception closure identified in the different alternatives would be expected to decrease or have no effect on the incidental take of these species because most of the vessels that normally would have fished inside of 120°W during the month of January will not fish. Therefore, because there will be a reduction in the fishing effort, there will be a reduction in the number of marine mammals incidentally taken during this time period.

Table 10. Summary and comparison of the impacts of the southern closure alternatives on marine mammals.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Strategic Stocks	Fin Whale		No Effect	No Effect	No Effect
	Humpback Whale		Slight Decrease	Slight Decrease	Slight Decrease
	Sperm Whale		No Effect	No Effect	No Effect
	Steller Sea Lion		No Effect	No Effect	No Effect
Non-Strategic	Northern Right Whale Dolphin		Slight Decrease	Slight Decrease	Slight Decrease
	Short-finned Pilot Whale		No Effect	No Effect	No Effect
	Other Cetaceans		Decrease	Decrease	Decrease

4.5.2. Impacts to Target and Non-target Fish

4.5.2.1. Northern Closures

The impact of Alternative 2 is expected to reduce the likelihood of catching the target species of swordfish since the entanglement rate is 2.945 north of Point Conception and 0.999 south of Point Conception. Even with the potential increase in the number of fair weather days to fish south of Point Conception, Alternative 2 would cause a significant decrease to the expected catch of swordfish by the CA/OR drift gillnet fishery. However, Alternatives 3 and 4 are not expected to have an affect on the

capture rate of swordfish since the entanglement rates within the closure and outside of the closure north of Point Conception are essentially the same. This assumption is based on the entanglement rate remaining constant even if there is an increase in the number of vessels that will be fishing in the area.

Alternative 2 is expected to increase the likelihood of capturing other billfish such as striped marlin since the entanglement rate south of Point Conception is higher. However, Alternative 3 and 4 are not expected to have an affect on the take of other billfish since NMFS assumes that the vessels that typically fish north of Point Conception will continue to fish in that area and that the striped marlin entanglement rate is relatively low. With respect to the incidental take of blue sharks, Alternative 2 is expected to reduce the incidental take of these animals because of the lower entanglement rate south of Point Conception. However, the entanglement rate for blue shark off of central California is higher than in ocean waters off of northern California and therefore, Alternative 3 and 4 is expected to increase the incidental take of blue sharks since the northern California fishing effort is expected to shift south to the escarpment off of central California. Alternative 2, 3 and 4 are all expected to increase the capture of thresher shark whereas mako shark will only increase with Alternative 2 (Table 11).

Table 11. Summary comparing the impacts of the different northern area alternatives on target and non-target fish.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Fish	Swordfish		Decrease	No Effect	No Effect
	Other Billfish		Increase	No Effect	No Effect
Sharks	Blue Shark		Decrease	Increase	Increase
	Thresher Shark		Increase	Increase	Increase
	Mako Shark		Increase	No Effect	No Effect

4.5.2.2. Southern Closures

The south of Point Conception closure during an El Niño event is expected to decrease the likelihood of an interaction with swordfish, other billfish, blue shark, thresher shark and mako shark. The primary reason for this decrease is because of the expected reduction in the total amount of fishing effort (Table 12).

Table 12. Summary and comparison of the impacts of the southern closure alternatives on target and non-target fish.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Fis	Swordfish		Decrease	Decrease	Decrease
	Other Billfish		Decrease	Decrease	Decrease
Sharks	Blue Shark		Decrease	Decrease	Decrease
	Thresher Shark		Decrease	Decrease	Decrease
	Mako Shark		Decrease	Decrease	Decrease

4.5.3. Impacts to Sea Turtles

4.5.3.1. Northern Closures

Green Turtle
Alternative 2 is not expected to have an affect on the incidental take of green sea turtles since there has only been one observed incidental take and that was outside of the time and area closure (Table 13). Alternative 3 and 4 are expected to slightly increase the likelihood of an incidental take of a green sea turtle because the take occurred slightly north of Point Conception during the time and area closure. However, because the entanglement rate of green sea turtles is very low, the likelihood of an interaction is also low.

Leatherback Turtle
Since the northern closures identified in the alternatives are designed to reduce the incidental take of leatherback turtles to avoid the likelihood of the CA/OR drift gillnet fishery from jeopardizing the continued existence of the species, Alternative 2, 3 and 4, decrease the likelihood of a leatherback interaction. Based on the observer data from July 1990 through January 2001, Alternative 2 and Alternative 4 (Preferred) are expected to provide the same level of protection for leatherback turtles since the number of observed entanglements that have occurred inside the time and area closures are equal (18 leatherbacks). Alternative 3 also provides a similar level of protection (17 leatherbacks). Moreover, Alternative 4 (Preferred) provides an additional level of protection by including the potential migratory corridor for leatherbacks departing Monterey Bay to return to their nesting beaches in the western Pacific.

Loggerhead Turtles
None of the northern closures are expected to have an affect on the incidental take of loggerhead sea turtles since there have been no observed interactions during the time period of the closure.

Olive Ridley Turtles
None of the northern closures are expected to have an affect on the incidental take of olive ridley sea turtles since there have been no observed interactions during the time period of the closure.

Table 13. Summary comparing the impacts of the different northern area alternatives on sea turtles.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Sea Turtles	Green Sea Turtle		No Effect	Slight Increase	Slight Increase
	Leatherback Sea Turtle		Decrease	Decrease	Decrease
	Loggerhead Sea Turtle		No Effect	No Effect	No Effect
	Olive Ridley Sea Turtle		No Effect	No Effect	No Effect

4.5.3.2. Southern Closures

Green Turtles
The south of Point Conception closure during El Niño events is not expected to have an affect on the incidental take of green turtles since there have been no observed takes during the time period of the closure (Table 14).

Leatherback Turtles
The south of Point Conception closure during El Niño events is not expected to have an affect on the incidental take of leatherback turtles since there have been no observed takes during the time period of the closure.

Loggerhead Turtles
The south of Point Conception closure during El Niño events is expected to decrease the likelihood of an interaction with loggerhead turtles. This alternative was analyzed in the biological opinion and determined that it was sufficient to avoid the likelihood of jeopardizing the continued existence of the loggerhead sea turtle species by significantly reducing the likelihood of an interaction. Based on observer data from July 1990 through January 2001, all the loggerhead sea turtle interactions occurred during an El Niño event. The majority of these interactions occurred during the month of August and January.

Olive Ridley Turtles
The south of Point Conception closure during El Niño events is not expected to have an affect on the

incidental take of olive ridley turtles since there have been no observed takes during the time period of the closure.

Table 14. Summary and comparison of the impacts of the southern closure alternatives on sea turtles.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Sea Turtles	Green Sea Turtle		No Effect	No Effect	No Effect
	Leatherback Sea Turtle		No Effect	No Effect	No Effect
	Loggerhead Sea Turtle		Decrease	Decrease	Decrease
	Olive Ridley Sea Turtle		No Effect	No Effect	No Effect

4.5.4. Impacts to Seabirds

4.5.4.1. Northern Closures

NMFS expects that Alternative 3 and 4 will increase the likelihood of an interaction with a seabird because fishing effort from the northern closed areas may shift to this area where there is a greater likelihood of an interaction. In particular, the northern fulmar has recently been observed picking at the net during retrieval. Alternative 2 is expected to decrease the likelihood of an interaction with a seabird because there have been no seabirds observed taken by the CA/OR drift gillnet fishery south of Point Conception (Table 15).

Table 15. Summary comparing the impacts of the different northern area alternatives on seabirds.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Birds	Seabirds		Decrease	Increase	Increase

4.5.4.2. Southern Closures

NMFS does not expect the southern closure to have an affect on seabirds since there have been no seabirds observed taken during the time period of the closure (Table 16).

Table 16. Summary of Impacts Comparing Southern Area Closure Alternatives

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Birds	Seabirds		No Effect	No Effect	No Effect

4.5.5. Socio-Economic Impacts

4.5.5.1. Northern Closures

Alternative 2 is expected to significantly decrease the amount of ex-vessel gross revenues by reducing the amount of swordfish that is caught. This conclusion is based on the higher entanglement rate of swordfish north of Point Conception compared to south of Point Conception. Alternative 3 and 4 are not expected to have an affect on the amount of ex-vessel gross revenues since the entanglement rate for swordfish north of the closed areas identified in the alternatives is almost equal to open areas north of Point Conception. Therefore, Alternative 3 or 4 would cause the least amount of economic impact to the CA/OR drift gillnet fishery (Table 17).

Alternative 2 is expected to increase the cost to an individual vessel owner whose home port of the vessel is north of Point Conception and typically fishes only north of Point Conception because of the increased fuel costs to travel to and from the fishing grounds south of Point Conception. Alternative 3 and 4 is expected to only slightly increase these costs because there are fewer vessels that work out of Oregon, Washington or northern California. Alternative 2 is also expected to increase the competition for fishery resources because there are expected to be more vessels fishing south of Point Conception on the fewer oceanographic water temperature breaks. In addition, Alternative 2 would increase the likelihood of gear conflicts between the recreational fishery targeting striped marlin because the drift gillnet vessels are more likely to capture a striped marlin in ocean waters south of Point Conception. Furthermore, Alternative 2 is likely to increase the number of vessels that may choose to fish in an area with adverse weather conditions because of the need to fish close to the line of Point Conception.

Alternatives 3 and 4 are expected to slightly increase the likelihood of vessels competing for the oceanographic temperature breaks along the central California coast north of Point Conception. However, there are more potential fishing areas north of Point Conception along the escarpment for vessels to fish. Alternative 3 and 4 eliminate the potential gear conflict between the recreational fishing

vessels targeting striped marlin since the drift gillnet vessels are expected to remain north of Point Conception. Allowing vessels to fish north of Point Conception also is not expected to have an affect on fishing in areas with a greater likelihood of adverse weather conditions since these vessels typically fish off of central California and will not need to fish differently.

Table 17. Summary comparing the impacts of the different northern area alternatives on socio-economics and fishery conflicts.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Economic Impact	Ex-Vessel Gross revenue		Decrease	No Effect	No Effect
	Cost to Vessel		Increase	Slight Increase	Slight Increase
Fishing Conflicts	Fishery Resources		Increase	Slight Increase	Slight Increase
	Gear Conflicts		Increase	No Effect	No Effect
	Weather Conflicts		Increase	No Effect	No Effect

4.5.5.2. Southern Closures

NMFS expects the impacts of the southern closure to be the same for all the alternatives since the southern closure is the same for each of the alternatives. However, Alternative 3 and 4 might have a slightly less of an impact since the vessels that typically fish north of Point Conception during the month of August would be able to fish up in those waters whereas under Alternative 2, this area would be closed. However, in general, NMFS expects a decrease in the amount of ex-vessel gross revenues since most of the vessels are not expected to fish during the month of January of an El Niño event. NMFS expects that there would be increased costs to an individual vessel that does decide to fish during the closure because of the additional fuel costs to travel to the area of the ocean that is open outside of 120°W longitude.

NMFS expects that there may be an increase in competition for fishing on desirable ocean temperature breaks outside of 120°W, especially near the Channel Islands. NMFS expects that there might be a

decrease in the likelihood of gear conflicts with other fisheries, especially during the month of August when vessels would normally fish inside off of San Diego near Nine-mile Bank. The south of Point Conception closure during an El Niño event is expected to increase the likelihood of vessels fishing in areas that may be subject to more adverse weather conditions than inside, nearer to shore (Table 18).

Table 18. Summary comparing the impacts of the southern closure on socio-economics and fishery conflicts.

	Category	Alternative 1 No Action Baseline for Comparison	Alternative 2 Reasonable and Prudent Alternative	Alternative 3 Take Reduction Team Recommendation	Alternative 4 (Preferred) Modified Take Reduction Team Recommendation
Economic Impact	Ex-Vessel Gross revenue		Decrease	Decrease	Decrease
	Cost to Vessel		Increase	Increase	Increase
Fishing Conflicts	Fishery Resources		Increase	Increase	Increase
	Gear Conflicts		Decrease	Decrease	Decrease
	Weather Conflicts		Increase	Increase	Increase

5.0. FINDING OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

For the reasons discussed in this Environmental Assessment, the National Marine Fisheries Service has determined that the implementation of the regulations to implement the (1) closure north of Point Sur (36°18.5'N) to the point 34°27'N 123°35'W from August 15th through November 15th, to avoid the likelihood of jeopardizing the continued existence of leatherback sea turtles; (2) closure south of Point Conception east of 120°W during an El Niño event to avoid the likelihood of jeopardizing the continued existence of loggerhead sea turtles; (3) requirement for California/Oregon drift gillnet vessel operators to attend skipper education workshops to learn about sea turtle biology and resuscitation techniques and (4) use of sea turtle rescue techniques to reduce the likelihood of an injury or mortality to entangled turtles are not expected to significantly affect the quality of the human environment and that the preparation of an environmental impact statement on these actions is not required by Section 102(2) of the National Environmental Policy Act or its implementing regulations.

DATE: AUG 17 2001

ACTING ASSISTANT ADMINISTRATOR
FOR FISHERIES
NATIONAL MARINE FISHERIES SERVICE

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