UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

August 5, 2003

Robert Arnberger
Regional Director, Alaska Region
National Park Service
2525 Gambell St
Anchorage, AK 99503

Dear Mr. Arnberger:

This document transmits the National Marine Fisheries Service's (NOAA Fisheries) biological opinion based on our review of the proposed vessel quota and operating requirements in Glacier Bay National Park and Preserve, Alaska, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). Your request of March 17, 2003, for formal consultation under Section 7 of the Act initiated the consultation procedures that produced this biological opinion.

This biological opinion is based on information provided in the March 17, 2003, Environmental Impact Statement (EIS) that served as the Biological Assessment for section 7 consultation along with subsequent discussions with NPS staff regarding the new alternative that will be in the Final EIS. A complete administrative record of this consultation is on file at the Alaska Regional Office, NOAA Fisheries, Juneau, Alaska.

After reviewing the current status of both populations of Steller sea lions and the central North Pacific population of humpback whales, the environmental baseline for the action area, the preferred alternative, and the cumulative effects of other actions on listed species, it is NOAA Fisheries biological opinion that the proposed vessel quota increases and operating requirements in Glacier Bay, as proposed, are not likely to jeopardize the continued existence of listed species in the action area, or destroy or adversely modify designated critical habitat found in the action area. In formulating this opinion, NOAA Fisheries used the best available information, including information provided by the National Park Service.

Sincerely,

James W. Balsiger
Administrator, Alaska Region

Endangered Species Act
Section 7 Consultation - Biological Opinion

Agency:	Glacier Bay National Park and Preserve Department of the Interior National Park Service Alaska Region
Activities Considered:	Vessel Quotas and Operating Requirements for Glacier Bay National Park and Preserve
Consultation By:	National Marine Fisheries Service (NOAA Fisheries) Protected Resources Division Alaska Region
Date:	August 5, 2003

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Department of the Interior
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Consultation By: National Marine Fisheries Service (NOAA Fisheries)
Protected Resources Division
Alaska Region

Date Issued: August 5, 2003

Approved by: _____

James W. Balsiger
Administrator, Alaska Region
NOAA Fisheries

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EXECUTIVE SUMMARY

The Glacier Bay National Park and Preserve, National Park Service (NPS) initiated consultation pursuant to section 7 of the Endangered Species Act (ESA) on March 17, 2003. NOAA Fisheries received a letter from NPS formally requesting consultation on the effects of possible increases in vessel traffic quotas in the Park on all threatened and endangered species under the authority of NOAA Fisheries in compliance with section 7(a)(2) of the ESA. Consultation was initiated by NPS due to Federal legislation passed in November 2001, wherein Congress directed the NPS to identify and analyze in an Environmental Impact Statement (EIS) the possible effects of increased vessel entries into the Park and to set a maximum level of vessel entries based on the analysis in the EIS. The purpose of the action was to address the continuing demand for vessel access into Glacier Bay National Park and Preserve (Park) and to evaluate new vessel quotas and operating requirements in the Park in a manner that provided continued protection of Park resources. The letter also indicated that new information on the status and occurrence of listed species in the action area has become available since the last biological opinion (NMFS 1993) further resulting in the need to consult on this action at this time. The letter was attached to a Draft Environmental Impact Statement (DEIS) completed by NPS on the Federal action.

The action area means "all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action" (50 CFR §402.02(d)). As such the action area for this Federal action includes all waters located inside the boundaries of Glacier Bay Park and Preserve, and those waters immediately adjacent to, and outside the entrance to, the Park boundaries where vessels will be funneled into the Park. Thus the action area would also include waters of Icy Strait between the Park entrance and Point Adolphus.

This document is the product of a consultation pursuant to Section 7(a)(2) of the ESA and implementing regulations found at 50 Code of Federal Regulations (CFR) Part 402. This consultation considers whether the effects of these actions are likely to jeopardize the continued existence of two Distinct Population Segments (DPSs) of Steller sea lions or cause the destruction or adverse modification of their designated critical habitat; and the North Pacific population of humpback whales with special emphasis on the North Central stock of this population. For all other listed species in the action area, or waters adjacent to the action area, under the authority of NOAA Fisheries, the NPS has determined that this action has "no effect" on those species. NOAA Fisheries concurs with that determination; therefore further consultation is not required for those species. The species of concern in this formal Section 7(a)(2) consultation are as follows:

(i) Western DPS of Steller Sea Lions (*Eumetopias jubatus*; listed as threatened on November 26, 1990 [55 FR 40204]; listed as endangered on May 5, 1997 [62 FR 30772]; critical habitat designated on August 27, 1993 [58 FR 45269])

(ii) Eastern DPS of Steller Sea Lions (*Eumetopias jubatus*; listed as threatened on November 26, 1990 [55 FR 40204]; critical habitat designated on August 27, 1993 [58 FR 45269])

(iii) North Pacific Humpback Whales (*Megaptera novaeangliae*) listed as endangered upon passage of the ESA of 1973 (16 U.S.C. 1531 *et seq*.)

The Preferred Alternative identified in NPS 2003 (Alternative 3, p. 2-11, NPS 2003) addresses motorized vessel use of Glacier Bay proper, including potential increases in cruise ship traffic, and Dundas Bay. This alternative would provide for potential cruise ship entries in Glacier Bay from 139 to 184 during the June 1-August 31 season. It would retain the daily quotas for tour, charter and private vessels; the seasonal quotas for tour, private and charter vessels; and the existing operating requirements for vessels.~~.~~ Any increase in cruise ship numbers would be contingent upon the completion of studies that demonstrate the increases would be compatible with the protection of park purposes and values. The existing operating requirements would also remain the same as currently enforced. By October 1 of each year, the Park Superintendent would determine, with the Director's approval, the number of cruise ship entries for the following summer season (June 1-August 31). This determination would be based upon available scientific information~~,~~ and other information, and applicable authorities.

As a result of public comments received and internal discussions within the NPS, the Preferred Alternative has changed somewhat from the DEIS (NPS 2003) to include parts of Alternative 3 and Alternative 5. The new alternative (Alternative 6) maintains the current daily vessel quotas for all vessel types in Glacier Bay (NPS 2003, Chap 2.7, pp 2-16). However, cruise ships would be limited to an average of 1.5 per day in May and September, rather than the average of 2 per day as in Alternative 3. The other vessel classes would maintain the June through August season. However, this alternative would increase private vessel use in Glacier Bay by allowing a maximum of 25 private vessels each day from June 1 through August 31 (for a total of 2300 seasonal use days) rather than the average of 21.5 vessels per day (for a total of 1971 seasonal use days) under Alternative 3. Operating requirements would be modified from Alternative 3 including limited closure of certain waters to cruise ships and tour vessels and decreased speed for large vessels throughout the Park rather than just in whale-waters.

Listed species within the action area may be affected by several direct and indirect factors as a result of implementing the Preferred Alternative: a potential increase in the number of collisions between cruise ships and whales or between other smaller vessels and whales; harassment or displacement of the whales and sea lions by vessels or disturbance of whale prey by vessels which may cause whales to redistribute; an increase in acoustic impacts from vessel noise which could impede communication or damage or interfere with hearing; disruption and alteration of normal feeding, resting and other critical behaviors; habitat modification including prey disruption; and ultimately, reduced fitness, leading potentially to reproductive effects or population level changes.

Regulations that implement section 7(a)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of federal actions to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution. Section 7 (a)(4) of the ESA and its implementing regulations also require biological opinions to determine if federal actions would appreciably diminish the value of critical habitat for the survival and recovery of listed species.

Jeopardy analyses usually focus on the effects of an action on a species' population dynamics. A conclusion of "jeopardy" for an action means that the action could reasonably be expected to reduce appreciably the likelihood of both the survival and recovery of a population or species, not an individual.

There is no reason to believe that the Preferred Alternative would affect the western DPS of Steller sea lions in the action area. After reviewing the current status of the endangered western population of Steller sea lions, the environmental baseline for the action area, the proposed action(s), and the cumulative effects of

other actions, it is NOAA Fisheries biological opinion that the Preferred Alternative may adversely affect but is not likely to jeopardize the continued existence of the western population of Steller sea lions.

Given that the eastern DPS of Steller sea lions is increasing and appears to be robust, it is unlikely that it would experience reductions in reproduction, numbers, and distribution in response to any of the proposed alternatives. After reviewing the current status of the threatened eastern DPS of Steller sea lions, the environmental baseline for the action area, and the cumulative effects of other actions on the eastern DPS of Steller sea lions, it is NOAA Fisheries biological opinion that the Preferred Alternative may adversely affect, but is not likely to jeopardize, the continued existence of the eastern population of Steller sea lions.

After reviewing the current status of the central North Pacific population of humpback whales, the environmental baseline for the Preferred Alternative, and the cumulative effects of other actions on the central North Pacific population of humpback whales, it is NOAA Fisheries biological opinion that individual whales within the action area may be adversely affected by the Preferred Alternative but that this alternative may adversely affect, but is not likely to jeopardize, the continued existence of the central North Pacific population of humpback whales.

Adverse modification analyses usually focus on the effects of an action on the physical, chemical, and biological resources that support a population. A conclusion of "adverse modification" means that the action could reasonably be expected to appreciably diminish the value of critical habitat for of a population or species. There are no areas designated as critical habitat for the western DPS of Steller sea lions or the central North Pacific population of humpback whales in the action area. After reviewing the current status of critical habitat that has been designated for the eastern population of Steller sea lions in the action area, the environmental baseline for the action area, the proposed alternatives, and the cumulative effects, it is NOAA Fisheries biological opinion that the Preferred Alternative is not likely to destroy or adversely modify designated critical habitat for the eastern DPS of Steller sea lions.

1.0 PURPOSE AND CONSULTATION HISTORY

1.1 Purpose

The Endangered Species Act (ESA or Act) (16 U.S.C. 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA, 16 U.S.C. § 1531 et seq., requires that each Federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a Federal agency may adversely affect a protected species, that agency (i.e., the "action" agency) is required to consult with either the National Marine Fisheries Service (NOAA Fisheries) or the U.S. Fish and Wildlife Service (FWS), depending upon the protected species that may be affected. For the actions described in this opinion, the action agency is the Glacier Bay National Park and Preserve, National Park Service (NPS); and the consulting agency is the Protected Resources Division, Alaska Region, NOAA Fisheries.

The NPS initiated consultation pursuant to section 7 of the Endangered Species Act (ESA) on March 17, 2003. NOAA Fisheries received a letter from NPS formally requesting consultation on the effects of possible changes in the management of motor vessels in Glacier Bay and Dundas Bay on all threatened and endangered species under the authority of NOAA Fisheries in compliance with section 7(a)(2) of the ESA. Consultation was initiated by NPS due to Federal legislation passed in November 2001, wherein Congress directed the NPS to identify and analyze in an Environmental Impact Statement (EIS) the possible effects of increased vessel entries into the Park and to set a maximum level of vessel entries based on the analysis in the EIS. The purpose of the action was to address the continuing demand for vessel access into Glacier Bay National Park and Preserve (Park) and to evaluate new vessel quotas and operating requirements in the Park in a manner that provided continued protection of Park resources. The letter also indicated that new information on the status and occurrence of listed species in the action area has become available since the last biological opinion (NOAA Fisheries 1993) further resulting in the need to consult on this action at this time. The letter was attached to a Draft Environmental Impact Statement (DEIS) completed by NPS on the Federal action (NPS 2003).

The NPS has jurisdiction over and manages the Park. Vessel traffic in Park boundaries is, therefore, under Federal control within the jurisdiction of the NPS. As a Federal action, changes to vessel management in the Park are subject to section 7 consultation for effects to species listed under the ESA. The March 17, 2003, letter indicated that any of the alternatives considered in the DEIS may adversely affect humpback whales and Steller sea lions. The purpose of this opinion, therefore, is to fulfill the section 7 requirements for consultation on vessel quotas and operating requirements for the National Park.

This document is the product of a consultation pursuant to Section 7(a)(2) of the ESA and implementing regulations found at 50 Code of Federal Regulations (CFR) Part 402. This consultation considers whether the effects of these actions are likely (1) to jeopardize the continued existence of two Distinct Population Segments (DPSs) of Steller sea lions; (2) to cause the destruction or adverse modification of designated critical habitat in the action area for the eastern DPS of Steller sea lions (critical habitat has not been designated in the action area for the western DPS of Steller sea lions or the North Pacific population of humpback whales); and (3) whether the actions are likely to jeopardize the continued existence of the North Pacific population of humpback whales with special emphasis on the central North Pacific stock of this

population (as described in Angliss *et al.* 2002). For all other listed species in the action area, or waters adjacent to the action area, under the authority of NOAA, the NPS has determined that this action will have "no effect" or is "not likely to adversely affect." NOAA Fisheries concurs with this determination. Therefore, the species of concern in this formal Section 7(a)(2) consultation are as follows:

> Western DPS of Steller Sea Lions (*Eumetopias jubatus*; listed as threatened on November 26, 1990 [55 FR 40204]; listed as endangered on May 5, 1997 [62 FR 30772]; critical habitat designated on August 27, 1993 [58 FR 45269])
>
> Eastern DPS of Steller Sea Lions (*Eumetopias jubatus*; listed as threatened on November 26, 1990 [55 FR 40204]; critical habitat designated on August 27, 1993 [58 FR 45269])
>
> North Pacific Humpback Whales (*Megaptera novaeangliae*) listed as endangered upon passage of the ESA of 1973 (16 U.S.C. 1531 *et seq*.)

This opinion is based on an evaluation of both the direct and indirect effects of the action on these listed species and their critical habitat (Eastern DPS of Steller sea lions), together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered in the context of an Environmental Baseline and Cumulative Effects. The Environmental Baseline includes the past and present impacts of other Federal, state, Tribal, or private actions and other human activities in the action area, or waters adjacent to the action area. There are no anticipated impacts from other proposed Federal projects in the action area that have already undergone Section 7 consultation, or from the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02). Cumulative Effects are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to affect these listed species either within the action area (50 CFR §402.02) or in waters adjacent to the action area.

This opinion also addresses authorization by NOAA Fisheries of the Preferred Alternative activities under section 101(a)(5) of the Marine Mammal Protection Act (MMPA) for the incidental, but not intentional, "taking" of marine mammals through harassment and disturbance. The term "take" means to harass, hunt, harm, pursue, capture, or kill, or attempt to harass, hunt, harm, pursue, capture, or kill any marine mammal. Such authorization may be accomplished through regulations and issuance of letters of authorization under those regulations, or through issuance of an incidental harassment authorization. These authorizations may be granted only if an activity would have no more than a negligible effect on species (or stock), would not have an unmitigable adverse impact on the availability of the marine mammal for subsistence uses, and that the permissible method of taking and requirements pertaining to the monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. These authorizations are often requested for activities in the Beaufort Sea which produce underwater noise at levels which harass marine mammals. Harassment is a form of taking otherwise prohibited by the MMPA and ESA.

1.2 Consultation History

The NPS first initiated consultation with NOAA Fisheries in 1979 due to the departure of humpback whales from Glacier Bay and the implication that this was due to an increase in vessel traffic in Glacier Bay at that time. The belief was that increased vessel traffic produced intolerable levels of noise and harassment which resulted in the near abandonment of the Park by humpback whales. At the request of the NPS, NOAA Fisheries issued a biological opinion (NMFS 1979) addressing the effects of the actions proposed by NPS

to control vessel activity in Glacier Bay National Monument. NOAA Fisheries determined that the uncontrolled increase in vessel traffic at the time, particularly of pleasure craft, may have altered the behavior of humpback whales in Glacier Bay such that it resulted in their departure from the bay during 1978-1979. NOAA Fisheries concluded that a continued increase in the amount of vessel traffic, particularly charter/pleasure craft, in Glacier Bay was likely to jeopardize the continued existence of the humpback whales in southeast Alaska. Critical habitat has not been designated for humpback whales in the North Pacific; therefore adverse modification of critical habitat for this species under section 7 was not considered.

NOAA Fisheries developed a Reasonable and Prudent alternative (RPA) that was implemented by the NPS. The RPA required the following measures:

(1) a restriction of total vessel use of Glacier Bay to 1976 levels (i.e. 123 large vessels, 318 private boats and 856 fishing vessels);

(2) the implementation of regulations governing vessel routes and vessel maneuvering to minimize whale/vessel interactions; and a prohibition of the willful pursuit and disturbance of whales; and vessel operators needed to be informed of such regulations;

(3) the continuation of research programs to monitor the humpback population and whale/vessel interactions; and

(4) a requirement to develop new research programs to characterize the food and feeding behavior of humpback whales in Glacier Bay and other areas; to ascertain the acoustic characteristics of vessels within the Bay and in other areas with the aim of identifying equipment and/or modes of operation which are inimical to the whales; and to compare behavioral responses of the humpback whales to vessels in Glacier Bay with those observed in other areas of southeastern Alaska.

The NPS promulgated regulations implementing the first and second element of the RPA and has monitored the abundance of humpback whales in the Park since this opinion. A research program was undertaken in 1981 and 1982. The NPS reinitiated consultation in 1983 due to new scientific information from these studies and to address whether vessel numbers could be increased and to what extent without jeopardizing humpback whales.

A second biological opinion, issued in 1983, considered impacts to humpback whales from existing levels of vessel traffic and from the effects of proposed increases in the levels of vessel traffic in Glacier Bay. In 1981 and 1982 (June 1 to August 31) large ships (over 100 tons gross) were limited to two entries per day with a seasonal maximum of 89 entries for cruise ships. During the same period private/pleasure craft were limited to 21 entries per day with a seasonal maximum of 538 entries. The 1983 biological opinion concluded that this level of vessel use and operational management of vessels in Glacier Bay was not likely to jeopardize the continued existence of the southeast Alaska humpback whale stock. NOAA Fisheries also concluded that some increase in vessel traffic could occur in Glacier Bay without jeopardizing the southeast Alaska stock of humpback whales. This determination was based on the NPS's ability to monitor and control both the amount of vessel traffic, and the operation of vessels in the Park. NOAA Fisheries stated that no more than a 20% increase in the large ship and small vessel categories would be prudent. This allowed for two large ships per day with a maximum of 107 large vessel-use days during June 1 to August 31. NOAA Fisheries recommended that the effects of these increases should be monitored for at least two years before additional increases were proposed. The 1983 opinion noted, as did the 1979 opinion, that if the amount of vessel traffic in Glacier Bay were allowed to increase without limit or if existing restrictions on the operation of vessels within the Bay were removed, the associated disturbance would likely jeopardize the continued existence of the southeast Alaska humpback whale stock.

The 1983 biological opinion did not suggest a threshold limit at which vessel traffic and operational practices would jeopardize the continued existence or survival of humpback whales. NOAA Fisheries did recommend, however, that the number of vessel entries should not be increased unless the number of whales in the Bay remains equal to, or greater than, the number of whales present in 1982. The 1983 biological opinion also recommended research and monitoring requirements pertaining to whale biology and feeding ecology and to the interactions of vessel presence within the Park.

It is important to recognize that the 1979 and 1983 biological opinions analyzed the effects of the action on a "southeast stock of humpback whales" or a "stock of humpback whales in southeast Alaska". Humpback whales in Glacier Bay and southeast Alaska are currently considered part of a larger ESA unit or population that occurs throughout the North Pacific basin, or at a minimum the Central North Pacific Ocean (Angliss et al. 2002). While humpback whales in southeast Alaska do represent a feeding aggregation of whales somewhat discrete from other humpback whales throughout central and western Alaska (possibly a substock of the Central North Pacific stock), the ESA does not distinguish between humpback whales in southeast Alaska from humpback whales throughout the remaining North Pacific Ocean. For that reason, the next consultation between NPS and NOAA Fisheries on this action (the 1993 biological opinion) analyzed whether the effects of the proposed activity were likely to jeopardize the continued existence of the entire North Pacific population, and not just those whales located in southeast Alaska. When placed in the appropriate ESA context, it becomes apparent that activities in Glacier Bay may have effects on whales at that local scale without jeopardizing the species or population.

NMFS issued another biological opinion in 1993 that also addressed the effects of vessel traffic in Glacier Bay on humpback whales (NMFS 1993). However, this opinion also considered Steller sea lions and gray whales (Eschrichtius robustus) (NMFS 1993). Steller sea lions throughout their range were listed as threatened under the ESA on November 26, 1990 (55 FR 49204). Therefore, the effects of the action on Steller sea lions throughout their range were considered in ESA consultations between the two agencies for the first time.

The listing of Steller sea lions followed a decline in the U.S. population of about 64% over the three decades prior to the listing. The species was split into two separate Distinct Population Segments (DPSs) in 1997 on the basis of demographic and genetic dissimilarities (Bickham *et al.* 1996, Loughlin 1997); a western DPS whose status was changed to endangered, and an eastern DPS whose status was left unchanged (62 FR 30772). Therefore, this consultation evaluates the effects of the action on two DPSs of Steller sea lions. Gray whales were considered in the 1993 consultation due to sightings in the action area and adjacent waters between 1983 and 1993. However, gray whales were delisted from the ESA in 1994 and are not considered in this consultation. Other species listed under the ESA, and under the authority of NOAA, are not considered in this opinion because NPS has determined that the action has "no effect" on those species. NOAA Fisheries concurs with that determination; therefore further consultation is not required for those species.

The 1993 consultation was based on the Preferred Alternative as described in the September 25, 1992, Draft Vessel Management Plan and Environmental Assessment (NPS 1995). This management proposal allowed cruise ships into the Bay at the rate of 2 per day for a total of up to 184 cruise vessels during June, July and August. Tour vessels would be allowed in at the rate of 3 each day for a total of 276 tour vessels; charter vessels would be allowed in at the rate of 6 per day for a total of 552 charter vessels; and private vessels at a rate of 25 each day for a total of 1,971 vessels for the same time period of June through August. The 1993 biological opinion concluded that the Preferred Alternative was not likely to jeopardize the continued existence of Steller sea lions, gray whales or North Pacific humpback whales.

Conservation recommendations in the 1993 opinion suggested that the NPS maintain a minimum vessel approach restriction around Steller sea lion haulouts throughout the year. NMFS also recommended that

the NPS implement a humpback whale feeding ecology research program and undertake studies "to determine how vessel presence alters the behavior and/or distribution of humpback whales" (presumably in the Park). NMFS also recommended that the NPS continue monitoring programs that "identify the number of humpback whales that feed in the National Park waters and their individual identity, age, reproductive status and length of stays". The Park has maintained an active monitoring program for humpback whales in, and adjacent to, Park waters since 1985.

1.3 Background on Jeopardy and Adverse Modification of Critical Habitat

In this section, we discuss the statutory requirements of ESA section 7(a)(2), and its implementing regulations, and their relation to the actions considered in this consultation. Whereas the statutory standards, and the regulations that interpret them, are the ultimate determinants for this biological opinion, it is necessary for NOAA Fisheries to develop a methodology for applying those standards that uses the best scientific and commercial data available. Both the FWS and NOAA Fisheries are currently revising regulations pertaining to jeopardy and adverse modification of critical habitat. However, they will not be available for this biological opinion.

Section 7(a)(2) of the ESA states:

> *"Each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any endangered species and threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this chapter."*

Definitions of "jeopardize the continued existence of" and "adverse modification of habitat" are not defined further in the statute. However, these definitions were further refined in the June 3, 1986, regulations implementing the ESA in 50 CFR §402.02.

> ***Destruction or adverse modification*** means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR §402.02).
>
> ***Jeopardize the continued existence of*** means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers or distribution of that species (50 CFR §402.02).

The consulting agency is required to consider both of these standards to insure that the proposed action does not result in jeopardy or adverse modification of critical habitat as intended by the Act. The jeopardy standard is intended to provide for the conservation of the species based on any impacts that might occur to that species no matter where they might occur, whereas the adverse modification standard is intended to look more closely at the effects to the core habitat essential for the species' long term survival.

Regulations that implement section 7(a)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of federal actions to determine if it would be reasonable to expect them to appreciably

reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (50 CFR §402.02). Biological opinions must also determine if federal actions would appreciably diminish the value of critical habitat of listed species (50 CFR §402.02).

The jeopardy analysis was approached using the following steps:

(i) First, we identify the possible direct and indirect effects of the action on the physical and biotic environment of the action area;

(ii) Given the environmental baseline, we determine if we would reasonably expect the western or eastern populations of Steller sea lions, and North Pacific population of humpback whales, to experience reductions in reproduction, numbers, or distribution in response to these effects, and the cumulative effects of future anticipated non-Federal actions; and

(iii) Third, we determine if any reductions in a species' reproduction, numbers, or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species' likelihood of surviving and recovering in the wild.

The final step in our analysis — relating reductions in a species' reproduction, numbers, or distribution to reductions in the species' likelihood of surviving and recovering in the wild — is often the most difficult step because (a) the relationship is not linear; (b) to persist over geologic time, most species' have evolved to withstand some level of variation in their birth and death rates without a corresponding change in the species' likelihood of surviving and recovering in the wild; and (c) we have imperfect knowledge of the population dynamics of other species and their response to human perturbation. Nevertheless, our analysis must attempt to distinguish between anthropogenic reductions in a species' reproduction, numbers, and distribution that can reasonably be expected to affect the species' likelihood of survival and recovery in the wild and other (natural) declines, given the best scientific and commercial information available at the time of the analysis.

We will approach an analysis for the adverse modification of critical habitat through a more qualitative analysis using available scientific and commercial information.

1.4 Standards of Survival and Recovery

For both the determination of jeopardy and adverse modification of critical habitat NOAA Fisheries must make a determination on whether an action is likely to appreciably reduce the likelihood of survival and recovery of a species in the wild. The following are the definitions of survival and recovery from the ESA Section 7 Handbook:

> ***Survival*** is defined as the species' persistence, as a listed or recovery unit, beyond the conditions leading to its endangerment, with sufficient resilience to allow for recovery from endangerment (ESA Handbook).

> ***Recovery*** is the process by which species' ecosystems are restored and/or threats to the species are removed so self-sustaining and self-regulating populations of listed species can be supported as persistent members of native biotic communities (ESA Handbook).

Recovery is also defined in the implementing regulations (however survival is not):

> ***Recovery*** means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act (50 CFR 402.02).

There is no uniform guidance either in regulation or through NMFS policy on the specific criteria to determine whether a species is likely to survive. In some cases, NMFS and FWS have attempted to project population trajectories into the future (such as 100 years) and account for some level of variability around that trend, such as environmental disturbance, threats of disease, and other unknown factors. Then, a probability of extinction has been calculated for some species. In some cases, this probability of extinction is related to a bright line definition of what risk is acceptable for that particular species. For this type of an analysis, considerable information on the life history of a species is needed in order to have confidence in the predictions of the model.

Since the listing of Steller sea lions in 1990, NMFS scientists have prepared a number of different Population Viability Analyses (PVA) (Merrick and York 1994, York 1994, and York *et al.* 1996). In a draft document prepared by Merrick and York (1994), they looked at a number of different models using both the 1985-94 and the 1989-94 population trends and determined that it was highly likely that the western population or DPS would reach extinction between 53 and 86 years respectively. These analyses were further refined in York (1994) and York *et. al.* (1996), however, they have relied heavily on using a population trend since the mid-1970s. At the current decline, Loughlin and York (2001) estimated that the western population would be reduced to only 11,430 animals by 2020. Neither the eastern DPS of Steller sea lions nor the North Pacific population of humpback whales are currently experiencing population declines. The potential for survival and recovery is likely for these two species.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND THE PREFERRED ALTERNATIVE

2.1 The Proposed Action

The NPS proposes to keep existing or establish new quotas and operating requirements for cruise ships and tour, charter and private motor vessels within Glacier Bay and Dundas Bay in Glacier Bay National Park and Preserve. Four action alternatives and a no action alternative are evaluated in a Draft Environmental Impact Statement (DEIS)(NPS 2003). The DEIS provides a reasonable range of alternatives and contains an analysis of the consequences of each of the alternatives on the human environment, including listed species, as required under the National Environmental Policy Act.

The existing regulations define a cruise ship as any motor vessel at or more than 100 tons gross (U.S. System) or 2,000 tons gross (International Convention System) that carries passengers for hire (Table 2.1, pp 2-2, NPS 2003). A charter vessel is any motor vessel under 100 tons gross (U.S. System) or 2,000 tons gross (International Convention System) that is rated to carry up to 49 passengers, and is available for hire on an unscheduled basis, except a charter vessel used to provide a scheduled camper or kayak drop-off service. A tour vessel is any motor vessel under 100 tons gross (U.S. System) or 2,000 tons gross (International Convention System) that is rated to carry more than 49 passengers, or any smaller vessel that conducts tours or provides transportation at regularly scheduled times along a regularly scheduled route. A private vessel is any motor vessel used for recreation that is not engaged in commercial transport of passengers, commercial fishing or official government business.

The Preferred Alternative identified in the DEIS (Alternative 3, p. 2-11, NPS 2003) addressed motorized vessel use of Glacier Bay proper, including potential increases in cruise ship traffic. This alternative would provide for potential future increases in cruise ship entries in Glacier Bay from 139 to 184 during the June 1 through August 31 season. It would retain the daily quotas for tour, charter and private vessels; the seasonal quotas for tour, private and charter vessels; and the existing operating requirements for vessels. Any increase in cruise ship numbers would be contingent upon the completion of studies that demonstrate the increases would be compatible with the protection of park values and purposes. The existing operating requirements would remain the same as currently enforced. While regulations do not prohibit cruise ships from entering Dundas Bay, existing cruise ship operators have committed to an itinerary that does not include Dundas Bay. By October 1 of each year, the Park Superintendent would determine, with the Director's approval, the number of cruise ship entries for Glacier Bay the following summer season (June 1-August 31). This determination would be based upon available scientific information, and other information, and applicable authorities.

During the consultation process, the NPS informed NOAA Fisheries that, as a result of comments received on the DEIS and internal discussions within the NPS, the Preferred Alternative changed from Alternative 3 as described in the DEIS (NPS 2003) to an Alternative 6 (described in the following section). This alternative will be described in the Final EIS and is the NPS Preferred Alternative for this action.

2.2 Alternative 6 (Preferred Alternative)

Alternative 6 would simplify the present vessel operating requirements based on the Park's experience administering them for the past several years and based on evaluation of the results of studies obtained since the 1996 Vessel Management Plan was developed. Alternative 6 would set a maximum level of vessel entries, as mandated by Congress, while protecting resources and providing for a range of visitor opportunities within the Park. Like Alternative 3, seasonal use day quotas for cruise ships in Glacier Bay would be set at 139 and could be increased to 184. Like Alternative 3, the Superintendent would determine by October 1 of each year the number of cruise ship seasonal use days in Glacier Bay for the following summer season. The number would be subject to the maximum year-round daily limit of two vessel use days. The Superintendent would publish a document of any revision in seasonal use day quotas in the Federal Register with an opportunity for public comment. Differences between Alternative 6 (the Preferred Alternative) and Alternative 3 (the DEIS Preferred Alternative, in NPS 2003) that are important to this opinion are described in the following sections.

2.2.1 Definition of Terms

The following terms and definitions are applicable to Alternative 6 and may be different from Alternative 3 as identified in the DEIS (NPS 2003):

(i) Charter vessel: Modified from Alternative 3 to be more accurate. Like Alternative 3, under Alternative 6 charter vessel applies to any motor vessel of less than 100 tons gross (U.S. System) or 2,000 tons gross (International Convention System) engaged in transport of passengers for hire. Unlike Alternative 3, the definition of charter vessel under Alternative 6 specifies the number of passengers a charter vessel is rated to transport overnight (up to 12) and for day-time use (up to 49), clarifies its use as an administrative vessel, and provides for uninspected vessels of a certain gross tonnage and length to serve as charter vessels. Eliminated is the reference to being "available for hire on an unscheduled basis except as used to provide a scheduled camper or kayak drop-off service."

(2) Cruise ship: Modified from Alternative 3. Like Alternative 3, the definition for cruise ship under Alternative 6 applies to a vessel of at least 100 U.S. gross tons, engaged in transport of passengers for hire. Unlike Alternative 3, it specifies a number of passengers (more than 12), thereby making it more consistent with the way the other two commercial motor vessel classifications are defined. It also clarifies its use as an administrative vessel.

(iii) Tour vessel: Modified from Alternative 3 to be more accurate. Like Alternative 3, the definition for tour vessel under Alternative 6 applies to any motor vessel of less than 100 tons gross (U.S. System) or 2,000 tons gross (International Convention System) engaged in the transport of passengers for hire. Unlike Alternative 3, it specifies the number of passengers a tour vessel is rated to transport overnight (more than 12) and for daytime use (greater than 49) and clarifies its use as an administrative vessel.

(iv) Private vessel: The definition of this vessel category is the same as for Alternative 3.

(v) Entry: Not applicable

(vi) Vessel-use Day: This definition was adjusted, in consideration of the elimination of seasonal entry quotas, to be when a vessel is in Glacier Bay or Dundas Bay operating under its permit for that calendar day.

(vii) Seasonal-use Day: Defined (not defined in present regulations) as the number of vessel-use days allowed during a specific seasonal period.

(viii) Daily Vessel Quota: Defined (not defined in present regulations) as the number of vessel-use days allowed in an area on any one calendar day.

(ix) Administrative Use: Defined (not defined in present regulations) as a motor vessel engaged in official government business.

(x) Administrative Vessel: Defined (not defined in present regulations) as any vessel involved in administrative use.

(xi) Short-Notice Private Vessel Permits: Permits available to private vessels on a short notice basis – with a 48 hour advance reservation.

2.2.2 Vessel Seasons and Quotas

The quota season is the same for alternatives 3 and 6, except that under Alternative 6, for cruise ships, the seasonal use day quota is extended to cover May and September (the season is June-August for Alternative 3). Quotas apply to Glacier Bay Proper for Alternative 3 and for both Glacier Bay Proper and Dundas Bay for Alternative 6. Alternative 6 provides for the following daily and seasonal quotas for each of the following vessel categories and locations:

Glacier Bay Proper

Cruise Ships

Daily Quota	2 vessels per day year-round (same as Alternative 3)
Seasonal Entry	Not applicable (seasonal entry quota is eliminated with this alternative)
Seasonal-Use Days	92 vessels for May and September with the potential increase of up to 122 (2 per day every day); 139 for cruise ships from June 1 through August 31 with a potential increase of up to 184 (2 per day every day -- same as Alternative 3)

Tour Vessels

Daily Quota	3 vessels per day year-round (same as Alternative 3)
Seasonal Entry	Not applicable (seasonal entry quota is eliminated with this alternative)
Seasonal Use-days	183 seasonal use days permitted during May and September; 276 from June 1 through August 31 (same as Alternative 3)

Charter Vessels

Daily Quota	No limit in May and September; 6 per day from June 1 through August 31 (same as Alternative 3)
Seasonal Entry	Not applicable (seasonal entry quota is eliminated with this alternative)
Seasonal-Use Days	No limit in May and September (no limit from September through May); 552 days from June 1 through August 31 (same as Alternative 3)

Private Vessels

Daily Quota	No limit in May and September; 25 per day from June 1 through August 31 (same as Alternative 3)
Seasonal Entry	Not applicable (seasonal entry quota is eliminated with this alternative)
Seasonal Use-days	No limit in May and September (no limit from September - May); 2300 from June 1 through August 31

Dundas Bay

Cruise Ships	Not permitted year-round

Tour Vessels

Daily Quota	Not permitted in wilderness waters year-round; 1 permitted per day in non-wilderness waters June 1 through August 31
Seasonal Use-days	Not permitted in wilderness waters year-round; 92 in non-wilderness waters June 1 through August 31

Charter Vessels

Daily quota	No limit
Seasonal Use-days	276 from June 1 through August 31 (an average of 3 per day)

2.2.3 Operating Requirements

As with Alternative 3, and consistent with the existing regulations, Alternative 6 would not require a permit for the following types of vessels for entry into Glacier Bay: administrative vessels, which include vessels operated by the Hoonah Indian Association and research vessels; vessels granted safe harbor in Bartlett Cove by the Superintendent based on hazardous conditions, such as weather or mechanical problems; skiffs launched from a permitted motor vessel and operated while the permitted vessel remains at anchor; and commercial fishing vessels otherwise permitted and engaged in commercial fishing.

As for Alternative 3, and unchanged from the current regulations, Alternative 6 would prohibit operation of a vessel within one-quarter nautical mile of a whale, except for certain commercial fishing vessel operations as otherwise authorized by the Superintendent. Also, an operator of a vessel accidentally positioned within one-quarter nautical mile of a whale shall immediately slow the vessel to 10 knots or less, without shifting into reverse unless impact is likely. Then the operator must proceed on a steady course away from the whale until at least one-quarter nautical mile of separation is established. As for Alternative 3, and consistent with the current regulations, Alternative 6 would prohibit pursuing or attempting to pursue a whale.

As for Alternative 3, and unchanged from the current regulations, Alternative 6 would prohibit operating a vessel or otherwise approaching within 100 yards of a Steller sea lion hauled out on land or a rock. This 100 yard approach distance applies specifically to a number of islands and islets in Glacier Bay and on the outer coast of the park, including Graves Rocks, a sea lion haulout [see 36 CFR 13.65(b)(3)(vi)(A) for the list of specific locations].

In addition to the above, Alternative 6 provides for the following vessel-use requirements:

(i) Speed Restrictions: Alternative 6 would maintain a 20 knot (through the water) speed restriction in lower Glacier Bay whale waters from May 15 through September 30 for motor vessels less than 80 meters (262 feet) long. However, Alternative 6 would set a maximum speed restriction of 13 knots (through the water) year-round in Glacier Bay for motor vessels 262 feet or greater in length. It would set a 13 knot rather than a 10 knot (through the water) speed restriction from May 15 through September 30 when the Superintendent deems it necessary due to the presence of whales. This lowered speed restriction would also apply to Dundas Bay. Thus, as compared to Alternative 3, Alternative 6 would differentiate between vessel lengths in assigning speed limits in Glacier Bay, extend the vessel speed season through September in the lower Bay whale waters for vessels less than 80 meters long, and set a year-round 13-knot speed limit throughout Glacier Bay for large vessels (80 meters or greater in length). In addition, as compared to Alternative 3, Alternative 6 would increase (from 10 to 13 knots) the speed limit imposed in Glacier Bay when the Superintendent has designated a maximum speed due to the presence of whales, impose this limit in Dundas Bay and extend the through September the time-frame during which this speed limit could be imposed.

(ii) Whale Waters: As compared to Alternative 3, Alternative 6 would reduce the number of designated whale waters from four areas to one, keeping the designation for the lower bay only and extending the time during which the designation would be in effect from May 1 through September 30 (versus May 15 - August 31 under Alternative 3). It is important to note, however, that Alternative 6 retains the Superintendent's authority to impose temporary whale waters within the Park boundaries in response to identified and shifting whale aggregations, and to impose vessel speed restrictions in those "whale waters." The Park defines "whale waters" as any portion of Glacier Bay designated by the Superintendent as having a high probability of whale occupancy, based on recent sightings or past patterns of occurrence (at Table 2.1, pp 2-4, NPS 2003).

Vessel operating restrictions in designated whale-waters would be the same as for Alternative 3 (no change from the current regulations). In designated whale waters, all motor vessels more than 18 feet long are required to navigate a mid-channel course and, where possible, maintain a distance of at least 1 mile from the shoreline while in transit through whale-waters. All vessels are prohibited from operating within 0.25 nautical mile of a humpback whale or pursuing, or attempting to pursue, humpback whales within 0.5 nautical mile in marine waters within the boundary of the park and preserve.

(iii) Closures: In addition to the closures for Alternative 3, which are the same as those in the current regulations, Alternative 6 would close the following areas to cruise ships and/or tour vessels.

> Non-motorized waters: closed for cruise ships: Alternative 6 adds Beardslee Entrance, extends the closure of Adams Inlet to the entrance of that inlet, and includes all of Dundas Bay.
>
> Non-motorized waters: closed for tour vessels : Alternative 6 adds Beardslee Entrance, extends the closure of Adams Inlet to the entrance of that inlet, and includes the wilderness waters of Dundas Bay.

Vessel routes are not defined, although cruise ships generally follow the mid-channel of Glacier Bay. The permit exemption for private motor vessels 'based in Bartlett Cove' would be eliminated. Private vessels based in Bartlett Cove are currently (and under Alternative 3) allowed to transit between Bartlett Cove and waters outside Glacier Bay without a permit.

2.3 Research and Monitoring

The Park maintains a research and monitoring program that provides a tool to identify problems early and to provide a basis for making adaptive management decisions as needed to protect park resources. This research and monitoring program would be continued under the Preferred Alternative and would make a real-time contribution to 1) the identification of whale-waters, 2) to the research needed for evaluation of the potential effects of increased cruise ship quotas within the limits of the proposed action, and 3) to assess the effectiveness of and modify, as needed, measures implemented to mitigate the environmental effects of motor vessels in the park.

2.4 Action Area

The action area means "all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action" (50 CFR §402.02(d)). As such the action area for this Federal action includes all waters located inside the boundaries of Glacier Bay Park and Preserve, and those waters immediately adjacent to, and outside the entrance to, the Park boundaries where vessels will be funneled into the Park. Thus the action area would also include waters of Icy Strait between the Park entrance and Point Adolphus.

Chapter 3.2.1 (NPS 2003) provides a physical and oceanographic description of Glacier Bay National Park and Preserve.

3.0 STATUS OF SPECIES AND CRITICAL HABITAT

The following species summaries were abstracted and compiled from the information found in the Alaska Marine Mammal Stock Assessments, 2002 (Angliss et al. 2002); Chapter 3 - Affected Environment (NPS 2003); Chapter 3 - Status of Species and Critical Habitat, NOAA Fisheries (2001a); NOAA Fisheries (2001b); and scientific literature, reports and research summaries as identified in the literature cited.

3.1 Steller Sea Lions (*Eumetopias jubatus*)

The Steller sea lion (*Eumetopias jubatus*) is the only species of the genus *Eumetopias*, and is a member of the family Otariidae, order Pinnipedia. The closest relatives of the Steller sea lion appear to be the other sea lion genera, including *Zalophus*, *Otaria*, *Neophoca*, and *Phocarctos;* and fur seals of the genera *Callorhinus* (Northern fur seals) and *Arctocephalus*. Loughlin *et al*. (1987) provide a brief but informative summary of the fossil record for *Eumetopias*. Repenning (1976) suggests that a femur dated 3 to 4 million years old may have been from an ancient member of the *Eumetopias* genus, thereby indicating that the genus is at least that old. *Eumetopias jubatus* likely evolved in the North Pacific (Repenning 1976).

Steller sea lions range along the North Pacific Rim from northern Japan to California (Loughlin et al. 1984), with centers of abundance and distribution in the Gulf of Alaska (GOA), and the Bering Sea and Aleutian Islands (BSAI), respectively, and along the eastern shore of the Kamchatka Peninsula. The GOA and the Aleutian Islands are considered the geographic center of the sea lions' distribution (Kenyon and Rice 1961). The species is not known to migrate, but individuals disperse widely outside of the breeding season (late May-early July), thus potentially intermixing with animals from other areas. Despite the wide ranging movements

of juveniles and adult males in particular, exchange between rookeries by breeding adult females and males (other than between adjoining rookeries) appears low (NMFS 1995).

The breeding range of the Steller sea lion covers virtually all of the North Pacific Rim from about 34 N to 60 N lat. Within this range, sea lions are found in hundreds of rookeries and haulouts. These rookery and haulout sites can be grouped in rookery/haulout clusters on the basis of politics, geography, demographic patterns, genetics, foraging patterns, or other reasons related to scientific study or management. Geographic distinctions are frequently made on the basis of variable habitat or ecosystem characteristics in differing parts of the range. For example, rookeries and haulouts in the Aleutian Islands are often separated from those in the GOA, and these two areas are again separated from southeastern Alaska and British Columbia. These distinctions may have demographic significance because of the important variability in ecosystem features such as prey resources.

Loughlin (1997) recommended reclassifying the one stock structure of Steller sea lions based on the phylogeographic approach of Dizon et al. (1992). This approach examined 1) distributional data: geographic distribution continuous, yet a high degree of natal site fidelity and low (<10%) exchange rate of breeding animals between rookeries; 2) population response data: substantial differences in population dynamics (York et al. 1996); 3) phenotypic data: unknown; and 4) genotypic data: substantial differences in mitochondrial DNA (Bickham et al. 1996). Based on available information information, two Distinct Population Segments (DPSs) of Steller sea lions are now recognized within U. S. waters: a western U. S. DPS which includes animals at, and west of, Cape Suckling , Alaska (144 W); and an eastern U. S. DPS which includes animals east of Cape Suckling, Alaska. Some of the western DPS of Steller sea lions move east of the management boundary separating the two populations and have been seen within the boundaries of Glacier Bay National Park (Matthews 2003). For that reason, both DPSs are considered in this biological opinion.

On November 26, 1990, the Steller sea lion was listed as threatened under the ESA (55 FR 40204), and on August 27, 1993 (58 FR 45269) critical habitat was designated based on observed movement patterns. In 1997 the Steller sea lion population was split into two separate stocks (western and eastern stocks) based on demographic and genetic dissimilarities (Bickham *et al.* 1996, Loughlin 1997)(62 FR 30772). Due to the continued decline, the status of the western stock was changed to endangered, while the status of the increasing eastern stock was left as threatened. Since 1977 the western population has continued to decline while the eastern population has maintained steady increases and may be considered for de-listing over the next few years if the positive trend continues.

3.1.1 Western Distinct Population Segment (DPS)

The Western DPS of Steller sea lions includes all animals at, and west of, Cape Suckling, Alaska (144 W). Some of the western DPS of Steller sea lions move east of the management boundary separating the two populations and have been seen within the boundaries of Glacier Bay National Park (Matthews 2003). For that reason, both DPSs are considered in this biological opinion.

(i) <u>Abundance</u>: Assessments of Steller sea lions are based largely on (a) aerial counts of nonpups (juveniles and adults) on rookeries and haulouts, and (b) counts of pups on rookeries in late June and early July. Both kinds of counts are indices of abundance, as they do not necessarily include every site where animals haul out, and they do not include animals that are in the water at the time of the counts. Population size can be estimated by standardizing the indices (e.g., with respect to date, sites counted, and counting method), by making certain assumptions regarding the ratio of animals present versus absent from a given site at the time of the count, and by correcting for the portion of sites counted. Population estimates from the 1950s and 1960s (e.g., Kenyon and Rice 1961; see also Trites and Larkin 1992, 1996) are used with caution

because counting methods and dates were not standardized, and the results contain inconsistencies that indicate the possibility of considerable measurement error at some sites in some years. Efforts to standardize methods began in the 1970s (Braham *et al*. 1980); as a result, counts conducted since the late 1970s are the most reliable index of population status and trends.

Recent comprehensive estimates (pups and non-pups) of Steller sea lion abundance in Alaska is based on aerial surveys and ground based pup counts in June and July 1998 from Southeast Alaska to the western Aleutian Islands (Sease and Loughlin 1999). Data from these surveys represent actual counts of pups and non-pups at all rookeries and major haulout sites in Alaska. During the 1998 survey, a total of 28,658 non-pups were counted; 12,299 in the GOA and 16,359 in the BSAI (Sease and Loughlin 1999). The 1998 counts for the GOA (12,299) were incomplete because only three of the 25 sites in the eastern GOA were surveyed during 1998. These three sites, however, are major rookeries and included a majority of the animals counted in the eastern Gulf subarea during the 1994 and 1996 surveys (52% and 60%, respectively). The 22 remaining sites were surveyed in 1999 and 757 animals were counted (NMFS, unpublished data). The pup counts were conducted at all known rookeries for this stock during 1998. There were 4,058 pups counted in the GOA and 5,315 pups counted in the BSAI for a total of 9,373 for the stock. Combining the pup count data from 1998 (9,373), non-pup count data from 1998 (28,658), and estimate for unsurveyed sites from 1999 (757) resulted in a 1998 minimum abundance estimate of 38,788 Steller sea lions in the western DPS.

All non-pup trend sites, haulout sites, and rookeries were surveyed during 2000 (Sease et al., 2001). During the 2000 survey, a total of 25,384 non-pups were counted: 11,738 in the GOA and 13,646 in the BSAI (Sease et al. 2001). The best available population estimate for the western DPS of Steller sea lions is the sum of the total number of non-pups counted in 2000 (25,384) and the number of pups counted in 1998 (9,211). Thus, the best available count in 2000 was 34,595, a decrease from the 1998 estimate of 38,788 animals.

(ii) Minimum Population Estimate (Nmin): The 2000 count of non-pups (25,384) plus the number of pups in 1998 (9,211) was 34,595 and is considered the minimum population estimate for the western DPS of Steller sea lions in 2000 (in Angliss et al. 2002).

(iii) Population Trend: The first reported trend counts (an index to examine population trends) of Steller sea lions in Alaska were made in 1956-60. Those counts indicated that there were at least 140,000 (no correction factors applied) sea lions in the GOA and Aleutian Islands (Merrick et al. 1987). Subsequent surveys indicated a major population decrease, first detected in the eastern Aleutian Islands in the mid-1970s (Braham et al. 1980). Braham *et al*. (1980) documented declines of at least 50% from 1957 to 1977 in the eastern Aleutian Islands, the heart of what now is the western DPS. Counts from 1976 to 1979 indicated about 110,000 sea lions (no correction factors applied). The decline appears to have spread eastward to the Kodiak Island area during the late 1970s and early 1980s, and then westward to the central and western Aleutian Islands during the early and mid-1980s (Merrick et al. 1987, Byrd 1989). The greatest declines since the 1970s occurred in the eastern Aleutian Islands and western GOA, but declines also occurred in the central GOA and central Aleutian Islands. Merrick *et al.* (1987) estimated a population decline of about 50% from the late 1950s to 1985 over a much larger geographical area, the central Gulf of Alaska through the central Aleutian Islands, although this still included a patchwork of regional counts and surveys. The population in the GOA and Aleutian Islands declined by about 50% again from 1985 to 1989, or an overall decline of about 70% from 1960 to 1989 (Loughlin *et al*., 1992). During the late 1980s the population from the Kenai Peninsula to Kiska Island in the central

Table 3.1: **Counts of adult and juvenile Steller sea lions observed at rookery and haulout trend sites by year and geographical area for the western U. S. June 21, 2003 DPS from the late 1970s through 1998**

Area	late 1970s	1990	1991	1992	1994	1996	1998	2000
Gulf of Alaska	65,296	16,409	14,598	13,193	11,862	9,784	8,937	7,995
Bering Sea/Aleutians	44,584	14,116	14,807	14,106	12,274	12.426	11,501	10,330
Total	109,880	30,525	29,405	27,299	24,136	22,210	20,438	18,325

Aleutian Islands declined at about 15.6% per year (York *et al.*, 1996). More recently, counts of Steller sea lions at trend sites for the western U. S. DPS decreased 40% from 1990 to 2000 (Table 3.1). Counts at trend sites during 2000 indicate that the number of sea lions in the Bering Sea/Aleutian Islands region has declined 10.2% between 1998 and 2000.

From 1991-2000, an average annual decline of 5.4% in non-pup counts at trend sites was reported by Loughlin and York (2000). From 2000 to 2002, the population of the western DPS increased by 5.5%. This was the first region-wide increase observed during more than two decades of surveys. Despite this increase, however, the 2002 count was still down 5% from 1998 and 34% from 1991. The average, long-term trend was a decline of 4.2% per year from 1991 to 2002. Trends were similar in the Kenai-to-Kiska subarea (four regions from the central Gulf of Alaska through the central Aleutian Islands), another geographical region used as a population index. Counts at the 70 Kenai-to-Kiska trend sites increased by 4.8% from 2000 to 2002 but decreased by 26% from 1991 to 2002. The long-term trend across the Kenai-to-Kiska region represents a decline of 3.1% per year from 1991 to 2002 (Sease, 2002).

Population viability analyses have been conducted for the western population by Merrick and York (1994) and York *et al.* (1996). The results of these analyses indicated that the next 20 years (from the publication of the paper) would be crucial for the western population of Steller sea lions, if the rates of decline observed at that time were to continue. Within this time frame, they determined the possibility that the number of adult females in the Kenai-to-Kiska region could drop to less than 5000. Extinction rates for rookeries or clusters of rookeries could also increase sharply in 40 to 50 years, and extinction for the entire Kenai-to-Kiska region could occur within 100–120 years. In a recent paper by Loughlin and York (2001), they estimated that the population may decline to only about 11,430 animals in the year 2020, of that only about 6,325 would be counted in the bi-annual survey, about a third of the current numbers. At that low an abundance, current survey techniques would have much higher errors associated with it and research would be difficult to undertake with few pups or juveniles available for studies with an adequate sample size. Although the recent survey estimate is encouraging, it will be at least 6-8 years before we are sure we have detected a true reversal in the sea lion decline. However, for all areas except the western Aleutian Islands, this positive trend could be a signal that this population is recovering. For the western Aleutian Islands, continued sharp declines could lead to the extirpation of sea lions from this region - however recent modeling has not been done on this sub-population within the western DPS.

3.1.1.1 <u>Occurrence of the Western DPS in the Action Area</u>: Matthews (2003) documented the occurrence of Steller sea lions from the Western DPS at South Marble Island in Glacier Bay National Park. The observations occurred during a vessel-interaction study during 1994, 1995 and 1997, 1998. Six identifiable individuals (tagged animals) were observed during the 1994-1997 period. None of the individually identifiable animals from the western DPS were seen in the action area in more than one year. Two other sea

lions observed in 1998 were possibly tagged in Russia given their tag numbers. Matthews estimated that these tagged animals represented 0.7-1.9% of the animals on South Marble Island. These numbers represent a minimum estimate of the number of animals in the Park from the Western DPS. Most of the animals were not tagged so it was impossible to determine their DPS origin, and the numbers do not include animals on Graves Rock, a haulout designated as critical habitat that occurs within the Park boundaries but outside the area of the study by Matthews.

3.1.2 Eastern Distinct Population Segment

The Eastern DPS of Steller sea lions includes all animals at, and east of Cape Suckling, Alaska (144 W), including most of the sea lions in the action area. Steller sea lions from this DPS are the most likely ones to be found in the action area inside Glacier Bay and along the Park's outer coastline. There are three designated rookeries in southeast Alaska; Hazy Island, White Sisters near Sitka and Forrester Island near Dixon Entrance. None of the designated rookeries are in the action area although one haulout has recently had pups on it during surveys, so a new rookery may have formed since critical habitat was designated for this species.

(i) Abundance: Steller sea lion abundance in Southeast Alaska was based on comprehensive aerial surveys performed in June 1996 (Sease et al. 1999, Sease and Loughlin 1999). Data from these surveys represent actual counts of pups and non-pups at all rookeries and major haulout sites in Southeast Alaska. In 1996 a total of 14,621 Steller sea lions were counted in Southeast Alaska, including 10,907 non-pups and 3,714 pups. Aerial surveys in 1998 and 2000 included the trend sites and other major sites. There were some differences between which major sites were surveyed in 1998 and 2000, so the total counts for each survey are not entirely comparable. The counts for 1998 and 2000 were 10,939 and 12,417, respectively (Sease and Loughlin 1999, Sease et al. 2001). Pup counts totaled 4,160 in 1997 and 4,257 in 1998 (Sease and Loughlin 1999). The total count for Southeast Alaska in 1998 is 15,196 (10,939 non-pups plus 4,257 pups); if we assume that the pup count is roughly stable, the total 2000 count for the eastern DPS would be 16,674 (12,417 non-pups plus 4,257 pups).

Aerial surveys and ground counts of California, Oregon, and Washington rookeries and major haulout sites were also conducted during the summer of 1996. A total of 6,555 Steller sea lions were counted in California (2,042), Oregon (3,990), and Washington (523), including 5,464 non-pups and 1,091 pups.

The eastern DPS of Steller sea lions is a transboundary population, including sea lions from British Columbia rookeries (see Wade and Angliss 1997 for discussion of transboundary populations or stocks). Aerial surveys were last conducted in British Columbia during 1994 and produced counts of 8,091 non-pups and 1,186 pups, for a total count of 9,277 (Dept. Fisheries and Oceans, unpubl. data, Pacific Biological Station, Nanaimo, BC, V9R 5K6, reported in Angliss et al. 2002). Complete count data are not available for British Columbia in 1996. However, because the number of Steller sea lions in British Columbia is thought to have increased since 1994, the 1994 counts represent a conservative estimate for the 1996 counts. Combining the total counts for the three regions results in a minimum estimated abundance of 31,028 (15,196 + 6,555 + 9,277) Steller sea lions in the eastern DPS.

The abundance estimate for the eastern U. S. stock is based on counts of all animals (pup and non-pup) at all sites and has not corrected for animals missed because they were at sea. A reliable correction factor to account for these animals is currently not available. As a result, this represents an underestimate for the total abundance of Steller sea lions in this DPS.

(ii) Minimum Population Estimate (Nmin): Angliss et al. (2002) estimated the minimum population estimate by adding 1998 counts from Southeast Alaska (15,196), 1996 counts from WA/OR/CA (6,555), and Canadian counts from 1994 (9,277). This resulted in a minimum population estimate for the eastern U. S. DPS

of Steller sea lions of 31,028. This count has not been corrected for animals which were at sea, and also uses the 1994 data from British Columbia where Steller sea lion numbers are thought to have increased.

(iii) Population Trend: In Southeast Alaska, counts (no correction factors applied) of non-pups at trend sites increased by 30% from 1979-2000 from 6,376 to 9,862 (Merrick et al. 1992, Sease et al. 2001)(Table 3.2). During 1979-97, counts of pups on the three rookeries in Southeast Alaska increased by an average of 5.9% per year. Since 1989 pup counts on the three rookeries increased at a lower rate (+1.7% per year) than for the entire period (Calkins et al. 1999). A slightly lower increase in pup counts (3.3% per year from 1979-97) is reported by Sease et al. (2001). In British Columbia, counts (no correction factors applied) of non-pups throughout the Province increased at a rate of 2.8% annually during 1971-98 (P. Olesiuk, pers. comm., Pacific Biological Station, Canada, reported in Angliss et al., 2002).

Steller sea lion numbers in California, especially in southern and central California, have declined from historic numbers. Counts in California between 1927 and 1947 ranged between 5,000 and 7,000 non-pups with no apparent trend, but have subsequently declined by over 50%, remaining between 1,500 and 2,000 non-pups during 1980-98. Limited information suggests that counts in northern California appear to be stable (NMFS 1995). At Año Nuevo, (central) California, a steady decline in ground counts started around 1970, resulting in an 85% reduction in the breeding population by 1987 (LeBoeuf et al. 1991). In vertical aerial photographic counts conducted at Año Nuevo, pups declined at a rate of 9.9% from 1990 to 1993, while non-pups declined at a rate of 31.5% over the same time period (Westlake et al. 1997). Pup counts at Año Nuevo have been steadily declining at about 5% annually since 1990. Overall, counts of non-pups at trend sites in California and Oregon have been relatively stable since the 1980s.

Based on recent trends in southeast Alaska and British Columbia, prospects for slow recovery of the eastern population are encouraging.

Table 3.2 Counts of adult and juvenile Steller sea lions observed at rookery and haulout trend sites by year and geographical area for the eastern U. S. DPS from the 1982 through 2000 (NMFS 1995, Strick et al. 1997, Sease et al. 1999, Sease and Loughlin 1999; P. Olesiuk, unpubl. data, Pacific Biological Station, Nanaimo, BC, V9R 5K6; ODF&W unpubl. data, 7118 NE Vandenberg Ave., Corvallis, OR 97330; Point Reyes Bird Observatory, unpubl. data, 4990 Shoreline Hwy., Stinson Beach, CA 94970; Sease et al. 2001). Central California data include only Año Nuevo and Farallon Islands. Trend site counts in northern California and Oregon include St. George, Rogue, and Orford Reefs. British Columbia data include counts from all sites

Area	1982	1990	1991	1992	1994	1996	1998	2000
Central CA	511[1]	655	537	276	512	385	208	349
Northern CA/OR	3,094	2,922	3,180	3,544	2,834	2,988	3,175	n/a
British Columbia	4,711	6,109[2]	no data	7,376	8,091	no data	9,818	n/a
Southeast Alaska	6,898	7,629	8,621	7,555	9,001	8,231	8,693	9,862
Total	15,214	--	--	18,754	20,263	--	21,864	n/a

[1] This count includes a 1983 count from Año Nuevo
[2] This count was conducted in 1987

3.1.3 Critical Habitat

The term "critical habitat" is defined in the ESA (16 U.S.C. 1532(5)(A) to mean:

> *(i) the specific areas within the geographic area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection; and (ii) the specific areas outside of the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential to the conservation of the species.*

The ESA also states that "Except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species."

By this definition, critical habitat includes those areas that are essential to the "conservation" of a threatened or endangered species. The ESA defines the term "conservation" as: ". . . to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary." That is, the status of the species would be such that it would be considered "recovered." Therefore, the area designated as critical habitat should contain the physical and biological features necessary to support and sustain a population of a threatened or endangered species that is sufficiently large and persistent to be considered recovered.

3.1.3.1 Designated Steller Sea Lion Critical Habitat: On August 27, 1993 NOAA Fisheries designated critical habitat for the threatened eastern DPS, and endangered western DPS, of Steller sea lions (August 27, 1993; 58 FR 45269) at 50 CFR §226.202. The areas designated as critical habitat for the Steller sea lion were determined using the best information available at the time. This included information on land use patterns, the extent of foraging trips, and the availability of prey items. Particular attention was paid to life history patterns and the areas where animals haul out to rest, pup, nurse their pups, mate, and molt. Critical habitat areas were finally determined based upon input from NOAA Fisheries scientists and managers, the Steller Sea Lion Recovery Team, independent marine mammal scientists invited to participate in the discussion, and the public.

3.1.3.2 Essential Features of Critical Habitat: Steller sea lions require both terrestrial and aquatic resources for survival in the wild. Land sites used by Steller sea lions are referred to as rookeries and haulouts. Rookeries are used by adult males and females for pupping, nursing, and mating during the reproductive season (late May to early July). Haulouts are used by all size and sex classes but are generally not sites of reproductive activity. The continued use of particular sites may be due to site fidelity, or the tendency of sea lions to return repeatedly to the same site, often the site of their birth. Presumably, these sites were chosen by sea lions because of their substrate and terrain, the protection they offer from terrestrial and marine predators, protection from severe climate or sea surface conditions, and the availability of prey resources.

The regulations at 50 CFR §424.12(b) outline those physical and biological features which should be considered when designating critical habitat for listed species:
(1) Space for individual and population growth, and for normal behavior;
(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;
(3) Cover or shelter;
(4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally;
(5) Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The physical and biological features of critical habitat essential to the conservation of Steller sea lions can be broken out into two major habitat categories; terrestrial and foraging habitat. These habitats have features that support successful foraging, resting, refuge, and reproduction. Critical habitat in the action area is considered a haulout and not used for reproduction.

(i) Terrestrial habitat: Because terrestrial areas are more easily observed by humans, terrestrial habitat is relatively easy to identify based on use patterns. The shoreline, offshore rocks, cliffs, and caves used by sea lions are likely chosen because they offer refuge from terrestrial predators (e.g., are inaccessible to bears), include suitable substrate for reproductive activities (pupping, nursing, mating), resting (haulouts), provide some measure of protection from the elements (e.g., wind and waves), and are in close proximity to prey resources. Generally, the rookery and haulout sites are well scattered along the Alaska shoreline. They provide access to a variety of prey resources which is represented in the scat collections taken from terrestrial sites (Sinclair and Zeppelin 2001).

Reports of disruption on rookeries and haulouts has been well documented. On rookeries, human disturbance may disrupt breeding and nursing activities, lead to pup abandonment, and possibly increase the likelihood of predation. On haulouts, disturbance can also lead to increased chance of predation and the disruption of the social structure of sea lions. Since the early 1990s and the passage of critical habitat regulations, as well as the Marine Mammal Protection Act, these terrestrial sites have been largely undisturbed by humans, and are not considered to be a major factor in the continued decline of the species. One of the main concerns in the 1980s was that animals were being shot at from vessels nearby rookeries and haulouts. This is considered to be a rare occurrence today.

(ii) Aquatic-Foraging habitat: Prey resources are the most important feature of marine critical habitat for Steller sea lions. Marine areas may be used for a variety of other reasons (e.g., social interaction, rafting or resting), but foraging is the most important sea lion activity that occurs when the animals are at sea.

The at-sea distribution of Steller sea lions is a critical element to any understanding of potential effects of fisheries on sea lions and their critical habitat. Substantial new information has been collected on the at-sea distribution of the western DPS of Steller sea lions as reported in Loughlin *et. al.* (2002) and ADF&G and NMFS (2001). Although not without limitations (discussed in ADF&G and NMFS 2001), information on location reflects the best scientific information available on the distribution of Steller sea lions in their aquatic habitat. Ideally, location would be combined with dive data to indicate at which locations sea lions are actively foraging. However, this combination of analyses is not yet available. In the absence of this combined information, NMFS must assume that information on location of sea lions does reflect, at least in part, where sea lions forage.

Marine foraging habitat designated as critical in the eastern DPSs include areas immediately around rookeries and haulouts. Rookery and haulout areas were chosen based on evidence that lactating, adult females took only relatively short foraging trips during the summer (20 km or less; Merrick and Loughlin 1997). These areas were also considered to be important because young-of-the-year sea lions took relatively short foraging trips in the winter (about 30 km; Merrick and Loughlin 1997) and are just learning to feed on their own, so the availability of prey in the vicinity of rookeries and haulouts appeared crucial to their transition to feeding themselves. Recent work by Loughlin *et al.* (2002), Sinclair and Zeppelin (2002), and DeMaster *et al* (2001) provide detailed information about sea lion habitat revealing what features of critical habitat that may be more important than others.

3.1.3.3 Description of Steller Sea Lion Critical Habitat in the Action Area: Steller sea lion critical habitat is listed in 50 CFR §226.202. All major Steller sea lion rookeries are identified in Table 1 [their Table 1] and major haulouts in Table 2 [their Table 2] along with associated terrestrial, air, and aquatic zones.

(i) Eastern DPS of Steller Sea Lions: Critical habitat for the eastern DPS includes the following areas:

> A terrestrial zone that extends 3,000 feet (0.9 km) landward from the baseline or base point of each major rookery and major haulout
>
> An air zone that extends 3,000 feet (0.9 km) above the terrestrial zone, measured vertically from sea level
>
> An aquatic zone that extends 3,000 feet (0.9 km) seaward in State and Federally managed waters from the baseline or basepoint of each major haulout in Alaska that is east of 144 W long.

The only haulout designated as critical habitat for Steller sea lions in the immediate action area is Graves Rocks. The Graves Rocks haulout is designated as critical habitat for the eastern DPS of Steller sea lions and is located within the Park boundaries (50 CFR §226.202, Table 2). Little is known about the foraging habitat in the immediate vicinity of the Graves Rocks haulout. However, this designated haulout is sufficiently remote and offers a measure of protection due to its location inside Park boundaries, that it is not believed that disturbance at this location is a major factor in either the population trends or abundance, or the ability to sea lions to successfully forage.

Raum-Suryan and Pitcher (2000) (reported in NPS 2003) reported up to 49 pups at this location in 2000 and 2001; therefore this may have become a new rookery since critical habitat was designated.

(ii) Western Distinct Population Segment of Steller Sea Lions: There are no areas designated as critical habitat for the western DPS in the Action Area.

3.2 Central North Pacific Humpback Whale (*Megaptera novaeangliae*) Population

The humpback whale, Megaptera novaeangliae, belongs to the Order Cetacea, suborder Mysteceti. The mysticeti are baleen whales, named for the comb-like plates (baleen) descending from the roof of the mouth that are used to filter prey. Humpback whales are in the family of rorquals, the Balaenopteridae.
The humpback whale is distributed worldwide in all ocean basins. Most humpback whales occur in the temperate and tropical waters of the northern and southern hemispheres in the winter (from 10 -23 latitude). During this period, breeding and reproductive activities are the principal focus of humpback whales. During the warmer months, humpback whales move to northern latitudes where feeding is the principal activity. The historic feeding range of humpback whales in the North Pacific included coastal and inland waters around the Pacific rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Nemoto 1957, Tomlin 1967, Johnson and Wolman 1984).

Three management units (stocks or population stocks) of humpback whales currently are recognized in the North Pacific. The following units migrate between their respective summer/fall feeding areas to winter/spring calving and mating areas in the North Pacific (Calambokidis et al. 1997, Baker et al. 1998):

> 1) the California/Oregon/Washington and Mexico population stock which are found winter/spring in coastal Central America and Mexico and migrate to the coast of California

to southern British Columbia in summer/fall (Calambokidis et al. 1989, Steiger et al. 1991, Calambokidis et al. 1993);

2) the Central North Pacific population stock which are found winter/spring in the Hawaiian Islands and migrate to northern British Columbia/Southeast Alaska (including Glacier Bay) and Prince William Sound west to Kodiak (Baker et al. 1990, Perry et al. 1990, Calambokidis et al. 1997); and

3) the Western North Pacific population stock which occurs in winter/spring off Japan and, based on Discovery Tag information, probably migrate to waters west of the Kodiak Archipelago (the Bering Sea and Aleutian Islands) in summer/fall (Berzin and Rovnin 1966, Nishiwaki 1966, Darling 1991).

There are currently insufficient data to apply the Dizon et al. (1992) phylogeographic approach to classify any further population structure to humpback whales in the North Pacific. Recent discussions within the Alaska Scientific Review (SRG) group and between the Alaska SRG and NMFS have considered redesignating humpback whales of the Central North Pacific stock into separate population segments based on their summer feeding grounds. This approach would potentially create new stocks based on feeding aggregations in Southeast Alaska and several other places within the range of the Central North Pacific stock of humpback whales. Should this occur, the animals in Glacier Bay could be redesignated as part of a new, and separate Southeast Alaska population stock. However, this approach has not as yet been adopted. Until further information becomes available, the currently accepted management units of humpback whales (as described above) are recognized by NOAA Fisheries pursuant to the MMPA. However, it needs to be understood that only one humpback whale population or DPS exists in the North Pacific pursuant to the ESA. NOAA Fisheries recognizes that while only one DPS of humpback whales is found in the North Pacific Ocean, it is doubtful that animals from anything other than the central North Pacific population stock (as identified in Angliss et al. 2002) occurs within the action area. Therefore, for purposes of this consultation, we are going to focus on the Central North Pacific stock and refer to it as a population. This is the group of humpback whales that will be affected by the proposed action and while it is not considered a DPS under the ESA, it is appropriate to focus the analysis of effects of the action on this stock or "population."

(i) Abundance: Baker and Herman (1987) used capture-recapture methodology to estimate the wintering population at 1,407 (95% CI 1,113-1,701), which they considered an estimate for the entire population (NMFS 1991). However, the robustness of this estimate is questionable due to the opportunistic nature of the survey methodology in conjunction with a small sample size. Further, the data used to produce this estimate were collected between 1980 and 1983.

The most recent abundance estimate of humpback whales throughout the North Pacific is based on data collected by nine independent research groups that conducted photo-identification studies of humpback whales in the three wintering areas (Mexico, Hawaii, and Japan). Photographs taken between 1991 and 1993 were used to estimate abundance because samples throughout the entire North Pacific were the largest and most complete during this period. Using Darroch's (1961) method, which utilizes only data from wintering areas, and averaging the 1991-92, 1992-93, and 1991-93 winter release-recovery information resulted in an abundance estimate of 4,005 (CV = 0.095) for the Central North Pacific humpback whale population (Calambokidis et al. 1997). This is the estimate used to assess effects to this listed species by the proposed action. The current annual abundance estimate for the North Pacific population is 6,010 animals (Calambokidis et al. 1997). Therefore the Central North Pacific population consists of 67% of the total number of whales in the entire North Pacific basin.

Using photographs of the unique markings on the underside of each whales' flukes, there were 149 individual humpback whales identified in Prince William Sound from 1977 to 1993 (von Ziegesar 1992, Waite et al. 1999). The abundance of the Prince William Sound feeding aggregation is thought to be less than 200 whales (Waite et al. 1999). The most recent estimate by Straley et al. (2002) indicated that the annual abundance of humpback whales in southeastern Alaska is around 961 animals. Waite et al. (1999) identified 127 individuals in the Kodiak area between 1991 and 1994, and calculated a total annual abundance estimate of 651 (95% CI: 356-1,523) for the Kodiak region. In the Northern British Columbia region (primarily near Langara Island), 275 humpback whales were identified from 1992 to 1998 (G. Ellis, pers. comm., Pacific Biological Station, Nanaimo, BC, V9R 5K6, reported in Angliss et al. 2002). These estimates represent minimum estimates for these feeding areas because the study areas did not include the entire geographic region (i.e., the southeast Alaska study area did not include waters to the south of Chatham Strait). In addition, little is known regarding humpback whale abundance where photo-identification effort is typically low, such as the waters between feeding areas, south of Chatham Strait (southeastern Alaska), the eastern Gulf of Alaska and west of Kodiak Island. As a result, the sum of the estimates from these feeding aggregations (approximately 2,100) is considerably less than 4,005 animals.

(ii) Minimum Population Estimate: The minimum population estimate for this population is calculated according to Equation 1 from the PBR Guidelines (Wade and Angliss 1997): The minimum population estimate = $N/\exp(0.842\ [\ln(1+[CV(N)]^2)]^{½})$. Using the population estimate (N) of 4,005 and its associated CV(N) of 0.095, the minimum population estimate for this humpback whale stock is 3,698 (from Angliss et al. 2002).

(iii) Current Population Trend: The current population trend for the Central North Pacific stock of humpback whales is thought to be increasing. Comparison of the estimate provided by Calambokidis et al. (1997) with the 1981 estimate of 1,407 (95% CI 1,113 - 1,701) from Baker and Herman (1987) suggests that the stock has increased in abundance between the early 1980s and the early 1990s. However, the robustness of the Baker and Herman (1987) estimate is questionable due to the small sample size and the opportunistic nature of the survey. As a result, although the data support an increasing population size for this current Central North Pacific stock, it is not possible to assess the rate of increase (NMFS 2002).

3.2.1 Humpback Whales in Southeast Alaska with Emphasis on the Action Area

The humpback whales of the central North Pacific population show a high degree of fidelity to feeding areas. This fidelity is maternally directed; that is, whales return to the feeding areas where their mothers first brought them as calves (Martin et al. 1984, Baker et al. 1987). The humpback whales in the central North Pacific stock show fidelity to either the southeast Alaska or the Prince William Sound feeding areas. Photographs taken from 1979-1996 indicate that under 1% of the individual whales photographed in these areas moved between areas. Therefore, while humpback whales in Glacier Bay belong to a much larger population, a smaller group of whales return to the action area from year to year to forage.

The Park Service has monitored humpback whales in the bay every year since 1985 to document the number of individuals, residence times, spatial and temporal distribution, feeding behavior and interactions with vessels (Doherty and Gabriele 2001). This monitoring program covers most of Glacier Bay and Icy Strait. The number of whales using the park rises in mid-June, peaks in July and August, then declines again in September, and is lowest from October through April (NPS 2003).

Largely as a result of the site fidelity of foraging humpback whales to this area, the percentage of the range of the Central North Pacific population of humpback whales which occurs in Glacier Bay and adjacent waters, and the number of animals that return annually to the action area, are both relatively small compared to the overall range and abundance of the entire population. The number of whales that used Glacier Bay and Icy

Strait each year from 1985 to 2002 ranged from 41 to 104 individuals (Doherty and Gabriele 2002). A current estimate of abundance for animals inside Glacier Bay is 169 (95% CI=97-229) (Straley et al. 2002). The most recent estimate of abundance for Southeast Alaska is 961 whales (95% CI = 657-1076) (Straley et al. 2002). Therefore the percentage of whales in Glacier Bay is approximately 18% of the total number of whale throughout southeast Alaska, and less than 5% of the entire Central North Pacific population.

Humpback whale abundance in Glacier Bay has shown some increase since the earlier counts in the Bay which were the basis for earlier biological opinions. Standardized counts for the Bay itself show a low of 15 animals in 1985 with generally increasing numbers to 62 animals in the Bay in 1998. The whale count has declined since 1998 to a low of 45 animals in 2001 and 44 animals in 2002. The total count of whales in 2002 was 85 whales; however most were seen in Icy Strait not in the Park. The overall number of whales in Glacier Bay and Icy Strait combined has generally increased over the last 20 years. In 2002 whales were first sighted in the Bay in April and through November. Survey effort is somewhat inconsistent; although the effort is consistently higher over the years in the months of June, July and August. Whales are generally distributed in nearshore areas as opposed to the main central areas of Glacier Bay (Doherty and Gabriele 2002).

The crude birth rate (calculated as the number of calves divided by total number of whales) of humpback whales in Glacier Bay has fluctuated over the last 20 years of data from a low of 4.0% to a high of 18.5%. There does not appear to be an apparent trend in crude birth rate during this 20 year span. The last two years (2001-2002) the crude birth rate was 12.1 and 12.9% respectively, up significantly from the previous three years (Doherty and Gabriele 2002). The number of calves observed in 2002 is the second highest number of calves that have been observed in the study area since 1982 and is significantly higher than the average number of calves per year (6.5) for all years studied.

Whales in the study area typically feed primarily on small schooling fishes such as capelin (*Mallotus villosus*), juvenile walleye pollock (*Theragra chalcogramma*), sand lance (*Ammodytes hexapterus*) and Pacific herring (*Clupea harengus pallasi*) (Wing and Krieger 1983; Krieger and Wing 1984, 1986) . Groups of whales have been commonly seen feeding at Point Adolphus, Bartlett Cove, and Pleasant Island Reef (reported in NPS 2003). The availability of prey species appears to vary from year to year within the Park, and the number of whales in the park each year is dependent to a great degree on the availability and concentrations of prey in the park each year. Low numbers of whales are believed to correlated with years of low prey availability.

3.2.2 Critical Habitat for Humpback Whales in the Action Area

Critical habitat has not been designated for humpback whales anywhere throughout their range.

3.2.2.1 <u>High-use "Whale Waters" in the Action Area</u>: NPS (2003) has identified "whale-waters" within the boundaries of the National Park and Preserve based on the high probability of whale occurrence by humpback whales in these waters. The definition of whale-waters is found at Chapter 2.2.3 of this document. Another area with the high probability of whale occurrence inside the action area but outside the boundaries of the Park is Pt. Adolphus, across Icy Strait from the entrance to the Park.

4.0 ENVIRONMENTAL BASELINE

4.1 Biological Factors That May Affect Listed Species Within the Action Area.

Natural factors that determine the biogeography of listed species in the action area include climate and oceanography, avoidance of predators, distribution and availability of prey, the reproductive strategy of the species (Steller sea lions only), and movement patterns between sites. The marine habitats of Steller sea lions and humpback whales in the North Pacific tends to reduce variation in important environmental or climatic features, allowing both listed species to disperse widely around the rim of the North Pacific Ocean. Avoidance of terrestrial predators must clearly be an important factor for Steller sea lions, as rookeries and haulouts are virtually all located at sites inaccessible to such predators. Distribution and availability of prey are likely critical determinants of the biogeography for both Steller sea lions and humpback whales, and probably determine the distribution of both species during their non–reproductive seasons.

The reproductive strategy of the species (Steller sea lions), on the other hand, requires aggregation at rookery sites, and therefore likely places important limits on the species' movement patterns and dispersion. Reproduction of Steller sea lions in the action area has recently been observed (Raum-Suryan and Pitcher 2000). Humpback whales do not calve in the area. Finally, movement patterns and site-fidelity between sites determine, in part, the extent to which such groups of sea lions at different rookeries and haulout sites, and different foraging stocks or assemblages for humpback whales in the Central North Pacific population of whales, are demographically independent.

4.1.1 Effects of Disease on the Status of Listed Species

As with any wild mammal population, a multitude of infectious (viral, bacterial, parasitic, or mycotic) or toxicological (heavy metal, organochlorine) diseases may affect both listed species especially Steller sea lions. Many anatomical and clinical studies have been performed to determine disease prevalence, with an ultimate goal of determining incidence, interactions with environment, and what role disease may play in the population decline or as an impediment to recovery. Disease has not been considered to have played a significant role in the overall decline of the western stock of Steller sea lions (NMFS, 1995), but it is inconclusive to what extent it played as a contributory factor, and to what extent disease may be operating as a limitation to recovery. In declining populations, decreased genetic diversity and synergistic effects from chemical contaminant toxicity can act to compound factors that lead to reduced fitness (Bickham *et al.*, 2000). Disease is not believed to be a factor in the population trends of either the eastern DPS of Steller sea lions or humpback whales in the action area.

4.1.2 Effects of Climatic Variability on Prey Availability And Species Foraging: From 1940-1941 an intense Aleutian Low was observed over the BSAI, and GOA, this was followed from December 1976 to May 1977 with an even more intense Aleutian Low. During this latter period, most of the North Pacific Ocean was dominated by this low pressure system which signaled a change in the climatic regime of the BSAI, and GOA (NRC, 1996). The system shifted from a "cold" regime to a "warm" regime that persisted for several years. Since 1983, the GOA and Bering Sea have undergone different temperature changes. Sea surface temperatures in the GOA were generally above normal and those in the Bering Sea were below normal. The temperature differences between the two bodies of water have jumped from about 1.1 C to about 1.9 C. Recent evidence now indicates that another regime shift occurred in the North Pacific in 1989 (NRC, 1996).

Most scientists agree that the 1976/77 regime shift dramatically changed environmental conditions in the BSAI and GOA (Benson and Trites, 2000). However, there is considerable disagreement on how and to what degree these environmental factors may have affected both fish and marine mammal populations. Productivity of the Bering Sea was high from 1947 to 1976, reached a peak in 1966, and declined from 1966 to 1997. Some authors suggest that the regime shift changed the composition of the fish community and reduced the overall biomass of fish by about 50 percent (Merrick *et al.,* 1995; Piatt and Anderson, 1996). Other authors suggest that the regime shift favored some species over others, in part because of a few years of very large recruitment and overall increased biomass (Beamish, 1993; Hollowed and Wooster, 1995; Wyllie-Echeverria and Wooster, 1998).

It is reasonable to conclude that the regime shift created environmental conditions that produced very large year classes of gadids (i.e. pollock and Pacific cod). However, because of the historically high catches of gadids before the regime shift occurred, it is not likely that the regime shift favored gadids in a way which would allow them to out- compete other fish species and dominate the ecosystem, although the absolute level of biomass is not well known. The important question is whether the diet of listed species was adversely affected by the regime shift.

Shima *et. al.* (2000), looked at the GOA and three other ecosystems which contained pinniped populations, similar commercial harvest histories, environmental oscillations, and commercial fishing activity. Of the four ecosystems only the GOA pinniped population (western DPS of Steller sea lions) were decreasing in abundance. They hypothesized that the larger size and restricted foraging habitat of Steller sea lions, especially for juveniles that forage mostly in the upper water column close to land, may make them more vulnerable than other pinnipeds to changes in prey availability. They further reasoned that because of the behavior of juveniles and nursing females, the entire biomass of fish in the GOA might not be available to them. This would make them much more susceptible to spatial and temporal changes in prey, especially during the critical winter time period (Shima *et. al.*, 2000).

The eastern DPS of Steller sea lions have not been affected by environmental influences in the same manner as has the western DPS. Forage appears to be available in sufficient quantities to the eastern DPS such that reproduction and survival have not been compromised. The eastern DPS of Steller sea lions continues to increase in abundance at approximately 1.8% per year.

Other natural factors such as local prey fluctuations may occur and could affect humpback whales. However, prey fluctuations within Glacier Bay and waters immediately adjacent to the Bay, are not likely to be caused by these large-scale environmental influences affecting the western DPS of Steller sea lions in the BSAI or western GOA. The quantification of prey fluctuations is not possible at this time with few data available.

4.2 Known Anthropogenic Factors Affecting the Species Environment

Anthropogenic, or human-caused, activities can affect listed species through incidental takes, or through directed taking by several methods. Those discussed in this section include commercial fishing; direct takes from the subsistence harvest (Steller sea lions only); vessel traffic and disturbance; and vessel noise and disturbance.

4.2.1 Direct Effects of Commercial Fishing on Listed Species

A primary source of data for the rate of mortalities that occur incidental to commercial groundfish fishing is from the North Pacific Groundfish Observer Program database.

4.2.1.1 Direct Effects of Commercial Fishing on Listed Species: Six different commercial fisheries operating within the range of the western DPS of Steller sea lions were monitored for incidental take by fishery observers during 1990-1999. However, many fisheries known to interact with Steller sea lions have not been observed, and thus estimates of direct takes by fisheries should be considered minimum estimates. The mean annual estimate of (total) mortality for the most recent 5-year period was 7.8 (CV = 0.21) for the Bering Sea groundfish trawl fishery, 0.6 (CV = 0.6) for the GOA groundfish trawl fishery, and 1.2 (CV = 1.0) for the GOA groundfish longline fishery. Combining the mortality estimates from all fisheries interacting with the western DPS of sea lions results in an estimated mean annual mortality rate in the observed fisheries of 24.1 (CV = 0.6) sea lions per year from the western DPS (Table 4.1, data from Angliss et al. 2002).

Entanglement of Steller sea lions in derelict fishing gear or other materials seems to occur at frequencies that do not have significant effects upon the population. Entanglement of sea lions in derelict fishing gear or other marine debris does not appear to represent a significant threat to the population.

Table 4.1: Summary of incidental mortality of Steller sea lions (western U. S. stock) due to commercial fisheries from 1990 through 2000 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from self-reported fisheries information. Data from 1996 to 2000 (or the most recent 5 years of available data) are used in the mortality calculation when more than 5 years of data are provided for a particular fishery. n/a indicates that data are not available. * Data from the 1999 Cook Inlet observer program are preliminary.

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Bering Sea/Aleutian Is. (BSAI) groundfish trawl	90-00	obs data	53-76%	13, 13, 15, 4, 9, 2, 4, 6, 6, 8, 6	13, 19, 21, 6, 11, 3, 4, 10, 9, 9, 7	7.8 (CV = 0.21)
Gulf of Alaska (GOA) groundfish trawl	90-00	obs data	33-55%	2, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0	4, 0, 0, 3, 3, 0, 0, 0, 3, 0, 0	0.6 (CV = 0.6)
GOA groundfish longline (incl. misc. finfish and sablefish fisheries)	90-00	obs data	8-21%	1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1	2, 0, 0, 0, 1, 4, 0, 0, 0, 0, 6	1.2 (CV = 1.0)
Prince William Sound salmon drift gillnet	90-91	obs data	4-5%	0, 2	0, 29	14.5 (CV = 1.0)
Prince William Sound salmon set gillnet	90	obs data	3%	0	0	0
Alaska Peninsula/Aleutian Islands salmon drift gillnet	90	obs data	4%	0	0	0
Cook Inlet salmon set gillnet*	99-00	obs data	2-5%	0, 0	0, 0	0

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Cook Inlet salmon drift gillnet*	99-00	obs data	2-5%	0, 0	0, 0	0
Observer program total						24.1 (CV = 0.64)
				Reported mortalities		
Alaska Peninsula/Aleutian Islands salmon set gillnet	90-00	self reports	n/a	0, 1, 1, 1, n/a n/a, n/a, n/a, n/a	n/a	[≥0.75]
Bristol Bay salmon drift gillnet	90-00	self reports	n/a	0, 4, 2, 8, n/a n/a, n/a, n/a, n/a, n/a	n/a	[≥3.5]
Prince William Sound set gillnet	90-00	self reports	n/a	0, 0, 2, 0, n/a n/a, n/a, n/a, n/a, n/a	n/a	[≥0.5]
Alaska miscellaneous finfish set gillnet	90-00	self reports	n/a	0, 1, 0, 0, n/a n/a, n/a, n/a, n/a, n/a	n/a	[≥0.25]
Alaska halibut longline (state and federal waters)	90-00	self reports	n/a	0, 0, 0, 0, 1 n/a, n/a, n/a, n/a, n/a	n/a	[≥0.2]
Alaska sport salmon troll (non-commercial)	93-00	strand	n/a	0, 0, 0, 0, 1, 0, n/a	n/a	[≥0.2]
Minimum total annual mortality						≥29.5 (CV = 0.64)

The number of animals taken from the eastern DPS of Steller sea lions by commercial fisheries during the period 1990-1998 in the Southeast Alaska salmon drift gillnet fishery (Table 4.2) resulted in an annual mean of 1.25 mortalities from interactions with commercial fishing gear. However, because logbook records (fisher self-reports required during 1990-94) are most likely negatively biased (Credle et al. 1994), these are

considered to be minimum estimates. During 1990, 11 Steller sea lion injuries incidental to the Alaska salmon troll fishery and one Steller sea lion injury incidental to the CA/OR/WA salmon troll fishery were reported. Logbook data are available for part of 1989-1994, after which incidental mortality reporting requirements were modified. Under the new system, logbooks are no longer required; instead, fishers provide self-reports. Data for the 1994-95 phase-in period is fragmentary. After 1995, the level of reporting dropped dramatically, such that the records are considered incomplete and estimates of mortality based on them represent minimums.

Table 4.2 Summary of incidental mortality of Steller sea lions (eastern U. S. DPS) due to commercial and tribal fisheries from 1990-2000 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from self-reported fisheries information or stranding data. Data from 1996-2000 (or the most recent 5 years of available data) are used in the mortality calculation when more than 5 years of data are provided for a particular fishery. n/a indicates that data are not available. * indicates a mortality seen by an observer, but during an unmonitored haul; because the haul was not monitored, no extrapolation can be done (from Angliss et al. 2002)

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
CA/OR thresher shark and swordfish drift gillnet	90-00	obs data	4-27%	0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0	0, 0, 7, 0, 6, 0, 0, 0, 0, 0, 0	0
WA/OR/CA groundfish trawl (Pacific whiting component)	90-00	obs data	44-72%	0, 0, 0, 0, 1, 0, 0, 2, 0, 0, 0	0, 0, 0, 0, 1, 0, 0, 2, 0, 0, 1*	0.5 (CV = 1.0)
Northern WA marine set gillnet (tribal fishery)	90-98	obs data	47-98%	0, 0, 0, 0, 0, 0, 1, 0, 0	0, 0, 0, 0, 0, 0, 1, 0, 0	0.2 (CV = 1.0)
Observer program total						0.7 (CV = 1.0)
				Reported mortalities		
Southeast Alaska salmon drift gillnet	90-00	self reports	n/a	0, 1, 2, 2, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[≥1.25]
Alaska salmon troll	92-00	strand data	n/a	0, 0, 0, 1, 0, 0, n/a, n/a	n/a	[≥0.2]
British Columbia aquaculture predator control program	91-00	permit reports	n/a	14, 8, 10, 11, 6, 13, 34, 63, 91, na , na	n/a	41.4

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Minimum total annual incidental mortality (includes an estimate of 0.8 fishery-related strandings per year; see text)						≥2.85 (CV = 1.0)
Minimum total annual mortality (includes intentional mortalites in the BC predator control program)						≥44.3 (CV = 1.0)

Stranding reports of Steller sea lions entangled in fishing gear or with injuries caused by interactions with gear are another source of mortality data. During the 5-year period 1995-1999, there were 4 fishery-related strandings in Southeast Alaska. One of these strandings has been attributed to the Alaska salmon troll fishery and has been included in Table 4.2. Details regarding which fishery may be responsible for other fishery-related strandings between 1994-99 is not available at this time. In 2000, there were reports of 3 Steller sea lions observed in southeast Alaska with "flashers" lodged in their mouths and one animal entangled in fishing line; all animals were alive when seen. It is not clear whether these entanglements resulted from the commercial or recreational fisheries, nor is it clear whether the interactions resulted in mortality. However, based on Angliss and DeMaster (1998), it would be appropriate to call these "serious injuries". During the 5-year period from 1996-2000, there were 6 fishery-related stranding events. This results in an estimated annual mortality of 1.2 animals from this population. This estimate is considered a minimum because not all entangled animals strand and not all stranded animals are found or reported.

Stranding reports of Steller sea lions entangled in fishing gear or with injuries caused by interactions with gear are another source of mortality data. During the 5-year period 1995-1999, there were 4 fishery-related strandings in Southeast Alaska. One of these strandings has been attributed to the Alaska salmon troll fishery and has been included in Table 4.2. Details regarding which fishery may be responsible for other fishery-related strandings between 1994-99 is not available at this time. In 2000, there were reports of 3 Steller sea lions observed in southeast Alaska with "flashers" lodged in their mouths and one animal entangled in fishing line; all animals were alive when seen. It is not clear whether these entanglements resulted from the commercial or recreational fisheries, nor is it clear whether the interactions resulted in mortality. However, based on Angliss and DeMaster (1998), it would be appropriate to call these "serious injuries". During the 5-year period from 1996-2000, there were 6 fishery-related stranding events. This results in an estimated annual mortality of 1.2 animals from this population. This estimate is considered a minimum because not all entangled animals strand and not all stranded animals are found or reported.

The minimum estimated mortality rate incidental to commercial fisheries (both U.S. and Canadian) is 3.35 sea lions per year, based on observer data (0.7), self-reported fisheries information (1.25), and stranding data (0.2 + 1.2 = 1.4) (Table 4.2, from Angliss et al. 2002).

4.2.1.2 Direct Affects of Commercial Fisheries on the Central North Pacific Humpback Whale Population: Four different commercial fisheries operate in Alaska waters within the range of the Central North Pacific humpback whale stock, and were monitored for incidental take by fishery observers during 1990-1999 BSAI groundfish trawl, GOA groundfish trawl, longline, and pot fisheries. One humpback whale mortality was observed in the BSAI groundfish trawl fishery in 1998 and one in 1999. Average annual mortality from the observed fisheries in Alaska was 0.4 humpbacks from this stock (Table 4.3). The range of observer coverage for this fishery, as well as the annual observed and estimated mortalities, are presented in Table 4.3.

The observer program in the Hawaii in 1994 became mandatory and observer coverage has been approximately 4-5% since that time. Fishery observers recorded one humpback whale entangled in longline gear in 1991. The fate of this animal is unknown, though it is presumed to have died. The mortality rate was not estimated from the 1991 mortality due to the low level of observer coverage in that year (<1%). Therefore, that single mortality also appears as the estimated mortality for 1991 and should be considered a minimum estimate. Note that another humpback whale was reported by fishers and whalewatch operators entangled in longline gear off Maui during 1993 (E. Nitta, pers. comm, NOAA Fisheries). This report was never confirmed and the fate of this animal is also unknown. The estimated mean annual mortality rate in all observed fisheries during the 5-year period from 1994-98 is 0.2 humpback whales per year from this stock.

An additional source of information on the number of humpback whales killed or injured incidental to commercial fishery operations is the self-reported fisheries information required of vessel operators pursuant to the MMPA. In 1994, the incidental take of a humpback whale was reported in the Southeast Alaska salmon purse seine fishery. Another humpback whale is known to have been taken incidentally in this fishery in 1989, but due to its historic nature has not been included in Table 4.2. In 1996, a humpback whale was reported entangled and trailing gear as a result of interacting with the Southeast Alaska drift gillnet fishery. This whale is presumed to have died. Together, these two mortalities result in an annual mortality of 0.4 (0.2 + 0.2) humpback whales based on self-reported fisheries information (Table 4.3). This is considered to be a minimum estimate because logbook records (fisher self-reports required during 1990-94) are most likely negatively biased (Credle et al. 1994).

Reports of entangled humpback whales found swimming, floating, or stranded with fishing gear attached occur in both Alaskan and Hawaiian waters. Two such reports from Alaska are included in Table 4.3 because they could be attributed to the Southeast Alaska salmon drift gillnet fishery.

An entanglement of a humpback whale occurred in this fishery in 1992 but was reported as a stranding. In 1994, a humpback whale was reported in a weakened condition entangled in a fishing net with floats attached and is presumed to have died. Given the location of this animal (Chatham Strait), the mortality was attributed to the Southeast Alaska salmon drift gillnet fishery. Details of other strandings that occurred between 1992 and 1999 in these areas are presented in Table 4.4. Fishery-related strandings from Hawaii and Alaska during 1994-99 as listed in Table 4.4 result in an estimated annual mortality of 2.2 humpback whales from this stock. This estimate is considered a minimum because not all entangled animals strand and not all stranded animals are found, reported, or cause of death determined.

The estimated minimum mortality rate incidental to commercial fisheries is 4.1 humpback whales per year, based on observer data (0.4), and self-reported fisheries information (0.4) , stranding records traceable to a

Table 4.3: Summary of incidental mortality of humpback whales (Central North Pacific Population) due to commercial fisheries from 1990 through 2000 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate. For a particular fishery, the most recent 5 years of available data are used in the mortality calculation when more than 5 years of data are provided. n/a indicates that data are not available (from Angliss et al. 2002)

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Hawaii swordfish, tuna, billfish, mahi mahi, oceanic shark longline/setline	90-00	obs data	<1-5%	0, 1, 0, 0, 0, 0, 0, 0, 0, 0	0, 1, 0, 0, 0, 0, 0, 0, 0, 0	0
Bering Sea/Aleutian Is. (BSAI) groundfish trawl	90-00	obs data	53-74%	0, 0, 0, 0, 0, 0, 0, 0, 1, 0	0, 0, 0, 0, 0, 0, 0, 1, 1, 0	0.4 (CV = 0.61)
Observer program total						0.4
				Reported mortalities		
Southeast Alaska salmon drift gillnet	90-00	self reports	n/a	0, 0, 0, 0, n/a, n/a, 1, n/a, n/a, n/a, n/a	n/a	[≥0.2]
Southeast Alaska salmon purse seine	90-00	self reports	n/a	0, 0, 0, 0, 1, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[≥0.2]
Southeast Alaska salmon purse seine	92-00	stranding records		1 in 2000	n/a	[≥0.2]
Southeast Alaska salmon drift gillnet	92-00	stranding records	n/a	0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0	n/a	[≥0.2]
Crustacean pot		stranding records	n/a	1 each in 1998 and 1999	n/a	[≥0.4]
Minimum total annual mortality						[≥1.6]

specific fishery (0.8) and other stranding records indicating mortality or serious injury (Table 4.5). As mentioned previously, this estimate should be considered a minimum. No observers have been assigned to several fisheries that are known to interact with this stock, making the estimated mortality rate unreliable. Further, due to limited Canadian observer program data, mortality incidental to Canadian commercial fisheries (i.e., those similar to U.S. fisheries known to interact with humpback whales) is uncertain. Though interactions are thought to be minimal, the lack of data regarding the level of humpback whale mortality related to commercial fisheries in northern British

Table 4.4 Human-related strandings and entanglements of humpback whales (central North Pacific Population), 1996-2000. An asterisk in the "number" column indicates cases that were not considered serious injuries (from Angliss et al. 2002)

Year	Number	Area	Condition	Description
1996	1*	"Hawaiian waters"	Released alive	Disentangled from non-fishing gear
1996	1	Oahu, HI	Injured; status unknown	Ship strike
1996	1	Oahu, HI	Injured; status unknown	Partial disentanglement from Hawaiian crab fishery gear; some gear around pectoral fin and mouth still attached
1996	1	Sand Point, AK	Injured; status unknown	Released from fishing gear, but appeared injured; thought to have died
1996	1*	Alitak Beach, Kodiak Island, AK	Released alive	Released from commercial purse seine net
1997	1*	Island of Hawaii	Released alive	Alaska crab pot floats removed by U.S. Coast Guard
1997	1*	57 30 N 135 13 W NW Shelter Island	Alive	Collision with skiff
1997	1	Peril Straits, AK	Injured	Entangled in line; attempt to disentangle failed
1997	1	58 18 N 134 24 W NW Shelter Island	Injured	Tail wrapped in crab pot line
1997	1	58 21N 134 57 W NW Admiralty Island	Alive; entangled	Line and 2' diameter buoy attached
1998	1	Maalaea Bay, Lanai	Alive; entangled	Disentangled from gear, but some line still attached
1998	1	Sitka, AK	Alive; entangled	Commercial gillnet around flippers
1998	1*	Jakolof Bay	Alive	Disentangled from personal use pot gear
1998	1	Ketchikan, AK	Injury; status unknown	Salmon purse seiner net (commercial) torn through, thought to have died
1998	1	Juneau, AK	Injured	Ship strike (8/11)
1998	1	Juneau, AK	Entangled	No details available
1998	1*	Wrangell, AK	Alive	Commercial crab pot buoy removed
1998	1*	Homer, AK	Alive	Tanner crab pot cut loose
1998	1	Juneau, AK	Injured	Ship strike (9/24)
1998	1*	Sitka, AK	Alive	Commercial crab pot line cut free

1998	1	Ketchikan	Entangled	Swimming freely with pot gear attached
1999	1	Homer	Entangled	In crab pot gear; released
1999	1	Prince of Wales Island	Entangled	In unknown pot gear, released
1999	1	Metlakatla	Injury; status unknown	Ship strike
2000	1*	Lynn Canal	Entangled, released alive, status unknown	Purse seine gear
2000	1*	Skagway	Entangled, released alive	Shrimp pot gear
2000	1	Uyak Bay	Entangled	Unknown gear

Columbia are not available, again reinforcing the point that the estimated mortality incidental to commercial fisheries is underestimated for this stock.

At this time the number of entanglements that might result in serious injury or mortality for humpback whales is not known to be at a level to have population level effects on the Central North Pacific population.

4.2.1.3 Commercial Fishing inside the Immediate Action Area: Commercial fishing is authorized within the non-wilderness waters of the Park, subject to provisions in 36 CFR 13.65. Commercial fishing is administered pursuant to a cooperatively developed State/Federal park management plan, and existing federal law. Three types of fishing are authorized in Glacier Bay non-wilderness waters: longline fishing for halibut; pot and ring fishing for Tanner crab; and trolling for salmon (36 CFR 13.65(a)(3)). Of these only the fixed gear fishing may be of concern to listed species. Therefore incidental bycatch or competition for available fishes between commercial fisheries and listed species in the immediate action area (inside the Park boundaries) is minimized. The concern is primarily due to the potential for entanglement of humpback whales in longline or pot gear. All other commercial fishing is prohibited.

The indirect effects of fishing on prey availability or disruption of prey patterns is not a concern inside Glacier Bay. Both factors, prey fluctuations and entanglements in fishing gear, could also have some level of current impact outside of the Bay but on the same animals that frequent Glacier Bay waters. The level of entanglements in fishing gear in Southeast Alaska in general, has been increasing in recent years (NMFS unpublished data) and activity outside of the action area could affect those animals within the action area.

4.2.2 Direct Effects of the Subsistence Harvests on Listed Species

The 1992-1996 subsistence harvests of Steller sea lions in Alaska has been estimated by the Alaska Department of Fish and Game, under contract with the NMFS (Table 4.5; Wolfe and Mishler 1993, 1994, 1995, 1996, 1997; Wolfe and Hutchinson-Scarbrough 1999). Data were collected each year through systematic interviews with hunters and users of marine mammals in approximately 2,100 households in about 60 coastal communities within the geographic range of the Steller sea lion in Alaska.

4.2.2.1 Subsistence Harvest of the Western DPS of Steller Sea Lions: Steller sea lions are primarily taken for subsistence purposes in communities within the range of the western DPS. Pinniped

harvests in southeast Alaska tend to be dominated by harbor seals rather than Steller sea lions. Most Steller sea lions are harvested in the Pribilof Islands, well outside the action area. Estimates of the total number of sea lions taken (harvested plus struck and lost) during 1992 - 1998 ranged from 549 to 171 per year (Angliss *et al*., 2001), with an overall mean annual take of 329 sea lions for the entire period. Harvest levels typically have been lowest during June - August, peaking during September - November and declining through May, but this seasonality has been less pronounced since 1996 with declining harvest rates (Wolfe and Mishler, 1997). In 1998, an estimate of 171 Steller sea lions were taken, of which approximately 128 were harvested and 43 were struck and lost. Evidence indicates that the harvest levels in 1996 and 1997 were substantially lower than those in 1993- 1995. Data were not collected in 1999. Harvests in 2001 and 2002 have continued to decline.

4.2.2.2 Subsistence Harvest of Steller Sea Lions from the Eastern DPS: A very small percentage (<1%) of the statewide subsistence take of Steller sea lions was from the eastern U. S. population. The total subsistence take of Steller sea lions from this DPS was estimated at 6, 1, 5, 0, 0, and 0 animals in 1992-97, respectively. These values for total take include one animal per year during 1992-94 that was reported struck and lost. The mean annual subsistence take from this stock over the 3-year period from 1995 to 1997 was zero sea lions from this DPS.

Table 4.5 Summary of the subsistence harvest data for the western U. S. stock of Steller sea lions, 1992-98. Brackets indicate that the 1996 data remain in dispute and the 1997 data are preliminary. Subsistence harvest data were not collected in 1999 or 2000 (from Angliss et al. 2002)

Year	Estimated total number taken	95% confidence interval	Number harvested	Number struck and lost
1992	549	452-712	370	179
1993	487	390-629	348	139
1994	416	330-554	336	80
1995	339	258-465	307	32
1996	[179]	[158-219]	[149]	[30]
1997	[164]	[129-227]	[146]	[18]
1998	171	130-246	128	43
Mean annual take (1997-98)	167.5			

An unknown number of Steller sea lions from this stock are harvested by subsistence hunters in Canada. The magnitude of the Canadian subsistence harvest is believed to be small. Alaska Native subsistence hunters have initiated discussions with Canadian hunters to quantify their respective subsistence harvests, and to identify any effect these harvests may have on the cooperative management process.

4.2.2.3 Subsistence Harvest of Humpback Whales: Humpback whales are not harvested by Alaska Natives.

4.2.3 Other Direct Takes and Mortalities of Listed Species

(i): Illegal Shooting of Steller Sea Lions: The illegal shooting of Steller sea lions occurs, but the frequency of occurrence is difficult to estimate. NOAA Fisheries successfully prosecuted two cases of illegal shooting of sea lions in the Kodiak area in 1998, and two cases in southeast Alaska between 1995 - 1999 (Angliss *et al*., 2001). Illegal shooting of sea lions was thought to be a potentially significant source of mortality prior to the listing of sea lions as "threatened" under the ESA in 1990. Such shooting has been illegal since the species was listed as threatened. There are no reports of illegal takes in the action area. Strandings of Steller sea lions from the eastern DPS with gunshot wounds do still occur, along with strandings of animals entangled in gear that is not fishery-related.

During the period from 1996-99 human-related strandings of animals with gunshot wounds from this stock occurred in Oregon, Washington, and Alaska in 1996 (2 animals), 1997 (3 animals), 1998 (1 animal), and 1999 (2 animals), resulting in an estimated annual mortality of 2.0 Steller sea lions from this stock during 1996-99. This estimate is considered a minimum because not all stranded animals are found, reported, or cause of death determined (via necropsy by trained personnel). In addition, human-related stranding data are not available for British Columbia. Reports of stranded animals in Alaska with gunshot wounds have been included in the above estimates. However, it is not possible to tell whether the animal was illegally shot or if the animal was struck and lost by subsistence hunters (in which case the mortality would have been legal and accounted for in the subsistence harvest estimate). However, one of the two 1996 reports was from Alaska and has been included because there were no subsistence struck and lost reports during that year.

Stranding data also provide information on additional sources of potential mortality. In 2000, 4 Steller sea lions were entangled in rope or line that was not necessarily related to a commercial or recreational fishery, and one animal was seen entangled in a 14" tire. All of these animals were alive when sighted; the animal entangled in the tire was successfully released. It is not clear whether the occurrence of these interactions in stranding data in 2000 but not in previous years reflects an increase in these types of interactions or an increase in reporting. If the number of interactions is averaged over 5 years, the "other" interaction rate would be a minimum of one animal per year (from Angliss et al. 2002).

(ii) Predator Control: Steller sea lions are taken in British Columbia during commercial salmon farming operations. Preliminary figures from the British Columbia Aquaculture Predator Control Program indicated a mean annual mortality of 44 Steller sea lions from this DPS over the period from 1995 to 1999 (P. Olesiuk, pers. comm., Pacific Biological Station, Canada, reported in Angliss et al; 2002).

4.2.4 Effects of Historic Whaling on the Central North Pacific Population of Humpback Whales

The worldwide population of humpback whales was thought to have been in excess of 125,000 animals (NMFS 1991) pior to commercial whaling. Appoximately 15,000 animals were believed to have been present in the North Pacific prior to 1905. Intensive commercial whaling removed more than 28,000 animals from the North Pacific during the 20th century and may have reduced this population to as few as 1,000 before it was placed under international protection by the International Whaling Commission (IWC) in 1965. This estimate likely underestimates the actual kill as a result of under-reporting of the Soviet catches (Yablokov 1994).

Humpback whales are protected from hunting worldwide by the IWC. Humpback whales were listed as endangered under the ESA in 1973 due to the reduced population size that resulted from the significant mortality of commercial whaling. Humpback whales of the North Pacific basin have apparently been

increasing since being placed under the protection of the whaling moratorium. The Central North Pacific population has increased substantially in recent years based on available data; although the rate of that increase is not known because of uncertainty in earlier abundance estimates.

Whaling was considered the primary threat to the worldwide populations of humpback whales when the species was placed under the protection of the IWC. Commercial whaling is no longer a threat to this species.

4.2.5 Potential Direct Effects of Vessels on Listed Species

The past 7 years of opportunistic data on vessel collisions with humpback whales have shown an average of one humpback whale struck per year (Table 4.6). This is a minimum estimate as not all whales struck are reported and not all whales struck are identified to species or cause of mortality. The fate of struck animals is also not always determined unless the whale dies immediately upon impact or is discovered as a carcass on the bow of a ship and it can be determined that the strike was the cause of death.

Humpback whale distribution overlaps significantly with the transit routes of large commercial vessels that ply the waters off Alaska. The larger vessels are cruise ships, large tug and barge transport vessels and oil transport tankers. Cruise ships frequent the inside waters of Southeast Alaska, passing through areas of concentrated humpback whale abundance such as Glacier Bay National Park and Preserve, Point Adolphus and other areas adjacent to the action area. Tug and barge transport follows much of the traffic pattern of the cruise ships as they frequent the same coastal communities. Except for transit through Prince William Sound, oil transport tankers are generally operating farther offshore where there are presumably fewer concentrations of humpback whales.

Table 4.6 Vessel strikes of humpback whales in Alaska as reported to NMFS, Alaska Region 1996-2002. Condition of animal is as reported immediately after animal was struck. Fate of animals deemed "alive" is not known.

Year	Number	Animal Condition	Vessel speed	Location
2002	0			
2001	2	alive/inj dead	12kts unknown	Dixon Entrance Point Gustavus
2000	0			
1999	2	unknown dead	unknown unknown	Metlakatla 60mi S of Juneau
1998	2	alive alive	2 kts 15-18 kts	Juneau Juneau
1997	2	alive alive	22 kts unknown	Seward Juneau
1996	0			

Several incidents of vessel interactions with humpback whales in Glacier Bay were documented in 2002 (Doherty and Gabriele 2002). These included close approaches and possible harassment by several vessels

of different vessel classes including a kayak, a cruise ship and a float plane. Researchers also documented an injury to the dorsal fin that likely resulted from a vessel strike. It is likely that mortality of humpback whales will continue into the future and it is not known to what extent, if any, the proposed action will result in an increased rate of mortality as a result of ship-strikes.

4.2.6 Noise in the Action Area

Vessel noise is everywhere in the action area as a result of ambient conditions and noise from current operating procedures for vessels in the National Park. Chapter 3.2.2 (NPS 2003) provides a background for the levels of sound found in the action area which are produced from natural and anthropogenic sources. The reader is referred to this technical and thorough section for baseline information on sound in the action area.

4.3 Summary of Environmental Baseline Effects

Disease has not been considered to have played a significant role in the overall decline of the western stock of Steller sea lions (NMFS, 1995), but it is inconclusive to what extent it played as a contributory factor, and to what extent disease may be operating as a limitation to recovery. In declining populations, decreased genetic diversity and synergistic effects from chemical contaminant toxicity can act to compound factors that lead to reduced fitness (Bickham *et al.*, 2000). Disease is not believed to be a factor in the population trends of either the eastern DPS of Steller sea lions or humpback whales in the action area.

Environmental influences have affected the western GOA and BSAI during the past several decades. Those influences may be affecting the population trends of pinnipeds in those areas. The eastern DPS of Steller sea lions likely has not been affected by environmental influences in the same manner as has the western DPS. Forage appears to be available in sufficient quantities to the eastern DPS such that reproduction and survival have not been compromised. The eastern DPS of Steller sea lions continues to increase in abundance at approximately 1.8% per year. Other natural factors such as local prey fluctuations may occur and could affect humpback whales. However, prey fluctuations within Glacier Bay and waters immediately adjacent to the Bay, are not likely to be caused by these large-scale environmental influences affecting the western DPS of Steller sea lions in the BSAI or western GOA.

The direct effects of commercial fishing on Steller sea lions has been documented in Angliss et al. (2002) and are summarized in this section. The potential indirect effects of fishing on the western DPS of Steller sea lions has been the subject of much discussion in the past few years and has been summarized in several recent environmental impact analyses and biological opinions released by NOAA Fisheries on the effects of the GOA and BSAI on the western DPS of Steller sea lions (NOAA Fisheries 2000, 2001a, 2001b). Generally the western DPS of Steller sea lions minimally occurs in the action area. The eastern DPS of sea lions is found throughout the action area. The eastern DPS has been increasing and the effects of fishing in the action area on this population appear minimal. Recent observations suggest that a haulout has become a rookery in recent years suggesting little disturbance from any activity. The number of animals known to be taken by commercial fishing from this population is considered negligible pursuant to the MMPA.

The estimated minimum mortality rate of humpback whales from this population incidental to commercial fisheries is 4.1 whales per year, based on observer data, self-reported fisheries information, stranding records traceable to a specific fishery and other stranding records indicating mortality or serious injury. The level of entanglements in fishing gear in Southeast Alaska in general, has been increasing in recent years (NMFS unpublished data) and activity outside of the action area could affect those animals within the action area.

Three types of fishing are authorized in Glacier Bay non-wilderness waters: longline fishing for halibut; pot and ring fishing for Tanner crab; and trolling for salmon. Of these only the fixed gear fishing may be of concern to listed species. Therefore incidental bycatch or competition for available fishes between commercial fisheries and listed species in the immediate action area (inside the Park boundaries) is minimized. The concern is primarily due to the potential for entanglement of humpback whales in longline or pot gear. All other commercial fishing is prohibited. The indirect effects of fishing on prey availability or disruption of prey patterns is not a concern inside Glacier Bay. Both factors, prey fluctuations and entanglements in fishing gear, could also have some level of current impact outside of the Bay but on the same animals that frequent Glacier Bay waters.

Steller sea lions are primarily taken for subsistence purposes in communities within the range of the western DPS. Most Steller sea lions are harvested well outside the action area. Evidence indicates that the harvest levels in 1996 and 1997 were substantially lower than those in 1993- 1995. Data were not collected in 1999. Harvests in 2001 and 2002 have continued to decline. A very small percentage (<1%) of the statewide subsistence take of Steller sea lions was from the eastern U. S. population. The mean annual subsistence take from the eastern DPS over the 3-year period from 1995 to 1997 was zero sea lions from this DPS. Humpback whales are not harvested by Alaska Natives. Subsistence harvests are not considered a factor in the current trends of any of the listed species.

Whaling was considered the primary threat to the worldwide populations of humpback whales when the species was placed under the protection of the IWC and listed under the ESA. Intensive commercial whaling removed more than 28,000 animals from the North Pacific during the 20th century and may have reduced this population to as few as 1,000 before it was placed under international protection by the IWC in 1965. Commercial whaling is no longer a threat to this species. The Central North Pacific population has increased substantially in recent years based on available data.

The past 7 years of opportunistic data on vessel collisions with humpback whales have shown an average of one humpback whale struck per year. Humpback whale distribution overlaps significantly with the transit routes of large commercial vessels that ply the waters off Alaska including cruise ships. It is likely that mortality of humpback whales will continue into the future and it is not known to what extent, if any, the proposed action will result in an increased rate of mortality as a result of ship-strikes.

Vessel noise is everywhere outside and inside the action area as a result of ambient conditions and noise generated from vessels. The effects of noise on listed species is dependent upon several factors including intensity, duration, behavior of animal, and proximity of noise source to animal. The effect of vessel noise on listed species, especially humpback whales, is the principal factor that needs to be monitored as a result of this action. These effects are discussed in greater detail in section 5 of this document.

5.0 EFFECTS OF THE FEDERAL ACTION

Pursuant to Section 7(a)(2) of the ESA (16 U.S.C. §1536), federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of their critical habitat. This biological opinion assesses the effects of NPS' proposed vessel entry quota and operating requirements for Glacier Bay National Preserve and Park. In Section 2 of this biological opinion, NOAA Fisheries provided an overview of the proposed action, particularly the increase in the number of vessels by vessel type to be allowed into the Action Area under the proposed action and which might negatively affect listed species and/or adversely modify their critical habitat.

In this biological opinion, NOAA Fisheries assesses (1) the probable direct and indirect effects of the proposed action on two Distinct Population Segments of Steller sea lions, and the Central North Pacific population of humpback whales; and (2) the effect of the action on designated critical habitat for the eastern DPS of Steller sea lions that is located in the action area.. Critical habitat for the western DPS of Steller sea lions is not located in the action area, and critical habitat has not been designated for humpback whales. The purpose of the assessment is to determine if it is reasonable to expect that the proposed action can have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild, or destroy or adversely modify designated critical habitat for threatened and endangered species in the wild.

Alternative 3 (as identified in the March 2003 NPS DEIS) proposes to continue using existing vessel quotas and operating requirements within the bounds of Glacier Bay National Park and Preserve. The preferred alternative would apply to Glacier Bay proper. The proposed action addresses motorized use of Glacier Bay, with specific focus on potential increases in cruise ship traffic. The preferred NPS alternative would provide for potential future increases in cruise ships up to 184 for the season (June 1 to August 31). Any increase would be contingent on the completion of studies that demonstrate that increases would be compatible with Park resources and values. These studies are generally identified as studies focusing on air quality, humpback whales, nesting birds and visitor experience.

Alternative 6 maintains the current daily vessel quotas for all vessel types in Glacier Bay (NPS 2003, Chap 2.7, pp 2-16). However, the vessel management season for cruise ships would be extended into May and September, rather than from June 1-August 31 as in Alternative 3, to limit entries to the same average levels (1.5 entries per day) found in June-August, a decrease from the average of 2 per day in May and September allowed under Alternative 3. The other vessel classes would maintain the June through August season. Both Alternatives 3 and 6 allow a maximum of 25 private vessels per day. However Alternative 5 increases private vessel use in Glacier Bay to a maximum of 25 per day, every day (2,300 seasonal use days), in contrast to the average 22.2 private vessels per day (1,971 seasonal use days) under Alternative 3. Operating requirements would be modified from Alternative 3 including eliminating the unregulated traffic from vessels 'based in Bartlett's Cove,' decreased speed for large vessels throughout Glacier Bay not just in whale waters, and removing the designated whale waters except for those in the lower Bay.

This opinion examines the effects of an increase in cruise ship traffic from the current level of 139 vessels to a potential new level of 184 vessels in June through August. Tour and charter vessel quotas would remain the same as currently allowed. The existing operating requirements and vessel quotas represent the vessel management plan completed in 1996 and the plan for which NMFS did a Biological Opinion in 1993. The NPS proposed action would allow seasonal entries (i.e., June 1 through August 31) of the following vessel classes: cruise ships, 139 up to 184; tour vessels 276; and charter vessels 312, private vessels 2300. Daily

entries during this same period would be limited at 2 for cruise ships; 3 for tour vessels; 6 for charter vessels; and 25 for private vessels (under Alternative 6).

5.1 Factors Contributing to an Effect of the Action on Humpback Whales

Vessel traffic within Glacier Bay has the potential to affect humpback whales and Steller sea lions, and increases in vessel traffic within the Bay under the proposed action may increase the probability of an effect to a listed species in the Park. The following are factors that could contribute to the nature of an effect on listed species (from NPS 2003).

(i) Proximity to the Action and Distribution: The action area for the proposed vessel quota increase is Glacier Bay proper. Humpback whales in Park boundaries overlap significantly with the action. Humpback whales frequent the same waters as the vessel traffic going into the Bay, up the Bay to the tidewater glaciers and exiting the Bay by the same route. Indeed one of the objectives of the cruise ship and tour, charter and private vessel use of the Bay is to explicitly watch whales. Although motorized vessels in whale-waters are required to stay more than 1 mile off shore and are prohibited from approaching within ¼ mile of whales, the vessels are often in areas occupied by the whales. This overlap is somewhat restricted by the bathymetry of the Bay and the natural distribution of the whales in the Bay.

Humpback whales generally feed in nearshore, more shallow waters of the Bay. Steller sea lions are also more accessible for viewing at haulout locations. Along with the Park regulation, the large cruise ships are necessarily restricted by vessel draft to the deeper more mid-channel courses of the Bay. The smaller tour and charter vessels are more likely to travel closer to shore than larger vessels, as they are less restricted by water depth. The small private vessels, therefore have greater potential to travel closer to Steller sea lion haulouts in Glacier Bay proper and areas occupied by whales. Non-motorized vessels such as including kayaks, not considered as part of the NPS proposed action, are the most likely vessels to be in very close proximity to marine mammals in Glacier Bay. Kayaks are slow-moving, are more maneuverable, travel closer to shore and are more likely in direct search of a whale or sea lion for observation.

(ii) Timing: Vessel traffic is present in the Bay mainly during the summer months. This applies to the large cruise ships as well as the smaller vessel classes that serve the visitor industry. The less temporally predictable vessel class is the private vessel, which may be in the Bay earlier and later than those vessels of the tour industry.

The seasonal distribution of whales in Glacier Bay is such that it overlaps significantly with the presence of the tour industry vessels. As 2002 Glacier Bay Park data demonstrate, the first whale was observed in April and the last observations occurred in November. Cruise ship vessel traffic is more concentrated around the summer months of June through August but some pre and post season traffic in May and September has become increasingly popular in recent years. The seasonal peaks of whales also generally peaks in July and numbers typically remain high through September.

(iii) Nature of the Effect: Feeding in the productive waters off Alaska (including the Action Area) represents a critical component in the life history of both listed species, especially humpback whales. Feeding occurs in late spring through fall, during the same period of time that the cruise ships are present in the Bay. Humpback whales, although not limited to these areas, return to specific feeding locations such as Frederick Sound, Chatham Strait, North Pass, Sitka Sounds, Glacier Bay, Pt. Adolphus, and Prince William Sound, as well as other similar coastal areas. Should the animals not get enough food during the time spent in Alaska compensation will not occur in other locations or at other times of the year.

Increased vessel traffic could result in disturbance thereby interfering with the ability of humpback whales to access prey present in the Bay. Reduced prey consumption could place a nutritional stress on the animal that may reduce its individual fitness and potentially its contribution to the fitness of the whole population by impacting that individual's reproductive ability. For the group of whales that frequents the Bay, some of whom return annually, and may feed principally within Park waters, the impacts from cruise ship traffic could displace the animals from prime feeding sites or altogether from the Bay. Should such an effect occur, increases to the vessel traffic under the proposed action could exacerbate the potential negative effect on the animal or population.

Steller sea lions are also found in the Bay during the peak tourist season and foraging is a principal component of a sea lions behavior in waters adjacent to these haulouts. Anecdotal information suggests that animals have different tolerances to boat traffic. In some areas sea lions are known to co-exist with fishing vessels, often taking advantage of the presence of nets to catch fish, in other areas tour vessels have been known to come within a few feet of a sea lion haulout with no observed impact on the group. However, there are also anecdotal accounts of smaller cruise vessels sounding a loud horn in order to evacuate a haulout and provide a show for the tourists on board, and other accounts from research vessels indicate that the animals on most haulouts will become nervous when a boat is within 3,000-2,000 feet and abandon the site. Therefore there is some concern for the take of animals due to encroachment by humans near sites for viewing.

(iv) Duration and Frequency of Disturbance: The proposed action could increase the annual cruise ship limit from 139 vessels up to 184 vessels in Glacier Bay with most of that potential increase likely to occur during the early and later parts of the summer season of June 1 to August 31. This would result in an impact to humpback whales occurring during the whales' prime feeding period. The potential increases in vessel traffic would be in existence annually for the foreseeable future, which would likely result in the same whales being exposed to the same potential impact over a long period of time, because of the high rate of site fidelity of humpback whales to particular feeding areas.

5.2 Potential Direct and Indirect Effects of Vessel Numbers on Humpback Whales

Humpback whales within Glacier Bay may be affected by several direct and indirect factors as a result of implementing the preferred alternative: an increase in the number of collisions with cruise ships or other smaller vessels; harassment or displacement of the whales by vessels or disturbance of the whale prey by vessels which may cause whales to redistribute; an increase in acoustic impacts from vessel noise which could impede passive listening or damage or interfere with hearing; disruption and alteration of normal feeding, resting and other critical behaviors; habitat modification, including prey disruption; and ultimately, reduced fitness, leading potentially to reproductive effects or population level changes.

Glacier Bay currently allows 139 cruise ships in the Bay, the minimum level of vessel traffic that is expressed by the proposed action. Other vessel traffic such as tour, charter, and private boats is present in the Bay and could also produce some of the same effects on humpback whales. The potential for vessels to cause disturbance to cetaceans, and other marine mammals, is widely recognized.

Studies of vessel impact to marine mammals have most often looked at short-term effects (e.g., measuring disturbance or avoidance behaviors) rather than longer-term or cumulative effects of repeated exposure to numerous vessels over time (e.g., decreased survivability or reproductive effects such as increased birthing intervals which are directly related to productivity). Immediate responses to vessel presence, such as avoidance behavior or changes in dive patterns, can be measured more easily; longer-term effects can often be difficult to define and to measure. Most studies have not addressed long-term impacts. Typical measures of a whale's reaction to the presence of a vessel have been visible changes in behavior, such as avoidance

reactions or displacement, increased fluke or flipper activity, blow intervals or dive patterns and swimming orientation and speed. These reactions are measurable and can be assumed to have a certain energetic cost. However, animals could also incur an energetic cost through behaviors that is not necessarily measurable (i.e., physiological stress responses such as increased heart rate or pathological conditions). Vessels could also interfere with prey dynamics, forcing animals to expend more energy in foraging efforts for the same amount of prey captured. The difficulty lies in quantifying the energetic cost or determining the net effect of a potential stressor on the animal's overall energy burden. An energetic cost that results from vessel disturbance might otherwise be devoted to reproduction. Should this occur, there may be long-term negative effects associated with vessel activity that might not be demonstrated through short-term studies. Therefore, it should not be assumed that the regular presence of animals in an area is an indication that the activities in the area have no impact. Long-term studies could yield additional information on the effects of disturbance on the overall population. However, this kind of information is not currently available.

These are generally changes that are manifested at the level of the individual, in either short-term or long-term changes in the individual that may or may not be measurable *(*i.e., obvious gross behavioral changes or undetected physiological changes). Impacts could also manifest in long-term changes at the level of the population(s) such as a range redistribution, or a reduction in some parameter such as fecundity or survival that would affect the status of the population. Short-term changes can be difficult to interpret in terms of the significance to the individual or the population. In instances of apparent lack of change in the individual or of habituation there is the risk of falsely interpreting this as no effect.

Whales frequenting Glacier Bay have been exposed to some level of cruise ship and other vessel traffic for many years. Whales may leave an area if sufficiently disturbed . It is more likely they will leave an area if not actively involved in feeding at the time of the disturbance. Although the number of ships has steadily increased over the last twenty years, from an average of 1.2 ships per day in the 1980's, the number of whales in the Park has also generally increased during the same period. Generally, there is no demonstrated relationship between cruise vessel numbers and whale numbers in Glacier Bay during the period the studies. While it is likely that there is a threshold above which the number of vessels may limit the habitat in the Park to whales or the ability of a whale to successfully forage, there is no evidence that this threshold has been reached at this time.

Indirect effects of vessel traffic such as redistribution of prey or redistribution of the whales are not well studied or understood. Such effects can only be supposed at this time and the real impact of indirect effects cannot be determined.

5.2.1 Potential Increases in Direct Collisions between Vessels and Whales or Sea Lions

Increased mortalities as a result of a collision between a vessel and a whale would be the principal concern with regards to an increase in cruise ship entries into the Park. Collisions involving cruise ships are known to result in mortalities to whales whereas a collision with a smaller vessel may result in injury other than death to the whale.

The past seven years of opportunistic data on vessel collisions with humpback whales have shown an average of one reported humpback whale struck per year in Alaska. Cruise ships frequent the inside waters of Southeast Alaska, passing through areas of concentrated humpback whale abundance such as Glacier Bay National Park, Point Adolphus and other areas adjacent to the action area. Several incidents of vessel interactions with humpback whales in Glacier Bay were documented in 2002 (Doherty and Gabriele 2002) including one mortality inside Park waters and several collisions. These also included close approaches and possible harassment by several vessels of different vessel classes including a kayak, a cruise ship and a float plane. Researchers also documented an injury to the dorsal fin of a whale that could have been caused by a

vessel collision/interaction. In 2001 a dead humpback whale was discovered in Park waters. Upon necropsy the whale was determined to have been killed by blunt trauma, likely the result of a collision with a large vessel.

A humpback whale was also necropsied in 2003 that had been first seen at Pt. Manby, Yakutat Bay. The results of that necropsy also indicated that the whale had been killed by blunt trauma as a result of large vessel collision.

In addition to these larger ships, which are most likely to cause significant injury or death to humpback whales, smaller tour, charter and private vessels also significantly overlap with inshore humpback whale distribution in Alaska waters. Smaller ships also have the potential to cause disturbance, serious injury, and possibly mortality.

The proposed action will not reduce the effects of, or numbers of, collisions between cruise ships and whales. It is not known to what extent the increased vessel traffic into the action area will result in an increase in humpback whale mortality due to ship strikes but it can be expected that these mortalities will continue at least at the current rate. The numbers of disturbances as a result of increasing small vessels in Glacier Bay (Alternative 6) would likely result in an increase of potential disturbances to whales but it is unlikely that it will increase mortalities as a result of the increased traffic, and it is not certain whether this disturbance will result in an increase in takes through harassment (See Chapter 5.3, this document).

There is no evidence that an increase in vessel traffic in the action area will result in an increase in direct collisions of Steller sea lions with vessels. The more likely scenario is that small vessel activity around sea lions at haulouts or in the water may increase but due to the mobility of the animals around vessels there is no reason to believe that this will result in a collision with a sea lion. There are no regulations specifically keeping vessels a distance away from sea lions; however the Alaska Marine Mammal Viewing Guidelines present other measures for vessel operation to minimize impacts to Steller sea lions, and other marine mammals, including a recommended minimum approach distance of 100 yards.

5.2.2 Effects of Vessel Speed on the Likelihood of Collisions between Cruise Ships and Humpback Whales

Generally, there is a direct relationship between the occurrence of a whale strike and the speed of the vessel involved in the collision. Most mortalities that have been documented occur when a vessel is traveling in excess of 13 knots (Laist et al. 2001). Vessel speed restrictions for cruise ships vary between alternatives considered, ranging from applying only to "whale waters" in the proposed action (Alternative 3) to a limit of 13 knots throughout the Park including whale waters (Alternative 6). Vessels less than 80m in length could still travel at any speed outside of whale waters under Alternative 3. There are no speed restrictions outside Glacier Bay, including Icy Strait which is considered part of the action area for purposes of this consultation. Collisions are expected events and generally occur throughout all of southeast Alaska peaking during the tourist season. Approximately one vessel strike per year results in a known mortality to a humpback whale in southeast Alaska. These are often the results of collisions with cruise ships operating at speeds considerably greater than 10 knots.

Some additional impact from harassment by tour vessels may also occur for humpback whales due to increased levels of noise projected into the water column as a function of increased vessel speed (See Section 5.2.1, this document). However, in an attempt to address this issue and minimize the potential for impact from harassment, NMFS implemented regulations in 2001 that imposed a restriction on approaching humpback whales by a vessel closer than 100 yds. A requirement for operating at a "slow, safe speed" when near humpback whales was also implemented. The Park Service has implemented even greater minimum approach

distances (1/4 mile in all Park waters) for humpback whales, which likely reduces the whales' underwater noise exposure and potential for behavioral disturbance.

The effects of the range of vessel speeds considered in the alternatives (1) do not address vessel speed outside the boundaries of the Park, and (2) vessel speeds inside the boundaries of the Park will increase in waters that have a high probability of having whales present while decrease in waters where whales are not likely to be present.

5.3 Effects of Vessel Noise on the Behavior of Marine Mammals

Reactions to sounds by marine mammals are variable and often related to their initial behavior. Watkins (1986) indicated that the primary cause of reaction by whales [to vessels] was to underwater sound. His study found some degree of habituation to relatively "non-disturbing" stimuli. Whales near shore became less wary, over time, of boats and their noise and the animals appeared to be less easily disturbed. This appeared to be particularly the case with humpback whales. It should be noted, however, that the conclusions drawn in this study did not result from controlled experiments on the impact of human activity on humpback whales. While measurable startle responses might diminish with time, this does not necessarily indicate that a negative impact has diminished as well. Generally foraging is important enough that some whales do not leave an area even if the area is compromised by disturbance from vessel noise. Other whales may shift their distribution in response to vessels presence or noise. However, it is not known what effect this habituation has on whales. Vessels could still cause stress impacts or could disrupt prey aggregations forcing whales to spend a greater amount of time and energy foraging. It is conceivable that habituation could also put whales at greater risk of collisions with vessels.

Baker and Herman (1989) conducted controlled studies on the impact of vessel traffic on humpback whales in Glacier Bay and in the Frederick Sound area of southeast Alaska. They examined responses to obtrusive, unobtrusive, and "passby" conditions conducted by different vessel classes. In that study, respiratory behaviors were the most sensitive indicators of response to a vessel. The obtrusive condition resulted in a striking increase in the frequency of blows when the whale was near the surface and an increase in the longest submergence observed (Baker and Herman 1989). The effects declined as the activity of the vessel moderated during the unobtrusive and "pass-by" conditions. Within the 400 m range of influence, vessel operations accounted for 27.5% of the variance in the blow intervals of whales.

Baker and Herman (1989) also noted the tendency of humpback whales to orient in the direction of a vessel as it approached, and then to turn away at a perpendicular as the vessel reached its closest point of approach. The percentage of whale movement devoted to avoidance behavior increased from 15% at a distance from the vessel of 4000 m to 27% at a distance from the vessel of 1000 m. Some of the other factors examined were difficult to analyze due to the infrequency and variability of the behaviors. Of note, however, is that predictable behavioral reactions were evident up to a distance of 4000 m from the vessel.

Baker and Herman (1989) also observed changes in aerial behavior and pod composition with the proximity and presence, respectively, of vessels. The presence of large vessels was correlated with changes in pod composition; aerial behavior occurred with a 50% probability when vessels approached
within 478m of the focal pod. Baker and Herman concluded that humpback whales exhibit a considerable degree of short-term changes in their behavior in response to vessel traffic.

Other studies on humpback whales in their wintering grounds indicate some changes in behavior in response to vessels. Corkeron (1995) showed that animals dove more often in the presence of vessels when the vessels were within 300 m of the animal. Calf pods almost never dove when vessels were absent yet did so when

vessels were present. Also, for non-calf pods the rates at which certain behaviors (e.g., roll, lunge, fluke and flipper activity, and breaching) occurred were significantly different when vessels were present than when vessels were absent.

Richardson et al. (1984) observed a strong avoidance reaction of bowhead whales to approaching vessels in arctic waters. Some bowheads reacted strongly to the presence of vessels by orienting and swimming rapidly away from the vessel. There was a highly significant orientation away from the vessel when the vessel's engine was engaged. The orientation away from the vessel was significant at a distance from the vessel of <900m. Significantly more whales also moved at a moderate to fast speed away from the vessel when the vessel was as far away as 4 km. An increase in whale swimming speed was also observed as vessel distance decreased to <2 km. Bowheads also exhibited significantly shorter surfacing times with fewer respirations per surfacing when the vessel was within 4 km. Some disruption of social groups was also observed in response to vessel approaches. The authors of this study note that bowheads responded to vessels more dramatically and consistently than to other human disturbances.

5.3.1 Potential Effects of Noise Levels on Humpback Whales from Vessel Traffic in the Action Area

NPS (2003) identified several issues of concern during the scoping process on the EIS related to the increased input of sound into the water column as a result of the proposed action. Any increases in maximum speeds would, at a minimum, project increased levels of noise (increased decibels) into the water column. These issues included several concerns around the fact that noise may alter marine mammal behavior. NPS recognizes that vessel noise is prevalent throughout the Bay. Ambient noise monitoring at a stationary hydrophone in lower Glacier Bay indicated that vessel noise was present in an average of 60 percent (52-69 percent) of hourly samples in the summer months (the season of peak presence of whales and vessels) at mean received levels of 93-97 dB re 1 microPascal (Kipple 2002; NPS 2003, p. 4-115).

Effects from the proposed action are likely to be direct effects. Based on the fidelity of the whales to the action area, and the observations of individual whales over the past decade, the likelihood of a whale leaving this area as a result of noise levels appears to be minimal.

5.3.2 Effect of Vessel Speed on Noise Input into the Water Column

Speed is related to the amount of noise put into the water column. For vessels traveling at greater than 10 knots, ensonification occurs over a much larger area. NPS indicated that "ensonification" in their analyses means to create noise greater than 130 decibels. Cruise ships traveling at or above 10 knots ensonify the area for up to 500m (LGL 2003). One ship traveling at 19 knots projected sound in the water column up to 3 miles. Because of the great distance that cruise ships project noise, and because they are found throughout the action area, most of the waters of the Bay are exposed to approximately 120-130 decibels of sound part of every day throughout the tourist season. An increase in cruise vessel traffic as proposed (Alternative 3) would increase the duration of this level of sound throughout the action area. The intensity of cruise ship noise would be greater in Alternative 3 because ships could travel at any speed outside of whale waters. Under Alternative 5 all waters of the Park would be exposed to cruise vessel speeds of 13 knots. Other vessel types produce comparatively small amounts of noise present less of a management concern.

According to analyses provided by NPS (2003) the maximum duration that any one point would be exposed to sound levels over 130 decibels is in the range of less than 3.5% of the time from June through August. Under Alternative 3 this level would increase in May and September because 2 ships per day typically enter the Bay at that time of year, whereas under Alternative 5 the 3.5% level would remain the same in May and September because cruise ship entries would occur at the average of 1.5 per day found in the main summer season.

Alternative 3 will not reduce vessel speeds and therefore, at a minimum, the effect of the action will be to keep noise in the action area at current levels with the possibility that both duration and intensity of noise may increase with the increase in minimum vessel speeds from 10 to 13 knots in whale waters being allowed. If the NPS incorporated the cruise ship speed of 13 knots throughout the Bay from Alternative 5 in the action, this would result in a net decrease of underwater sound in Glacier Bay.

5.3.3 Effects of Increased Noise Levels on the Potential for Hearing Loss in Humpback Whales

Hearing in marine mammals is a function of the level of sounds that marine mammals can hear in the absence of ambient noise (hearing thresholds); the ability of the animal to discriminate between different frequencies and intensities; effects of masking (the ability to distinguish signal from ambient; and individual variability (summary in NPS 2003, Chapter 3). In terrestrial mammals, and presumably in whales, received sound levels must exceed the animal's hearing threshold (sensitivity) for there to be any temporary threshold shift (TTS) and must be even higher for there to be risk of permanent threshold shift (PTS) (Richardson *et al* 1995).

The current incomplete understanding of hearing in baleen whales, including humpback whales, is based on anatomical evidence, studies and behavioral observations, and extrapolations from other marine mammals. Field observations of the responses by whales to sounds have set thresholds for detection of sounds by baleen whales. However, it is not possible to determine at what point the whale heard the sounds but did not respond. Responses vary with behaviors; the same frequency might result in a response from migrating whales whereas feeding whales do not respond at all, or the response may not be detectable to researchers. In addition, whales' responses to various types of sounds (e.g. vessel noise, oil exploration, military sonar) at equivalent sound levels may be quite different.

Anatomical evidence indicates that baleen whales are adapted to hear low-frequency sounds (Ketten 1998). Observations of whale responses to low frequency sound sources also support this (Richardson and Greene 1993; Richardson et al 1995). Migrating gray whales would avoid a sound source 50% of the time when the received level was 116-124 decibels (Malme et al. 1984, 1983). However when similar noises were played to feeding humpback whales, they showed no response at received levels up to 120 decibels (Malme et al 1985). The results of all of these studies lead to the prediction that baleen whales typically show avoidance response to prolonged man-made sounds at received levels greater than 120 decibels (Frankel and Clark 2003). Few studies of humpback whale response to vessels have included specific sound levels where behavioral responses occurred.

Cruise ship and other vessel noise is loud enough under all alternatives at prolonged durations to potentially cause hearing loss in marine mammals. In a recent study at Glacier Bay, the acoustic effects of vessels on humpback whales were modeled using measured vessel sound signatures from the acoustic monitoring program vocalizations, ambient noise and oceanographic parameters from Glacier Bayand estimations of whale hearing abilities, called audiograms (Erbe 2003). The model estimated that humpbacks would experience 4.8 decibel TTS after 20 minutes exposure to sound within 100 meters of the small craft or 4 km of the cruise ship. TTS is difficult to predict given the uncertainty about whales' normal hearing thresholds. The vessel sounds modelled were not nearly loud enough to induce PTS after a single exposure. PTS due to repeated exposure to vessel noise is impossible to predict for humpbacks because it has never been documented and there are no available data on any marine mammals. NPS (2003) states that marine mammals are rarely exposed to cruise ship noise for a duration that this would occur, but it is apparent that it does occur given the "rarely" caveat. Temporary hearing loss should be considered as a possibility if humpback whales or Steller sea lions were exposed to loud vessel sounds in close proximity for a sufficiently long period to induce such loss.

The effects from all classes of vessels are generally some level of disturbance, and usually a temporary disturbance. This depends on vessel speed, activity, type of vessel, and animal behavior at the time of the

disturbance and the animal's previous experiences. The NPS correctly assumes that vessels of smaller scale than cruise ships result in a larger number of disturbances. Disturbance to a marine mammal results in an increased energy need; or stated another way, disturbance results in energy loss to the marine mammal which has to be compensated for by increased costs associated with foraging. All of these effects occur at the individual level and there is no obvious mechanism for sub-lethal disturbance in such a small group of whales as found in Glacier Bay, or inside the action area, to have population level effects on the Central North Pacific population.

Based on what is known regarding hearing loss in whales, the expected levels under all alternatives may adversely affect humpback whales but would not likely cause permanent damage or harm to whales. Temporary thresholds may be reached but the long-term effects would likely be minimal. It is expected that vessel noise will result in disturbance to marine mammals on a regular basis, but that duration and intensity of effect would not be sufficient to harm or otherwise cause these species to leave the Bay. Generally in those rare occasions that a cruise vessel remains in an area and produces sound levels sufficiently high to inflict permanent harm, the proposed actions and the Park Service is relying on humpback whales to be disturbed sufficiently enough to move out of the area (at NPS 2003, pp. 4-118). Further, "the mobile nature of humpback whales and Steller sea lions, combined with the mobile sound sources, continue to make the probability of temporary and permanent threshold shift small; effects to marine mammal hearing still would be expected to be negligible to minor ' (NPS 2003, at Chap. 4.3.1, pp. 4-106).

5.3.4 Effects of Increased Noise Levels on Habituation and Sensitization in Humpback Whales

In addition to disturbance, habituation and sensitization also are important when discussing the potential reactions of whales to noise. Habituation refers to the condition in which the repeated experiences with a noise stimulus that has no important consequence for the animal leads to a gradual decrease in response. Sensitization refers to the situation in which the animal shows an increased behavioral response over time to a stimulus that has important consequences for the animal.

Bowheads have become habituated to noises from dredges and drilling over time (Richardson *et al.* 1995) In general there is a tendency for the level of response to noises to be related with the level of unpredictability and variability of the source (Richardson *et al* 1995). For example, over a period of time animals may show little response to a constant humming but react to a noise source that is rapidly changing in intensity. When whales are presented with loud noises, the will react regardless of frequency. Therefore animals are most likely to habituate to sounds that are unvarying and predictable.

The opposite process is sensitization. Sensitization occurs when animals associate a sound with an unpleasant sub-lethal event. In such cases, animals respond when the signal is barely audible. Within a species, the disturbance behavior is affected by the animals activity: animals that are resting would be expected to show greater behavioral change than animals highly motivated to perform an important activity such as feeding. Humpback whales are known to tolerate loud noises when sufficient prey is present. So individuals could stay in an area masking a potential effect of noise as a result of their overriding need for prey. Todd et al. (1996) found evidence of hearing damage in two dead whales that remained in an area to forage despite being exposed to potentially harmful sound levels. Therefore it should not be assumed that the presence of animals in an area is an indication that the activities in the area have no impact.

5.4 NOAA Fisheries Regulatory Interpretation of Effect of Noise on Marine Mammals

The definition of "take or taking" is to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect or kill any marine mammal." NOAA Fisheries (2002) has determined that a change in marine mammal actions does not always result in a disruption of behavior (at 67 FR 46712, July 16, 2002). A disruption of

behavior such that it would be considered within a normal range of behavioral responses by the whale or sea lion that result in a change of behavioral over a short time-frame and minimum level of intensity would not be considered a take under this interpretation. So a short-term change in behavior or movement would not necessarily have any biological significance and, therefore, do not rise to a level of a take requiring a take authorization. Furthermore, a noise in the water column that does not provoke a reaction by the marine mammal (a reaction greater than a minor response) is not considered a disruption of behavioral patterns and therefore does not constitute a take. Repetition of minor reactions within an animal's normal repertoire could be interpreted as take if the cumulative effects resulted in an effect that would be considered outside the limits of a normal response or range of responses.

Based on these findings, simple exposure to sound does not necessarily constitute a take due to harassment. Brief disturbances, therefore, do not disrupt normal behavior patterns in a biologically significant manner and, as a result, do not result in a take due to harassment. Therefore short-term disturbance by a vessel that does not alter long-term behavior would not be considered a take by harassment. However, long-term and frequent disturbances could still become biologically significant.

5.5 Summary of Potential Effects of the Preferred Alternative on Listed Species

The general effect of the preferred alternative (Alternative 6) is to allow more cruise vessels into Glacier Bay but require them to travel at slower speeds, and regulate their entries over an extended tourist season. Private vessel traffic will also increase. The result of that proposed action would be, at a minimum, to further increase the number of large vessels into an area where disturbance is already of concern; and to potentially increase the duration and intensity of sounds produced by these vessels into the water column. The intuitive conclusion is, therefore, that the action will amplify all levels of disturbance and concerns to listed species under the preferred alternative that are currently present. These would include the following potential effects:

a continued or possible increase in the potential for mortality to humpback whales due to ship collision due to the increased level of vessel traffic operating in the Park as a result of the preferred alternative. The increase in collision risk could be offset to some degree by the 13 knot speed limit for cruise ships;

an increased potential for disturbance to listed marine mammals as a result of increased vessel traffic into the Park and adjacent waters. This may result in behavioral effects due to disturbances within the normal range of behaviors for the species but which would not result in a disruption of normal behavior patterns in a biologically significant manner and, as a result, would not result in a take due to harassment; and

an increase in the ambient noise level in the water column as a result of increased vessel traffic. The increase in cruise ship and private vessel traffic would likely result in an increase in the percentage of time that underwater sound exceeds the 130 decibel ensonification level. The decibel levels of cruise ship sound should decrease due to the 13 knot speed limit, but the duration of each cruise ship transit in Glacier Bay could be increased due to the ships' slower travel speed. Most travel by all vessels except cruise ships would be at speeds considerably greater than 10 knots, except in whale-waters areas, producing sounds that would exceed 120 decibels, a level approaching that known to produce short term and potential long-term effects in humpback whales [130 decibels] and which would result in a more uniform level of ensonification as a result of cruise ship traffic.

The speed at which the vessels will travel throughout much of the Park introduces the possibility for temporary hearing impairment in marine mammals although it is recognized that the duration of such levels is small enough that permanent hearing loss is probably unlikely. This conclusion assumes that whales and sea lions will leave the area prior to a temporary or permanent effect from noise intensity;

The increased numbers of private vessels to be allowed in the Park under the preferred alternative will likely result in an increase in disturbances to smaller cetaceans and pinnipeds including Steller sea lions. There will likely be an increased potential for disturbance at haulout sites in the Park for Steller sea lions and an increased number of private vessels transiting through whale waters. "Serial" visitations where one vessel remains for a period of time, then is immediately replaced by another once it leaves, may increase with the effect that the whale or sea lion is constantly being affected by the presence of small vessels.

Impacts from noise might include disturbance or some other more "elevated" physiological or behavioral response. Response threshold would likely depend on whether animals have become habituated over time, as well as the animal activity or behavior at the time of the noise input. The energetic consequences of whales being disturbed while feeding has not been evaluated quantitatively. Energetic consequences likely depend, in part, on prey availability. The greater the densities and availability of prey, the less likely a significant energetic consequence. Noise may cause TTS or PTS which would have the potential to diminish the individual's chance for survival. Tolerance for noise is often demonstrated but it does not prove that the animals are unaffected by noise.

All potential and likely effects identified occur as a result of the increased levels of vessels, noise production and potential disturbance. All are considered to have potentially adverse effects on listed species in the action area. The extent to which these potential effects rise to the level of a "take" under the ESA is largely unquantifiable. Even with this uncertainty, however, they would not rise to the level of "jeopardy" by directly or indirectly reducing appreciably the likelihood of both survival and recovery of any of the listed species in the wild by reducing the reproduction, numbers of distribution of that species. This conclusion will be further analyzed in Chapter 7.

6.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Past and present impacts of state, other Federal and non-Federal actions are part of the environmental baseline discussed in section 4 of this biological opinion.

6.1 Subsistence harvest of Steller Sea Lions

The subsistence harvest of Steller sea lions by Alaska natives results in direct takes that are expected to continue into the foreseeable future. These takes represent the highest level of known direct mortality from an anthropogenic source. The primary areas of subsistence harvest are in the western DPS, outside the action area. The level of subsistence on the western DPS in the action area is considered zero. Subsistence harvest of the eastern DPS of Steller sea lions does occur in the action area but the level of take for subsistence is estimated in the 10s of animals per year (and decreasing in recent years) and, therefore, considered a negligible source of mortality for this population.

The criteria used to generally measure the direct effects of a harvest for significance is the comparison between the total number of takes (level of harvest) to the Potential Biological Removal (PBR) level which is calculated for all marine mammal stocks or DPS. Under the 1994 reauthorized MMPA, the PBR is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: therefore PBR = Nmin × 0.5Rmax × F_R, or PBR = 1,396 animals (31,028 x 0.06 x 0.75)(Angliss *et al.*

2002). Generally, PBR increases in significance and intensity as it approaches PBR and decreases in significance as it approaches zero. If the take level is less than 10 percent of PBR the level is considered negligible under the MMPA, and not significantly different from zero. A PBR calculation is the most applicable measure of significance for the direct effects of a subsistence harvest.

6.2 State-Managed Commercial Fisheries

Takes of Steller sea lions from both populations will likely continue into the foreseeable future. State managed fisheries affect listed species in both direct and indirect mechanisms. Direct impacts include sea lions killed in nets, as well as short term nonlethal effects such as disturbance of sea lion haulouts, vessel noise, entanglement in nets, and potential preclusion from foraging areas due to activity. Direct mortality to humpback whales as a result of entanglement in gillnets and fixed-line fishing gear such as crab pots and lines occur as well. All interactions occur outside the boundaries of the National Park and in waters of southeast Alaska. Therefore, the effects of fishing in waters outside the entrance to the Park do exist. These were reviewed in section 4.2 of this biological opinion.

6.3 Effects of Vessel Traffic outside the Action Area on Listed Species

The effects of vessel interactions with humpback whales that occur outside the action area are expected to continue into the future at rates consistent with recent records. However, independently of the proposed action, vessel traffic in Icy Strait is expected to increase appreciably in the next few years due to the recreational vessel traffic associated with the new Point Sophia cruise ship dock and cultural attraction scheduled to begin operating in May 2004. Increasing cruise ship traffic in the Hawaii wintering area in recent years presents very similar risks to those analyzed in this opinion. These include interactions that are both direct through collisions with vessels and disturbance, and indirect through the effects of vessel noise and pollution on humpback whale prey and other aspects of their environment. Given the increases in the humpback whale population in Southeast Alaska, vessel interactions of all kinds are likely to increase even if the number of vessels remains the same.

The number and type of disturbances from vessels of Steller sea lions in southeast Alaska also will likely continue and largely go unmonitored. Several recent research studies are ongoing to determine the frequency of disturbance from all vessel categories, especially smaller vessels, but these results are not yet available. Generally the eastern DPS is increasing and even with current levels of disturbance and potential mortality from illegal shootings of animals on haulouts, the population should continue to increase at its current rate.

6.4 Effects of Vessel Noise outside the Action Area on Listed Species

The potential effects of noise on marine mammals range from minor behavioral disturbances to potential injury or death. The noise level throughout the oceans is increasing due to increases in shipping and other activities including seismic activities, drilling and sonar use by the military and noise from research vessels. While there is no hard evidence of a whale population being adversely impacted by noise, biologists believe that it is possible for masking, the covering up of one sound by another, could interfere with marine mammals behavior and communication. Concerns about noise in the action area of this consultation include increasing noise due to increasing large vessel traffic in the action area. The potential cumulative effects of noise on marine mammals, especially whales, are the same as those described in the effects of the action in sections 5.2 and 5.4 of this document.

7.0 CONCLUSIONS

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. 1536; 50 CFR 402.02). Section 7 of the ESA and its implementing regulations also require biological opinions if Federal actions would destroy or adversely modify critical habitat.

7.1 Approach to the Assessment

We identified the likely or probable direct and indirect effects of the proposed action on the listed species found in the action area in section 5.4. Generally, the effect of the Preferred Alternative (Alternative 6) is to allow more cruise vessels into Glacier Bay but require them to travel at slower speeds, and regulate their entries over an extended tourist season. Private vessel traffic would also increase. The result of that Preferred Alternative would be, at a minimum, to further increase the number of large vessels into an area where disturbance is already of concern; and to potentially increase the duration and intensity of sounds produced by these vessels into the water column. The potential effects of this action were identified as:

a continued or possible increase in the potential for mortality to humpback whales due to ship collision due to the increased level of vessel traffic operating in the Park as a result of the Preferred Alternative, though this may be mitigated with a reduced speed limit in Glacier Bay for large vessels;

an increased potential for disturbance to listed marine mammals as a result of increased vessel traffic into the Park and adjacent waters although this potential may be mitigated by established minimum approach distances in place inside Glacier Bay and other vessel operating requirements. The increased numbers of private vessel to be allowed in the Park under the Preferred Alternative would likely result in an increase in disturbances to smaller cetaceans and pinnipeds, including Steller sea lions. There would likely be an increased potential for disturbance at haulout sites in Glacier Bay proper and an increased number of private vessels transiting through whale waters. "Serial" visitations where one vessel remains for a period of time, then is immediately replaced by another once it leaves, may increase with the effect that the whale or sea lion would constantly being affected by the presence of small vessels; and

an increase in the ambient noise level in the water column as a result of increased vessel traffic resulting in a possible increased level of disturbance, particularly to humpback whales, and the continued potential for temporary hearing impairment in marine mammals of concern, particularly humpback whales.

The second step of our analysis determines if we would reasonably expect the listed species to experience reductions in reproduction, numbers or distribution in response to these effects. Finally, we determine if any reductions in a species' reproduction, numbers or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species' likelihood of surviving and recovering in the wild.

The approach to determine whether the Preferred Alternative may adversely modify critical habitat was a much simpler task for this action. First we identified which aspects, if any, of critical habitat would most likely to be affected by the Preferred Alternative. Then we determine if the action is likely to diminish the value of critical habitat. In this case, the Preferred Alternative applies to Glacier Bay proper and Dundas Bay. Both

of these areas are part of the Glacier Bay National Park and Preserve. Critical habitat for the eastern DPS of Steller sea lions occurs in the action area only at Graves Rock, a rocky haulout which lies inside the boundaries of the Park but considerably outside the area where the proposed action will occur. The potential increases in cruise ship traffic in Glacier Bay, and consequences of that action, will not occur inside critical habitat, and would minimally, if at all, occur in the vicinity of critical habitat. Critical habitat has not been designated for the western DPS of Steller sea lions or for humpback whales in the Action Area. For these reasons, the Preferred Alternative will have no effect on critical habitat.

The final step in our analysis is to determine whether there would be a reduction in a species' reproduction, numbers, or distribution such that there is a reduction in the species' likelihood of surviving and recovering in the wild. This can be the most difficult step because (a) the relationship is not linear; (b) to persist over geologic time, most species' have evolved to withstand some level of variation in their birth and death rates without a corresponding change in their likelihood of surviving and recovering in the wild; and (c) our knowledge of the population dynamics of other species and their response to human perturbation is usually too limited to support anything more than rough estimates. Nevertheless, our analysis must try to distinguish between anthropogenic reductions in a species' reproduction, numbers, and distribution that can reasonably be expected to affect the species' likelihood of survival and recovery in the wild from other (natural) baseline effects.

7.1.1 Types of Decision Making Errors

As scientists we have two points of reference available when we consider data, information, or other evidence to support our analyses (1) we can analyze the information available and subsequently conclude that an action has an effect, when in fact it does not (false positive), or (2) we can analyze the information available and subsequently conclude that an action does not have an effect, when in fact it does (false negative). In statistics, these two points of reference are called "errors". The first point of reference is designed to avoid what is called Type I error, while the latter is designed to avoid what is called Type II error (see Cohen 1988). Although analyses that minimize either type of error are statistically valid, most biologists and ecologists focus on minimizing the risk of concluding that there was an effect when, in fact, there was no effect (Type I error) and tend to ignore Type II error.

To comply with direction from the U.S. Congress to provide the "benefit of the doubt" to threatened and endangered species [House of Representatives Conference Report No. 697, 96th Congress, Second Session, 12 (1979)], our analyses are designed to avoid concluding that actions would have no effect on listed species or critical habitat when, in fact, there was an effect (Type II error). This approach to error may lead us to different conclusions than scientists who take a more traditional approaches to avoiding error, but we consider our approach to be more consistent with the purposes of the ESA and direction from Congress.

Jeopardy and adverse modification analyses must look into the future to identify the effects of activities conducted today on the future of threatened and endangered species. Some human activities have delayed effects on animal populations, either because a species' population takes time to respond to an effect, because the population only responds when effects accumulate, or a combination of these two. The classic example of a combined response is the bald eagle population's response to DDT, which became apparent only after many years of population declines. These responses pose the challenge of choosing how far into the future we must look to (1) detect a population's response to an effect or (2) detect a change in a species' likelihood of surviving and recovering in the wild (Crouse 1999). If we do not look far enough into the future, our analyses will not detect a population's response to human activities and we are more likely to falsely conclude there was no effect when, in fact, an effect occurred. If we look too far into the future, our analyses can mask short-term collapses in a population and, again, we increase our likelihood of falsely concluding there was no effect when, in fact, an effect occurred.

7.1.2 Evidence Available for the Assessment

Detailed background information on the status of Steller sea lions and critical habitat has been published in a number of documents including the Steller Sea Lion Recovery Plan (NMFS 1992); several biological opinions on the effects of groundfish fishing on Steller sea lions (NOAA Fisheries 2000, 2001a); the SEIS for the Steller sea lions implementing measures (NOAA Fisheries 2001b). The NEPA documents and the section 7 consultations also address the status of humpback whales, as does the Humpback Whale Recovery Plan (NMFS 1991) and considerable literature. The marine mammal stock assessments reports provide information on the status of both species (Angliss *et al.* 2002). Many important studies have been completed on the acoustic properties of baleen whales (Richardson et al. 1995) and of the action area (Malme et al. 1984, 1985; Kipple 2002) and how noise may affect listed species (in Chapter 4.2, NPS 2003; LGL 2003; Erbe 2003).

7.2 Jeopardy Analysis

A description of the ESA standards, pertinent definitions, and a description of this analysis was presented in Section 1.7 of this document. Again, the jeopardy standard that NMFS must insure that any federal action avoids is:

> **Jeopardize the continued existence of [a listed species] means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers or distribution of that species (50 CFR §402.02)**.

Jeopardy analyses usually focus on the effects of an action on a species' population dynamics. A conclusion of "jeopardy" for an action means that the action could reasonably be expected to reduce appreciably the likelihood of both the survival and recovery of a population, not an individual.

The first steps of the jeopardy analysis are to determine (1) if we would reasonably expect the western or eastern populations of Steller sea lions to experience reductions in reproduction, numbers, or distribution in response to the Preferred Alternative; (2) and if we would reasonably expect the Central North Pacific population of humpback whales to experience reductions in reproduction, numbers, or distribution in response to the Preferred Alternative.

The second step of the analysis is to determine if any reductions in a species' reproduction, numbers, or distribution can be expected to appreciably reduce a listed species' likelihood of surviving and recovering in the wild.

The final step is to determine if any reduction in a species' reproduction, numbers, or distribution (identified in the second step of our analysis above) can be expected to appreciably reduce a listed species' likelihood of surviving and recovering in the wild.

7.3 Destruction or Adverse Modification of Critical Habitat Analysis

> ***Destruction or adverse modification*** means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR §402.02)

Adverse modification analyses usually focus on the effects of an action on the physical, chemical, and biological resources that support a population. A conclusion of "adverse modification" means that the action could reasonably be expected to appreciably diminish the value of critical habitat for both the survival and recovery of a population, not an individual. Such actions include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

7.4 Jeopardy Conclusions

In this section NOAA Fisheries must determine whether the listed species can be expected to survive an adequate potential for recovery under the effects of the Preferred Alternative, the environmental baseline, and cumulative effects. The information available is both quantitative and qualitative. Ultimately, NOAA Fisheries' conclusions are qualitative judgements based on the best quantitative and qualitative information available.

7.4.1 Western Population of Steller Sea Lions

In the section 3 we established that the endangered western DPS of Steller sea lions has been declining throughout its range for almost three decades. The population is approaching a 90 percent decline. Prior to early 1970s, the primary cause of the decline may have been commercial harvests, entanglement of juvenile sea lions in commercial fishing gear, and intentional shooting by fishermen. However, since 1991 these effects have been nearly eliminated, yet the overall rate of decline has been a relatively constant 4-5 percent per year (Loughlin and York 2001). However, there is no reason to believe that vessel traffic in the action area has affected this decline.

The greatest potential for a take to occur to Steller sea lions from activities identified in section 7.1 would be for an increased level of disturbance at haulouts in the action area. However this concern was expressed primarily for the eastern DPS of Steller sea lions which are far more numerous in Glacier Bay than the western DPS. While "western" Steller sea lions do occur in the action area (Matthews 2003), the action area is on the extreme eastern edge of their Alaska range, and the numbers of this DPS observed in the Park have been in the order of single or individual animals. As a result, the proposed action could only result in a minimal number of potential takes from this DPS, certainly at a level that could only have a *de minimis* effect on this population. As there is no reason to believe that vessel traffic in Glacier Bay has affected the decline of this species in the past, there is no reason to believe that the Preferred Alternative, as proposed, is likely to jeopardize the continued existence of the western population of Steller sea lions in the future.

7.4.2 Eastern Population of Steller Sea Lions

The eastern DPS of Steller sea lions is increasing slowly and has not experience the significant decline in recent decades as has the western population. The eastern population is the DPS most likely affected by the proposed action, and the most abundant within the action area. The effect of the Preferred Alternative that is of greatest concern for this species is the likelihood of increased disturbance on haulout sites within Glacier Bay proper. These sites are not designated as critical habitat for this species but do represent locations where sea lions haul out to rest and molt. The area around these sites are primary foraging areas for Steller sea lions in the action area. Factors that determine an area's value to predators like Steller sea lions include the distance of prey from shore, the depth of prey in the water column, the distribution and abundance of prey, and the dispersal of prey over time and space. As such a disturbance to this foraging zone around the haulouts could be of concern.

It is not believed that vessel traffic over the years has, or the Preferred Alternative would, reduce the abundance of prey within local foraging areas and alter the distribution of prey in ways that could reasonably be expected to reduce the foraging effectiveness of sea lions. Therefore, the action would not be expected to reduce the likelihood of their survival and successful reproduction nor their likelihood of recovery in the wild.

Another factor in understanding the effect of the action is understanding the relationship between the number of animals that could be affected relative to the entire DPS. There are very few sea lions from the eastern DPS that actually occur in Glacier Bay. A 1993 count of sea lions within the boundaries of the Park resulted in an estimated 1,100 animals (NPS 2003, Chap. 3.3.1, pp. 3-32). Accounting for a 1-2 percent increase per year since that count results in a current estimate of approximately 1,300 - 1,400 sea lions occurring on Park haulouts. This is approximately 4 percent of the estimated 31, 028 sea lions in the eastern DPS (Angliss *et al* 2002). A large percentage of these occur on Graves Rock which is located on the outside margins of the Park and is not even affected by the Preferred Alternative which occurs in Glacier Bay proper.

After reviewing the current status of the threatened eastern DPS of Steller sea lions, the environmental baseline for the action area, the Preferred Alternative, and the cumulative effects of other actions on the eastern DPS of Steller sea lions, it is NOAA Fisheries biological opinion that the Preferred Alternative may adversely affect but is not likely to jeopardize the continued existence of the eastern population of Steller sea lions.

7.4.3 Central North Pacific Population of Humpback Whales

The Preferred Alternative is most likely to affect this population of humpback whales (from section 7.1) by (1) a continued or possible increase in the potential for mortality to humpback whales due to ship collision due to the increased level of vessel traffic operating in the Park as a result of the Preferred Alternative; (2) an increased potential for disturbance to whales as a result of increased vessel traffic into the Park and adjacent waters; and (3) an increase in the ambient noise level in the water column as a result of increased vessel traffic resulting in a possible increased level of disturbance and the continued potential for temporary hearing impairment in humpback whales. These effects may be mitigated by a reduced speed limit in Glacier Bay for large vessels and minimum approach distances around humpback whales.

Indirect effects of the Preferred Alternative on prey availability are considered unlikely. The availability of prey species appears to vary from year to year within the Park, and the number of whales in the Park each year is dependent to a great degree on the availability and concentrations of prey rather than on the number of cruise ships or vessels allowed in the Park. Low numbers of whales have been generally correlated with years of low prey availability. There is little commercial fishing in the park and these fisheries do not target prey or forage species of humpback whales, so fishing is not considered a factor that could limit or otherwise redistribute prey available to whales or other listed species.

The other principal concerns, increased traffic, the possibility of mortality due to collisions, and the effects of increased noise levels, may adversely affect humpback whales in ways considered in this biological opinion and in NPS (2003), and the takes from these activities are largely unquantifiable at this time. However, even given this uncertainty, we can state with certainty that these effects will not jeopardize the continued existence of the central North Pacific population of humpback whales. This conclusion is based on the relationship between the number of whales which occur in Glacier Bay on an annual basis and cumulatively over the past decade relative to the abundance of the central North Pacific population; and the scale of the effects relative to the range of the population affected. Glacier Bay occupies an extremely small part of the entire range of the central North Pacific population of whales. As a result of these two factors, it can be stated with certainty that the effects of this action would neither rise to a level that would affect the trends, survival or reproduction of the population as a whole, nor could it affect a significant enough component of the habitat or range of the species to limit survival or recovery of the population. For these reasons, and after reviewing the current status

of the species, the environmental baseline for the action area, the preferred alternative and proposed action, and the cumulative effects of other actions on the central North Pacific population of humpback whales, it is NOAA Fisheries biological opinion that the Preferred Alternative may adversely affect the central North Pacific population of humpback whales but is not likely to jeopardize the continued existence of the species.

7.5 Destruction or Adverse Modification of Critical Habitat Conclusion

Critical habitat has not been designated for the western DPS of Steller sea lions in the action area, nor has critical habitat been designated for humpback whales. The action area contains one haulout (Graves Rock) designated as critical habitat for the eastern DPS of Steller sea lions. After reviewing the status of critical habitat that has been designated for the eastern DPS of Steller sea lions in the action area, the environmental baseline for the action area, the proposed action, and the cumulative effects, it is NOAA Fisheries biological opinion that the preferred alternative, as proposed, is not likely to destroy or adversely modify critical habitat for this species.

The justification for that conclusion was provided in section 7.1 and expanded in the following paragraphs. The Preferred Alternative occurs in Glacier Bay proper and Dundas Bay. Both of these areas are part of the Glacier Bay National Park and Preserve. Critical habitat for the eastern DPS of Steller sea lions occurs in the action area only at Graves Rock, a rocky haulout which lies inside the boundaries of the Park but considerably outside the area encompassed by the Preferred Alternative. The increases in vessel traffic and consequences of that Preferred Alternative will not occur inside critical habitat, and would minimally, if at all, occur in the vicinity of critical habitat. For that reason, the Preferred Alternative would have no effect on critical habitat.

Further support for this conclusion lies in the fact that Graves Rock was designated as a haulout in the 1993 designation of critical habitat for sea lions. A haulout is an area used for resting, molting, often of seasonal use, and usually surrounded by areas where sea lions can successfully forage. Haulouts are not used for breeding or reproductive purposes. These locations are referred to as rookeries. Recent evidence that pupping is now occurring on Graves Rock (Raum-Suryan, K. and K. Pitcher. 2000) supports the conclusion that there is little disturbance or effects from human induced activities at this location.

8.0 INCIDENTAL TAKE STATEMENT

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

8.1 Amount or Extent of Anticipated Take

NOAA Fisheries has determined that there is an unspecified number of takes expected to listed species in the action area as a result of the increased vessel traffic in the action area. However, NOAA Fisheries is not including an incidental take statement for the incidental take of Steller sea lions or humpback whales because

the take of these species has not been authorized under section 101(a)(5) (E) of the Marine Mammal Protection Act (MMPA).

The MMPA definition of "take or taking" is to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect or kill any marine mammal". Any activities that may adversely affect marine mammals are considered harassment and are prohibited under the MMPA.

Following issuance of such regulations or authorizations and a finding of no significant impact in a take authorization under the MMPA, NOAA Fisheries will amend this opinion to include an incidental take statement.

8.2 Effect of Takes

This biological opinion does not permit the direct taking of any threatened or endangered species. It is very difficult to describe or quantify the indirect level of take on Steller sea lions and humpback whales as a result of the Preferred Alternative. NOAA Fisheries (2002) determined that a change in marine mammal behavior does not always result in a take by harassment. A disruption of behavior within a normal range of behavioral responses by the whale or sea lion that results in a change of behavior over a short time-frame and minimum level of intensity would not be considered a take under this interpretation because this short-term change in behavior or movement would not necessarily have any biological significance and, therefore, would not require a take authorization (NOAA Fisheries 2002). Therefore, simple exposure to sound does not constitute a take due to harassment. Brief disturbances, that do not disrupt normal behavior patterns in a biologically significant manner do not result in a take by harassment. Therefore short-term disturbance by a vessel that does not alter long-term behavior might not be considered a take by harassment.

Despite this uncertainty, it is NOAA Fisheries biological opinion that the Preferred Alternative, and takes from that action, is not likely to result in jeopardy to the listed species or the destruction or adverse modification of critical habitat for the eastern DPS of Steller sea lions (section 7.4 of this document).

9.0 CONSERVATION RECOMMENDATIONS

Information presented in NPS (2003) and this document on the disturbance effects principally to humpback whales from the presence of vessels represent real concerns for the whales present in the action area. While the number of whales frequenting the Park waters has increased over the last 20 years, the number of vessels transiting Park waters has also increased. It could be argued that the increasing number of vessels present in the Bay has, therefore, not significantly affected the whales in the Bay. However, at some level of disturbance, be it cruise ship disturbance or noise from increased vessel traffic, or other factors, the threshold for tolerance of that factor would presumably be exceeded. The threshold is a function of the magnitude of the impact and the counter" effect" of the need for the animals to remain at a productive feeding site to obtain enough prey to satisfy their nutritional needs. After the threshold is exceeded we could expect to see whales permanently leaving the area, or a possible reduction in the ratio of calves to known females (a reduction in fecundity). While it is impossible to predict that threshold level, one can, with some certainty, predict that it exists. In the absence of such quantitative information we can only assume based on the studies noted above that humpback whales in Glacier Bay may change their behavior (in manners detected to date and likely in ways as yet undetected e.g. acoustic disturbance) in the presence of vessels at relatively close range. Additional vessels in the Bay would add to this effect. The effect may exist immediately only at the level of

the individual and current data do not provide information to determine the biological significance of those changes in behavior.

It is NOAA Fisheries' recommendation therefore that NPS should continue to monitor the levels of disturbance from vessels and vessel noise in Glacier Bay National Park Waters to Determine the Occurrence at which a Take of Steller sea lions and Humpback Whales Occurs as a Result of the Proposed Action. Upon determination of appropriate take levels, and issuance of regulations or authorizations under Section 101(a)(5) of the MMPA and/or its 1994 Amendments, NMFS will amend this opinion to include an ESA incidental take statement for listed species in the action area. No increases in cruise ship entries into Glacier Bay from the 2003 levels should occur until these determinations have been made**.**

In addition to the disturbance effect to humpback whales in Glacier Bay waters from the presence of vessels there is also the potential for collisions to occur that result in serious injury or mortality to the whale. A population in equilibrium can incur a certain level of mortality from anthropogenic sources and maintain stability. However, mortalities above that threshold may negatively affect the population and result in a declining trend. Mortalities related to vessel collisions for the central North Pacific population of humpback whales appears, from available information, to be sustainable at current levels.

As cruise ship numbers in the Bay increase, and with the increases in humpback whales in Park waters, the likelihood of a vessel collision may also increase. However, cruise ship traffic generally maintains a mid-channel course in Park waters, while the whales typically feed in more nearshore waters so the overall probability of vessel collisions inside Park boundaries with whales is likely low. A 13 knot speed restriction for large motor vessels in Glacier Bay may also reduce the risk of a collision between a cruise ship and a whale. Nonetheless, as numbers of whales and vessels increase, the probability of a collision also increases. **It is NOAA Fisheries' recommendation, therefore, that NPS continue to monitor the occurrence of whales in nearshore waters to determine if maximizing private vessel use in Glacier Bay by increasing the number of seasonal use days for private vessels results in increased disturbances to marine mammals including sea lions on rocks, or foraging whales.**

Another factor in vessel collisions that result in mortality to the whale is vessel length and speed. A vessel greater than 80m in length and traveling at greater than 13 kts was more likely to cause death to the whale with which that vessel collided (Laist 2001). Cruise ships and other large vessels are the most likely vessel classes to cause mortality to a whale should a collision occur. The action area includes all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action. Therefore, waters immediately adjacent to the park entrance in Icy Strait including Point Adolphus are included in this action. There are no vessel speeds at these locations at this time. **It is NOAA Fisheries' recommendation, therefore, that the NPS should work with NOAA Fisheries, the United States Coast Guard and the State of Alaska to implement vessel speed limits or exclusion zones in nearshore waters of Icy Strait (i.e, within 1 mile of Pt. Adolphus) adjacent to Park waters that contain known concentrations of whales, or establish agreements with cruise and tour vessel concessioners whereby vessel speed and course restrictions are adopted beyond the Park boundaries in these areas where whales are known to forage and occur in large numbers.**

As described earlier, the proposed increases in vessel traffic would occur in an area where disturbance and collision risk are already a concern. **It is NOAA Fisheries' recommendation, therefore, that vessel operating requirements should be monitored for compliance and evaluated to determine if they are effective at protecting whales in these nearshore waters.**

10.0 REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the vessel quotas and operating requirements as described in the Draft Environmental Impact Statement (2003), National Park Service, and the new Preferred Alternative as described by NPS in subsequent communications. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) a mortality to a humpback whale occurs as a result of a vessel strike in the boundaries of the National Park and Preserve; (2) new information reveals effects of the agency action that pertain to listed species or designated critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or designated critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. This opinion expires 5 years after the effective date of signing.

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