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

In response refer to:
2006/07392:MLD

JAN 25 2010

Commander (dp)
Eleventh United States Coast Guard District 11
Bldg. 50-2, Coast Guard Island
Alameda, CA 94501-5100

Dear Commander:

This document transmits NOAA's National Marine Fisheries Service's (NMFS) final biological opinion (Enclosure) based on NMFS' review of the proposed issuance of a United States Coast Guard permit to the St. George Reef Lighthouse Preservation Society (SGRLPS) to maintain the St. George Reef Lighthouse as a Private Aid to Navigation (PAN) and its effect on the federally threatened eastern Distinct Population Segment (DPS) of Steller sea lion (*Eumetopias jubatus*) and designated critical habitat, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.).* This final biological opinion is based on our review of: (1) the Habitat Conservation Plan (Section 10(a)(1)(B) of the ESA) and Application for a Letter of Authorization (modified to an Incidental Harassment Authorization) under the Marine Mammal Protection Act (MMPA) submitted by SGRLPS and the effects of the proposed action on Steller sea lions in accordance with section 7 of the ESA; (2) supporting documentation including the Quitclaim Deed and Biennial Report 2003-2004 submitted by the SGRLPS to the National Park Service; and (3) site visit by NMFS Southwest Region staff (Monica DeAngelis) on May 13, 2005. A complete administrative record of this consultation is on file at the NMFS Southwest Regional Office.

Based on the best available scientific and commercial information, NMFS' has concluded that the issuance of the PAN permit to the SGRLP is not likely to jeopardize the continued existence of the federally threatened eastern DPS of Steller sea lion and will not result in the destruction or adverse modification of Steller sea lion critical habitat.

Thank you for consulting with NMFS on the proposed project. If you have any questions regarding this consultation, please contact Monica DeAngelis, of my staff, at (562) 980-3232, or via e-mail at Monica.DeAngelis@noaa.gov.

Sincerely,

FOR Rodney R. McInnis
Regional Administrator

Enclosure: Biological Opinion

cc: ARN: 151422SWR2007PR00157
Brian Aldrich, USCG, District 11
Lisa Houlihan, USCG, District 11
Jeanine Cody, NMFS, OPR

National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion

Agency:	United States Coast Guard National Marine Fisheries Service Office of Protected Resources
Activities Considered:	Issuance of a United States Coast Guard Permit to Maintain St. George Reef as a Private Aid to Navigation Issuance of an Incidental Harassment Authorization Permit under the Marine Mammal Protection Act to Conduct Maintenance and Renovation Activities at St. George Reef Lighthouse, January 2010- April 2012
Consultation Conducted By:	Protected Resources Division, Southwest Regional Office, National Marine Fisheries Service
Tracking Number:	**2006/07392** **(AR#:151422SWR2007PR00157)**

Section 7(a)(2) of the Endangered Species Act (ESA; 16 U.S.C. § 1531 *et seq.*) requires that each Federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a Federal agency may affect a protected species or critical habitat, that agency is required to consult with either NOAA's National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species or critical habitat that may be affected. Federal agencies are exempt from this requirement to consult formally, if they have concluded that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat and NMFS or the USFWS concur with that conclusion (50 CFR 402.14(b)). For the actions described in this biological opinion, the action agencies are NMFS' Office of Protected Resources (OPR) for issuance of an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) and the United States Coast Guard (USCG) for the activities associated with maintaining the St. George Reef Lighthouse as a Private Aid to Navigation; and the consulting agency is the NMFS Southwest Region (SWR).

This document represents NMFS' Biological Opinion based on our review of the: (1) Habitat Conservation Plan (Section 10(a)(1)(B) of the ESA) and Application for a Letter of Authorization (LOA) under the MMPA submitted by the St. George Reef Lighthouse Preservation Society (SGRLPS) (see the *Background and Consultation History* section for more information on the purpose of these two documents), and the effects of the proposed action on Steller sea lions in accordance with section 7 of the ESA; (2) supporting documentation including the Quitclaim Deed and Biennial Report 2003-2004 submitted by the SGRLPS to the National Park Service (NPS); and (3) site visit by NMFS-SWR staff (Monica DeAngelis) on May 13, 2005.

This biological opinion is based on information from the final and most recent revised Recovery Plan for the Steller sea lion (NMFS 1992; NMFS 2006a; NMFS 2008), the most current marine mammal stock assessment reports (Angliss and Outlaw 2005, 2007, 2008; Angliss and Allen 2009), past and current research, and population dynamics modeling efforts. This biological opinion represents NMFS-SWR's review of the status of the listed species considered in this consultation, the condition of the critical habitat, the environmental baseline for the action area, the effects of the proposed action and cumulative effects (50 CFR 402.14(g)). For the jeopardy analysis, NMFS-SWR analyzed those combined factors to determine whether the proposed actions are likely to appreciably reduce the likelihood of both the survival and recovery of the affected listed species.

The critical habitat analysis determined whether the proposed action would destroy or adversely modify critical habitat for listed species by examining any change in the conservation value of the essential features of critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.2. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. Until we have promulgated a new definition of "destruction or adverse modification," our evaluation of effects to proposed or designated critical habitat considers the statutory concepts embodied in Section 3 (the definitions of "critical habitat" and "conservation"), Section 4 (the procedures for delineating and adjusting areas included in a designation), and Section 7 (the substantive standard in paragraph (a)(2) and the procedures in paragraph (b)).

NMFS initially identified several aspects of the proposed maintenance and renovation activities that represent potential hazards to Steller sea lions or their critical habitat: (1) aircraft operations, including the landing of the aircraft on the St. George Reef Lighthouse (Lighthouse) and delivery of materials using the helicopter and sling/basket (including noise associated with this action); (2) presence of humans (including human-generated noise); and (3) introduction of hazardous chemicals into the marine environment.

The SGRLPS is seeking a LOA (now modified to an IHA discussed further in this section), under Section 101 (a)(5)(D) of the MMPA, from NMFS-OPR, to allow the incidental take through harassment (disturbance) of the federally threatened eastern

Distinct Population Segment (DPS) of Steller sea lion (*Eumetopias jubatus*), and the non-ESA listed California sea lion (*Zalophus californianus*), Pacific harbor seal (*Phoca vitulina richardii*), and Northern fur seal (*Callorhinus ursinus*), during the process of restoring and maintaining the historic lighthouse on Northwest Seal Rock, Del Norte County, California. In addition, the SGRLPS is required to obtain a permit from the USCG for maintaining the lighthouse as a Private Aid to Navigation[1] (PAN). Since the issuance of both of these permits involves federal agency authorization, both actions are considered in this biological opinion.

I. Background and Consultation History

The USCG decommissioned the Lighthouse Station in 1975. In 1996, the United States Government Services Administration and the government of Del Norte County transferred the management and upkeep of the Lighthouse to SGRLPS, which aims to restore and preserve the Lighthouse, listed in the NPS' National Register of Historic Places (Reference Number 93001373). The SGRLPS presented a Program of Preservation and Utilization (Program) to the NPS in 1996. This Program was approved by the NPS, and restoration of the Lighthouse began that same year. The President of the SGRLPS addressed all wildlife issues through the Humboldt Bay National Wildlife Refuge (NWR) (G. Towers, SGRLPS, pers. comm., 2005). The original restriction in a Quitclaim deed to Del Norte County (April 3, 1996) precluded access to the Lighthouse from March 15-September 30, for any purpose. This restriction was partly based on documentation of seabirds nesting on ledges of some broken out windows of the Lighthouse in 1989 (Carter *et al.* 1992). The project leader of the Humboldt Bay NWR was designated as the local USFWS contact for wildlife issues at the site, due to the presence of nearby refuge lands and breeding seabird issues (K. Forrester, USFWS, pers. comm., 2005). The SGRLPS requested a larger window of operating time due to weather related constraints associated with attempting to restore the Lighthouse, primarily in the winter months. Biological information related to the project area was very limited, so the USFWS recommended that the SGRLPS conduct a study to evaluate wildlife use of the Northwest Seal Rock in spring and summer. The SGRLPS funded surveys of marine birds and mammals that spanned a four year period, 1997 to 2000, and included observations from April through September (Crescent Coastal Research 2001). Following a review of the wildlife study, and given the absence of breeding seabirds during the seasons of survey, in spring 2001, the USFWS modified the closed period to June 1 to October 15. This change was made according to the recommendations made by Charles Strong in the Crescent Coastal Research Report (2001). The shift was also intended to allow the SGRLPS a larger window to work in the spring and provide additional protection for post-breeding mother-pup Steller sea lion pairs, following dispersal from nearby rookeries. The USFWS memo from project leader Rich Guadagno, to Refuge Supervisor Dave Paullin (March 19, 2001), stated that the SGRLPS would need to obtain a permit under the MMPA due to potential take of marine mammals. NMFS has no record that the SGRLPS applied for an MMPA permit at that time, as recommended by the USFWS.

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[1] A PAN is a buoy, light, or day beacon owned and maintained by any individual or organization other than the USCG.

In 2002, the SGRLPS applied for a PAN permit from the USCG. This PAN permit was granted with the condition that, should repairs be necessary, they must be completed within a stipulated time period. A solar, wind powered optic light system was installed that same year. When the light experienced a failure in 2003 and the SGRLPS was not able to repair it within the stipulated time period, the USCG permit was revoked. The USCG stated that any new PAN permit would be dependent upon, among other things, the SGRLPS obtaining approval from the USFWS and NMFS, for emergency access to the light at any time of the year, in the event of equipment failure.

The SGRLPS contacted the USFWS Humboldt Bay NWR in 2003 regarding this matter. In the absence of concerns related to breeding migratory birds, the USFWS directed the SGRLPS to consult with NMFS regarding potential impacts to marine mammals.

A contractor working for the SGRLPS contacted NMFS-OPR via electronic mail, in April 2004, regarding possible impacts to Steller sea lions during emergency work at the Lighthouse. On April 30, 2004, this information was forwarded to NMFS-SWR. On May 6, 2004, NMFS-SWR telephoned the contractor, regarding the aforementioned e-mail, and was given the President of SGRLPS' contact information.

On May 10, 2004, NMFS-SWR spoke with the SGRLPS President regarding the project. The President of SGRLPS provided numerous documents to aid NMFS-SWR with review of the project history and proposed project work. Based on telephone conversations and review of the documents, NMFS-SWR advised the SGRLPS to consider applying for an IHA or LOA under the MMPA. On November 12, 2004, NMFS-OPR sent a letter to SGRLPS regarding their proposed project. NMFS-SWR also advised the USCG to consult with NMFS under Section 7 of the ESA on the issuance of the permit to maintain the Lighthouse as a PAN. On March 31, 2005, the SGRLPS, submitted a draft Application for the LOA. The application was incomplete and NMFS-SWR provided comments and edits on April 4, 2005, to SGRLPS to complete their application. On May 9, 2005, NMFS-SWR received a revised application for the LOA from the contractor hired by the SGRLPS.

On May 13, 2005, NMFS-SWR conducted a site visit to the Lighthouse via helicopter with the SGRLPS. Following the trip, NMFS-SWR requested that the SGRLPS provide more specific information on the proposed activities and the legal status of the site. NMFS-SWR also informed SGRLPS that their activities at the Lighthouse may impact marine mammals and that the SGRLPS should consider obtaining any necessary permits under the MMPA and ESA from NMFS. At that time, the SGRLPS ceased operations and began the process of applying for a permit from NMFS to take marine mammals. During this trip, SGRLPS indicated that the NPS receives a biennial report detailing SGRLPS' restoration activities at the Lighthouse. NMFS-SWR contacted the NPS to inquire about any NPS permits that would allow the SGLRPS to conduct restoration work. NPS indicated that while the NPS does receive a biennial report, the NPS does not permit the work, and therefore, would not need to consult under Section 7 of the ESA for restoration activities conducted by SGRLPS.

On May 25, 2005, NMFS-SWR contacted the contractor hired by the SGRLPS regarding the LOA and the requirements under Sections 7 and 10 of the ESA. On June 23, 2005, NMFS-SWR sent a letter to the USCG, regarding interagency consultation under Section 7 of the ESA and the proposed project at the Lighthouse. During a conference call between staff from the USCG and NMFS-SWR, the USCG agreed that they should consult with NMFS under Section 7 of the ESA regarding issuance of the PAN permit, but not for restoration activities. On August 25, 2005, NMFS-SWR contacted a member of the Del Norte County Board of Supervisors, to obtain a copy of the lease agreement between Del Norte County and the SGRLPS and to determine if Del Norte County should be included in this consultation. The Board member stated that "activities that are conducted by the SGRLPS at the Lighthouse are their responsibility, not the County's [Del Norte] responsibility" and did not need to be included in this consultation. The lease agreement was later provided to NMFS SWR by the SGRLPs. Under Section 10(a)(1)(B) of the ESA, "the Secretary may permit, under such terms and conditions as he shall prescribe any taking otherwise prohibited by Section (a)(1)(B) if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." It was determined that the USCG would consult under Section 7 of the ESA for issuance of the PAN permit and that the SGRLPS would apply for an Incidental Take Permit under Section 10 of the ESA for maintenance and restoration activities. Since the USCG requested information from the SGRLPS as part of their Section 7 responsibility and the SGRLPS would need a permit under Section 10 of the ESA from NMFS, the SGRLPS agreed to prepare a Habitat Conservation Plan to provide information to both NMFS and the USCG as part of the ESA and MMPA consultation processes.

As part of the ESA consultation process, NMFS provided the SGRLPS with information on compliance with Section 10 of the ESA. Before the federal actions by NMFS and the USCG began, the SGRLPS requested a permit under Section 10 of the ESA regarding the effects of maintenance and restoration activities and at the same time, they submitted the Habitat Conservation Plan and their revised application for the LOA to NMFS-OPR on July 26, 2006. NMFS-OPR and NMFS-SWR agreed that the application package for the LOA was incomplete. However, NMFS-SWR agreed to revise the LOA application for the SGRLPS, obtain the SGRLPS' final approval once revisions were made, and to expedite the LOA process to the maximum extent practicable based on staff workload. On September 27, 2006, NMFS-SWR sent the revised LOA package to the SGRLPS for final approval. On October 11, 2006, the SGRLPS submitted the revised LOA package to NMFS-OPR.

On January 19, 2007, SGRLPS contacted NMFS-SWR to discuss the opportunity of joining the USCG on a flight to examine the structure for any damage that may have incurred during the time period since the SGRLPS maintained the Lighthouse. NMFS-SWR instructed SGRLPS that, as long as there were no animals present, then no "take" under either the ESA or MMPA would occur; however the USCG and/or SGRLPS needed to contact NMFS-SWR prior to taking the flight and upon return. SGRLPS estimated that the entire trip would take approximately 2 hours and there would be two USCG personnel and 3 SGRLPS representatives on the aircraft.

On February 21, 2007, SGRLPS confirmed in a telephone conversation with NMFS-SWR that the SGRLPS and the USCG did fly to the Lighthouse on February 16 and 17, 2007, to conduct renovation and maintenance activities. In addition, on February 18, 2007, in conjunction with renovation and maintenance activities, 38 people were brought to the Lighthouse for tours. On February 16, 2007, approximately a dozen sea lions were flushed into the water (G. Towers, SGRLPS, pers. comm.). Mr. Towers was not able to determine whether the sea lions were California sea lions or Steller sea lions. The SGRLPS did not have a permit to "take" these animals, and a violation of the MMPA and possibly the ESA may have occurred. Information regarding the incident was forwarded to NOAA Office of Law Enforcement for investigation. This is an active investigation, and therefore will not be discussed further in this document. During this same telephone conversation, SGRLPS explained that they thought they had received verbal authorization from NMFS to proceed with their schedule. NMFS-SWR informed SGRLPS that they were not given verbal authorization and reiterated to SGRLPS that a permit issued by NMFS is the authorization permitting harassment of marine mammals should they perform restoration and maintenance activities, as described in their application for the LOA, in the presence of marine mammals.

On March 6, 2008, the NMFS-OPR requested formal consultation with NMFS-SWR pursuant to Section 7 of the ESA regarding the effects of issuing a permit under the MMPA for renovation and maintenance activities at the Lighthouse on the threatened eastern DPS Steller sea lion. Although, the SGRLPS requested an LOA under the MMPA to permit their activities, NMFS has determined that issuing an IHA is more appropriate. The IHA, if issued, will be valid for a one year period, and subsequent IHAs would be issued on a yearly basis, once renewal requests are received.

On December 12, 2008, the USFWS concurred via electronic mail, with the USCG's determination that activities would have "no effect" for the brown pelican (*Pelecanus occidentalis*) and marbled murrelet (*Brachyramphus marmoratus*). Subsequently, the USCG accepted the SGRLPS' application for a permit to maintain the Lighthouse as a PAN and the USCG entered into formal consultation with NMFS pursuant to Section 7 of the ESA regarding the effects of maintenance activities associated with maintaining the Lighthouse as a PAN on the threatened eastern DPS of Steller sea lion, on January 16, 2009. As mentioned previously, prior to the initiation of formal consultation by the Federal agencies pursuant to Section 7 of the ESA, the SGRLPS requested a permit pursuant to Section 10(a)(1)(B) of the ESA, accompanied by a Habitat Conservation Plan and an application for a LOA (both submitted on October 11, 2006), pursuant to the MMPA. Once the Habitat Conservation Plan and completed application for the LOA were submitted by the SGRLPS and accepted by NMFS-OPR, the Section 10 permit under the ESA by the SGLRPS was no longer needed as the consultation initiated between NMFS-SWR and NMFS-OPR and the USCG to address potential impacts to listed marine mammal species related to actions associated with the restoration and maintenance of the Lighthouse, and operation as a PAN, superseded the initial request by the SGRLPS. The information provided in the Habitat Conservation Plan was then used as an information document to assist with the Section 7 consultation.

II. DESCRIPTION OF THE PROPOSED ACTION

NMFS proposes to issue an IHA to the SGRLPS to harass Steller sea lions, California sea lions, Pacific harbor seals, and Northern fur seals, incidental to the restoration and maintenance of the Lighthouse. The IHA, once issued, is valid for one year, but may be renewed. The initial IHA will be valid from January 27, 2010 until April 30, 2010. Since it is expected that the restoration and maintenance activities will take a total of three years and it is anticipated that the SGRLPS will request to renew the IHA, this Biological Opinion would cover restoration and maintenance activities during the following work windows: January 27, 2010-April 30, 2010; November 1, 2010-April 30, 2011; and, November 1, 2011-April 30, 2012. In addition, the USCG proposes to issue a permit to the SGRLPS to maintain the Lighthouse as a PAN. This Biological Opinion would cover the PAN activities for the same time periods described above. Once the Lighthouse is restored (in 2012), maintenance trips to the Lighthouse may be necessary to minimize future large-scale restoration. It is expected that maintenance trips (post-restoration) would take one day (~ 3 hours)[2]. Below is a description of the activities to be covered under the NMFS and the USCG permit.

Project Location

The Saint George Reef Lighthouse is located on a small rocky islet known as Northwest Seal Rock (41^0 50'24" N, 124^0 22'06" W), which is part of the St. George Reef, in Del Norte County, California (Figure 1). The island is about 7 km (4.35 miles) offshore, is 91.4 meters (300 feet) in diameter, and peaks at 5.18 meters (17 feet) above mean sea level. The Lighthouse covers much of the surface of the island. Original construction of the Lighthouse was completed in 1892 and it was operated by the USCG until 1975. It rises 45.7 meters (150 feet) above the sea, consists of hundreds of granite blocks, and is topped with a cast iron lantern room. The USCG decommissioned the light (*i.e.*, the USCG no longer considers it an Aid to Navigation) and ceased to maintain the historic building which housed the light, which rapidly deteriorated and became subject to vandalism. The SGRLPS was founded in 1986 with the goals of restoring the Lighthouse and increasing recognition of its important historical role in maritime and regional history. As mentioned previously, in 1996, the SGRLPS entered into an agreement with the federal and local government to manage and renovate the Lighthouse on site.

"Action areas" are defined as "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)). The activities associated with the restoration and maintenance of the Lighthouse include the take-off and landing of the helicopter from McNamara Field, Crescent City, CA, to the Lighthouse (Figure 1) and any activities that occur at the Lighthouse on Northwest Seal Rock. NMFS-SWR consulted with Raven Helicopters and according to Raven Helicopters, the action area should also include a 2.0 mile noise diameter surrounding the helicopter while in flight (Steve Turnour, Raven Helicopters, pers comm., 2006). As

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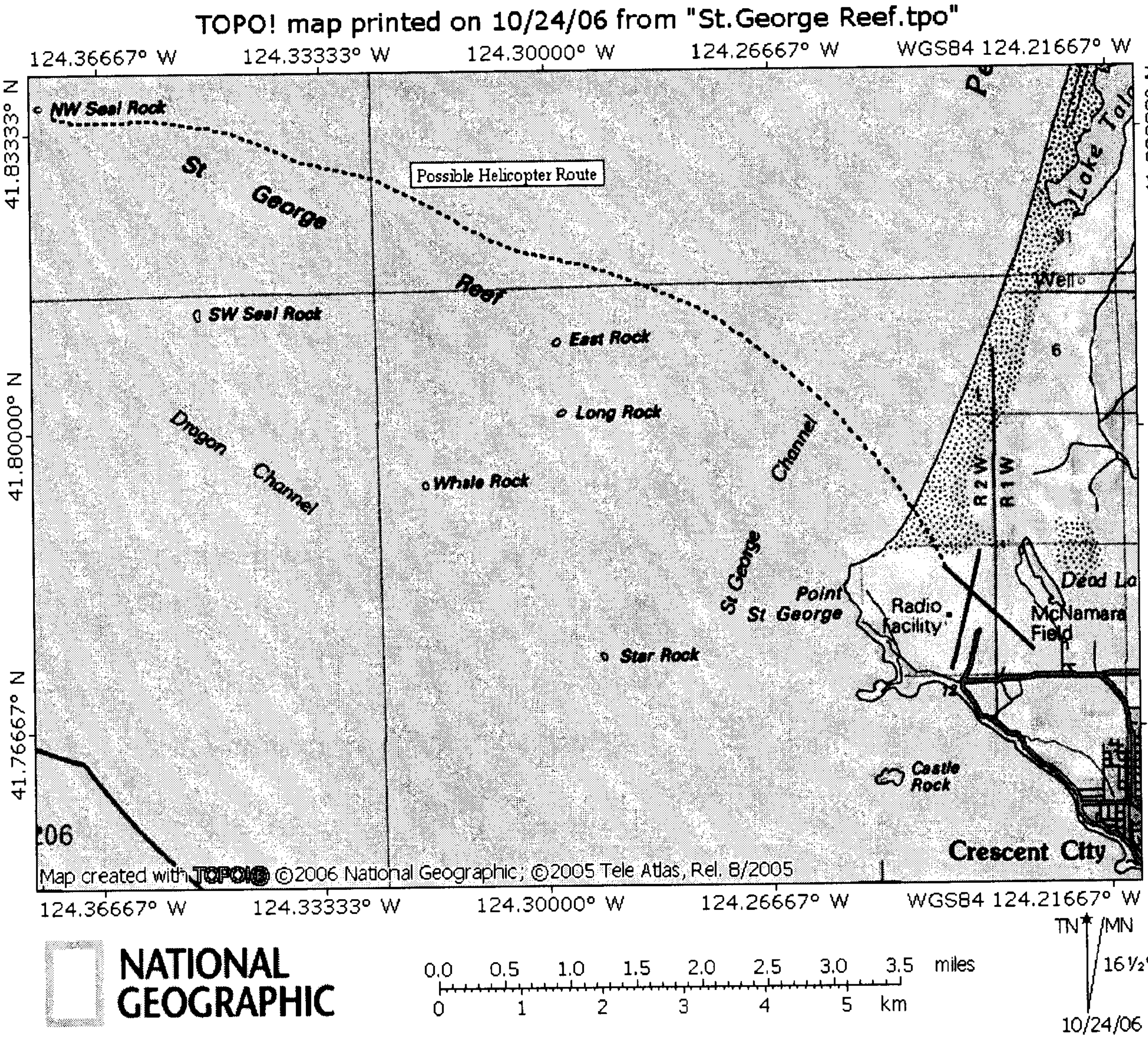
[2] Should PAN maintenance be necessary after April 30, 2012, it may be necessary to reinitiate consultation under Section 7 (if an ESA-listed marine mammal is present and may be adversely affected) and obtain authorization under the MMPA.

such, this area includes all waters located within the boundaries of this action area as previously described, and any islands or rock formations that fall within this boundary.

Figure 1. St. George Reef, in Del Norte County, California. Dashed line depicts possible helicopter route from McNamara Field in Crescent City.



Restoration

Physical restoration of the Lighthouse began in 1996 and will require approximately three more years to complete (2012). Work trips are proposed for a 6 month period (1 November through 30 April), likely beginning in January 2010, during one weekend each month and lasting no more than three days (*e.g.*, Friday, Saturday, and Sunday). Because Northwest Seal Rock has no safe landing area for boats, work crews and equipment will be transported from the mainland to the Lighthouse by a light helicopter, a Raven R44, that lands on top of the engine room at the Lighthouse, about 48 feet above the rock island (Figures 2a, 2b, and 3). Materials are transported by a basket attached to the underside of the helicopter. When the helicopter with the basket arrives at the Lighthouse, the helicopter hovers over the island and the basket is placed on the engine room of the Lighthouse. When the helicopter flies with the basket, it is unable to land at the platform and thus, hovers at least 150 feet above Northwest Seal Rock. Volunteers remove the materials from the basket and the helicopter returns to the mainland with the basket in tow. Typically, volunteers remain at the Lighthouse overnight the first two days of the trip and return to the mainland on the third day. Even though the helicopter is primarily used to transport volunteers and materials on the first and last days of the three day activity, the helicopter may fly to and from the Lighthouse on all three days of the restoration and maintenance activities. Detailed information is provided below.

Restoration activities include removal of peeling paint and plaster, restoration of interior plaster and paint, refurbishing structural and decorative metal, reworking original metal support beams throughout the lantern room and elsewhere, replacing glass as necessary, and upgrading the present electrical system. Power to the island is provided by an air compressor and gas generator. The beacon light is to be powered by solar energy. Trips to the site are made by small helicopter, owned and operated by Air Shasta Rotor and Wing, LLC, Redding, CA. The Raven R44, which seats three passengers and one pilot, is a compact-sized (1134 kilograms (kg)) (2500 pounds (lbs)) helicopter with two-bladed main and tail rotors. Both sets of rotors are fitted with noise-attenuating blade tip caps that would decrease flyover noise. Volunteers involved in restoration are taken out 3 at a time. The number of helicopter trips is estimated at no more than 30 landings/takeoffs per month (*i.e.*, one weekend per month-Friday, Saturday, and Sunday). Typically, on Friday, there would be six flights to the Lighthouse bringing 12 – 15 crew members and equipment/material and six flights back to the mainland for a total of 12 flights on day one. The first flight would depart from Crescent City Airport (Latitude: 41°46′48″ N; Longitude: 124°14′11″ W) at 9:00 am for a six-minute flight to Northwest Seal Rock. The helicopter would land and take-off immediately after offloading personnel and equipment every 20 minutes (min). The total duration of the first day's aerial operations would last for approximately three hours (hrs) and 26 min and would end at approximately 12:30 p.m. Once the restoration crew is transported to the Lighthouse, the majority of the crew would remain overnight (Friday and Saturday) and return the last day of restoration and maintenance activities (Sunday). Even though SGRLPS would use the helicopter to transport work crew members and materials on the first and last days of the three-day activity, the helicopter would likely fly to and from the Lighthouse on all three days of the restoration and maintenance activities. For the second day, the SGRLPS proposes a maximum of 2 flights (one arrival and one departure) to transport no more than three crew members off of Northwest Seal Rock. The first flight would depart from Crescent City Airport at 9:00 a.m. for a six-minute flight to Northwest Seal Rock. The total duration of the second day's aerial operations would last for no more than 30 minutes (approximately 26 min.). For the final day of operations, SGRLPS proposes to conduct a maximum of eight helicopter flights (four arrivals and four departures) to transport the remaining crew members and equipment/material back to the Crescent City Airport. The total duration of the last day's aerial operations for restoration and maintenance would last for approximately two hrs and 14 min.

As a means of funding support for the Lighthouse restoration, the SGRLPS proposes to conduct public tours at the Lighthouse during the last day of the proposed restoration schedule. Visitors would be transported by helicopter during the Sunday work window period. The SGRLPS began conducting public tours to the Lighthouse by helicopter in 1998 in conjunction with restoration activities. Although additional flights would be conducted solely for the transport of tourists to and from the Lighthouse, those flights would be conducted in the later hours of the morning, when no Steller sea lions are expected to be hauled out on Northwest Seal Rock (*i.e.*, it is expected animals will have been harassed off Northwest Seal Rock from previous activities).

The maximum number of expected tourists is 36 people per tour day. The total number of helicopter trips on a tour day (Sunday) is estimated at 17, all between the hours of 9:00 am to 1:00 pm. It is expected that each flight would land every 15-20 minutes. Thus, the total duration of the last day's aerial operations, including the restoration and maintenance activities described previously (two hour and 14 minute duration) would last for approximately four hrs. The scheduled duration of each visit is 1 hour per tour group. The last tour group would leave the Lighthouse before 1:00 pm. An example of the Sunday tour schedule is shown in Table 1. No additional allowance is included for animals that might be affected by additional flights for the transportation of tourists. Return trips from the Lighthouse to the mainland would include construction workers, some equipment, and some tourists. An additional eleven flights would be flying to the Lighthouse to transport tourists. The corresponding return flights would transport tourists, construction equipment, or remaining construction workers. Although some of these flights would be conducted solely for the transportation of tourists, those flights would be flown at a time when no pinnipeds are expected to be at the Lighthouse, since it is expected that all animals on the island would flush into the water by the first few helicopter flights.

Major restoration work is expected to be completed in three years. After that, maintenance trips are anticipated at a lower frequency for maintenance and minor repairs. The MMPA permit, the IHA, would only cover a one year period, if it is issued. Subsequent IHAs would be issued on a yearly basis.

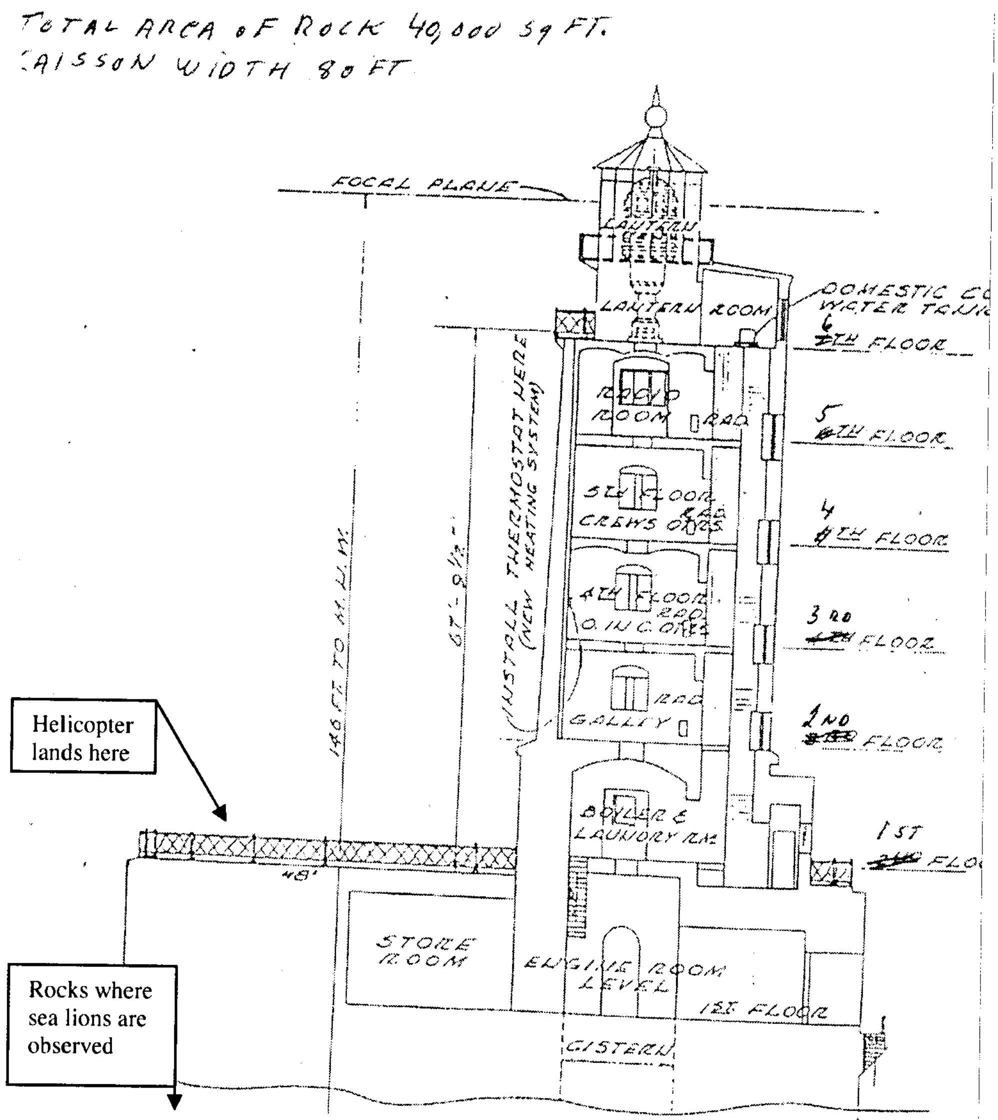
Table 1. An example of a Lighthouse tour in conjunction with restoration activities (Sundays only) at St. George Reef Lighthouse, Crescent City, CA.

Flight No.	Time	Crew Out	Crew at Lighthouse	Tourists In	Tourists Out	Tourists at Lighthouse
	Before 09:00	0	15	0	0	0
1	09:00	3	12	3	0	3
2	09:15	3	9	3	0	6
3	09:30	3	6	3	0	9
4	09:45	3	3	3	0	12
5	10:00	0	3	3	3	12
6	10:15	0	3	3	3	12
7	10:30	0	3	3	3	12
8	10:45	0	3	3	3	12
9	11:00	0	3	3	3	12
10	11:15	0	3	3	3	12
11	11:30	0	3	3	3	12
12	11:45	0	3	3	3	12
13	12:00	0	3	0	3	9
14	12:15	0	3	0	3	6
15	12:30	0	3	0	3	3
16	12:45	0	3	0	3	0
17	13:00	3	0	0	0	0

Figure 2a. St. George Reef Lighthouse, about 48 feet above the island. Engine Room is to the right of the lighthouse structure. (NOAA Photo ***M.L. DeAngelis***)

Figure 2b. Work crews and equipment transported by a light helicopter, a Raven R44, that lands on top of the engine room at the St. George Reef Lighthouse. (NOAA Photo *M.L. DeAngelis*)

Figure 3. Schematic of St. George Reef Lighthouse and description of levels with corresponding measurements.



In summary, the proposed project consists of the following:

A. *Restoration and Maintenance Activities*

Restoration and maintenance activities include one to three day bouts of restoration activities, including daily helicopter landings on Northwest Seal Rock and corresponding return flights back to the mainland. "Light construction" includes removal of peeling paint and plaster, restoration of interior plaster and paint, refurbishing structural and decorative metal, reworking original metal support beams throughout the lantern room and elsewhere, replacing glass as necessary, and upgrading the present electrical system.

B. *Light Maintenance*

As required by the USCG, in order to maintain Lighthouse as a PAN, the SGRLPS will need to conduct maintenance at least once or twice a year (during restoration and post-restoration). During restoration, this maintenance will coincide with restoration trips during the work window. To access Northwest Seal Rock, the same helicopter (Raven R44) used for restoration activities will be employed. Light maintenance is expected to take no longer than 3 hours and would coincide with the helicopter flights described under Section A above. Should the beacon light fail during the work window (1 November to 30 April), a trip to the Lighthouse will be made by helicopter (same as above) by one crew of 2-3 people. Only 1-2 helicopter landings at the Lighthouse are anticipated to service the light during an emergency situation (*i.e.*, beacon light failure during the work window) for a maximum of 4 flights. The helicopter may remain on site or transit back to shore and make a second landing to pick up the repair personnel.

C. *Emergency Light Maintenance* (Not covered by this Biological Opinion)

If the beacon light fails between outside of the work window (May 1 and October 31), the SGRLPS must contact the NMFS-SWR and the USCG immediately to discuss: (1) the potential of receiving an authorization from the NMFS-SWR to conduct an emergency repair of the beacon light; and (2) the potential of reinitiating consultation under section 7 of ESA. In this case of an emergency repair, the NMFS-SWR could authorize trips to the Lighthouse, but would be on a case-by-case basis, based upon the existing environmental conditions and the abundance and distribution of any marine mammals present on Northwest Seal Rock. The NMFS-SWR would also ensure that the SGRLPS' request for incidental take during emergency repairs would not exceed the number of incidental take authorized in the IHA.

D. *Tours* (Take not authorized)

There are no provisions under the MMPA for authorizing "takes" of protected marine mammals for tourism purposes. Tours should not result in the harassment of marine mammals, including that which may result from the approach of helicopters transporting tourists to and from the site. Any person visiting the island should remain at least 100 yards away from any established pinniped haulouts and 50 yards away from individual sea lions to avoid disturbing them.

The tours proposed during the three year restoration and maintenance activities will occur in conjunction with maintenance and restoration activities conducted during the Sunday work window period. As previously mentioned, those flights would be conducted at a later time during the morning flight plan when no Steller sea lions are expected to be at the Lighthouse. No additional allowance is included for animals that might be affected by additional flights for the transportation of tourists. The take associated with maintenance and restoration activities, A. and B. above, will be covered under the IHA permit under the MMPA, should it be issued. Thus, tours are not discussed further in this document with regard to take, as there should be no take associated with tours.

Proposed Mitigation Measures

The mitigation measures presented below were taken from the Habitat Conservation Plan provided by the SGRLPS as part of their Section 10 application under the ESA and their LOA application (now IHA application) under the MMPA. These measures will be included in the IHA permit.

Biological Goals

The desired outcome is that the Steller sea lion will continue to use Northwest Seal Rock as a haulout and that haulout habitat will remain unchanged.

Measures to Minimize Impacts

Impacts will be minimized by the following measures:

A) Restricting the window of operations and visitation schedule to the island. By restricting helicopter flights to November 1 to April 30, harassment impacts will affect a lower number of Steller sea lions and only juveniles and/or adults (no pups).

B) Employing helicopter approach patterns and timing techniques least disturbing to Steller sea lions.

1) The most severe impacts (stampede) are precipitated by rapid and direct helicopter approaches. Initial approach to the lighthouse will be offshore from the island at a relatively high altitude (*e.g.*, 800-1,000 ft).

2) Cluster helicopter arrival/departures within a short time period, as animals show less response to subsequent landings.

C) Tourists, SGRLPS members, and restoration crews will be educated about the MMPA, ESA, and be instructed to avoid unnecessary noise and not reveal themselves visually to Steller sea lions around the base of the Lighthouse. The door to the lower platform (which is used at times by Steller sea lions) will remain closed and barricaded to all tourists and other personnel. The door will only be opened when necessary and when no animals are on the lower platform.

D) Complete automation of the light generating system and automatic backup system will minimize maintenance and emergency repair visits to the island. The light is solar powered using one solar panel; an installed second panel serves as a backup which is automatically activated if needed. A second smaller bulb in the lantern is activated if the primary bulb fails. Use of high quality, durable materials and thorough weatherproofing is planned to minimize trips for maintenance and repair in the future. All tools and supplies are stored on the island so that a minimal number of transport trips will be necessary.

E) Each trip to the Lighthouse could involve activities that would result in some physical environmental impacts due to discharges and pollutants being released into the air and water, however, the scale of the proposed action and working area is small and is only restricted to the Lighthouse. All discarded materials, including paint chips, and waste, would be brought back to the mainland.

Monitoring

Short-term Impact Monitoring

At least once per year, a qualified biologist will be present during a typical workday at the Lighthouse. The biologist hired will be subject to approval of NMFS. The biologist will document use of the island by the Steller sea lion, frequency and response to disturbances. In the event of any observed Steller sea lion injury, mortality, or presence of a newborn pup, NMFS will be notified immediately.

Aerial photographic surveys may provide the most accurate means of documenting species composition, age and sex class of Steller sea lions, using the project site during human activity periods. Aerial photo coverage of the island will be completed from the same helicopter used to transport SGRLPS personnel to the island during restoration trips. Photographs of all marine mammals hauled out on the island will be taken at an altitude greater than 300 meters by a skilled photographer, prior to the first landing on each visit included in the monitoring program. Photographic documentation of marine mammals present at the end of each 3-day work session will also be made, for a before and after comparison. These photographs will be forwarded to a biologist capable of discerning marine mammal species. Data will be provided to NMFS annually in the form of an annual report with a data table, any other significant observations related to marine mammals, and a report of restoration activities. The original photographs can be made available to NMFS or other marine mammal experts for inspection and further analysis.

If funding is available, the SGRLPS would like to install a remote camera or video surveillance equipment at the lighthouse, so that use patterns and disturbance impacts to marine mammals can be documented in greater detail.

Long-Term Monitoring

Existing monitoring plans will serve as an index to long-term use of the project site by Steller sea lions. Aerial surveys (conducted by NMFS and the Oregon Department of Fish and Wildlife (ODFW)) take place during the post-breeding season when use of the haulout is expected to be high. Any long-term negative effects from Lighthouse restoration would be indicated by an overall reduction in use by Steller sea lions.

The Steller Sea Lion Recovery Team has recommended that the eastern DPS be considered for de-listing due to the positive status of the population and absence of current threats. As part of this process, the team has recommended the development of a post-delisting monitoring plan that would extend for 10 years. This should bolster existing monitoring programs and help ensure that there are no threats to the population's continued existence. Long-term negative impacts from Lighthouse maintenance and public access would likely show up in any additional large-scale monitoring plans that include evaluation of the status of Steller sea lion haulouts.

Outreach

The SGRLPS is developing a museum at the Crescent City Harbor. The plans include an exhibit describing the natural features of the St. George Reef. This will provide an opportunity for positive outreach regarding the Steller sea lion, as well as a means to disseminate information regarding existing protective laws and regulations pertaining to this sensitive species.

III. APPROACH TO THE ASSESSMENT

NMFS approaches its section 7 analyses through a series of steps. The first step identifies those aspects of proposed actions that are likely to have direct and indirect effect on the physical, chemical, and biotic environment of an action area. As part of this step, we identify the spatial extent of these direct and indirect effects, including changes in that spatial extent over time. The results of this step represent the action area for the consultation. The second step of our analyses identifies the listed resources that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent. Once we identify which listed resources are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed resources are likely to respond given their exposure (these represent our *response analyses*).

The final steps of our analyses, establishing the risks those responses pose to listed resources, are different for listed species and designated critical habitat (these represent our *risk analyses*). Our jeopardy determinations must be based on an action's effects on the continued existence of threatened or endangered species as those "species" have been listed, which can include true biological species, subspecies, or distinct population segments of vertebrate species. Because the continued existence of listed species depends on the fate of the populations that comprise them, the viability (probability of extinction or probability of persistence) of listed species depends on the viability of the populations that comprise the species. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them; populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so). Our risk analyses reflect these relationships between listed species and the populations that comprise them, and the individuals that comprise those populations. Our risk analyses begin by identifying the probable risks actions pose to listed individuals that are likely to be exposed to an action's effects. Our analyses then integrate those individual risks to identify consequences to the populations that those individuals represent. Our analyses conclude by determining the consequences of those population-level risks to the species those populations comprise.

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

When individual, listed plants or animals are expected to experience reductions in fitness, we would expect those reductions to also reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent (Stearns 1992). Reductions in one or more of these variables (or one of the variables we derive from them) is a *necessary* condition for reductions in a population's viability, which is itself a *necessary* condition for reductions in a species' viability. On the other hand, when listed plants or animals exposed to an action's effects are *not* expected to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (for example, Anderson 2000; Mills and Beatty 1979, Stearns 1992). If we conclude that listed plants or animals are *not* likely to experience reductions in their fitness, we would conclude our assessment.

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

To conduct these analyses, all lines of evidence available through published and unpublished sources that represent evidence of adverse consequences or the absence of such consequences, were considered. Many investigators have studied potential responses of marine mammals and other marine organisms to human-generated sounds in marine environments (for example, Reeves 1992; Bowles *et al.* 1994; Norris 1994; Whitlow *et al.* 1997; Frankel and Clark 1998; Gisiner 1998, Croll *et al.* 1999, 2001;

Tyack 2000; McCauley and Cato 2001), however there has been little research conducted on the impact of aircraft noise on marine mammals (for example, Richardson and Würsig 1997; Patenaude *et al.* 2002; Kucey 2005).

In order to supplement that body of knowledge, various electronic literature searches using available and relevant database services were conducted. The results of these electronic searches were supplemented by acquiring all of the references gathered that, based on a reading of their titles or abstracts, appeared to be relevant information necessary to conduct this consultation.

From each document, the following was extracted: when the information for the study or report was collected, the study design, which species the study gathered information on, the sample size, acoustic source(s) associated with the study (noting whether it was part of the study design or was correlated with an observation), other stressors associated with the study, study objectives, and study results, by species. The probability of responses from the following information was estimated: the known or putative stimulus; exposure profile (intensity, frequency, and duration of exposure) where information is available, and the entire distribution of responses exhibited by the individuals that have been exposed. Because the response of individual animals to stressors will often vary with time (for example, no responses may be apparent for minutes or hours followed by sudden responses and vice versa) any differences in time to a particular response were noted.

Given the limited information that is available, this assessment involved a large amount of uncertainty. There is limited information on behavioral reactions of marine mammals to human presence and aircraft disturbance; the mechanisms by which human-generated sounds affect the behavior and physiology (including the non-auditory physiology) of marine mammals, and the circumstances that are likely to produce outcomes that harm marine mammals (see NRC 2000, for further discussion of these unknowns).

APPLICATION OF THIS APPROACH IN THIS ASSESSMENT

NMFS initially identified several elements of the proposed maintenance and renovation activities that represent potential hazards to threatened or endangered species or critical habitat that has been designated for them: (1) aircraft operations, including the landing of the aircraft on the Lighthouse and delivery of materials using the helicopter and sling/basket; (2) presence of humans; and (3) introduction of hazardous chemicals to the marine environment. After reviewing the proposed mitigation measures the SGRLPS proposes to implement (see *Description of the Action* Section), NMFS concludes that the mitigation measures to minimize impacts associated with Element 3, can be expected to avoid adversely affecting threatened or endangered species or destroying or adversely modifying designated critical habitat (these conclusions are summarized in the *Status of the Species* section of this biological opinion).

Thus, this assessment focuses on the remaining two elements of the proposed SGRLPS activities: aircraft operations and human presence. The potential risks associated with aircraft operations and human presence was analyzed by assessing the frequency of aircraft operations and the potential for disturbance by human presence. The first step in the analysis evaluates the available evidence to determine the likelihood of listed species or critical habitat being exposed to SGRLPS activities. The analysis assumed that SGRLPS activities pose no risk to listed species or critical habitat if they are not exposed to the activities (NMFS recognizes that some activities could have indirect, adverse effects on listed species or critical habitat by disrupting marine food chains, a species' predators, or a species' competitors; however, situations where these effects might apply to species under NMFS' jurisdiction were not identified in this case). The analysis also assumed that the potential consequences of exposure to SGRLPS activities on individual animals would be a function of the intensity of human presence and the aircraft, maintenance and restoration noise (measured in both sound pressure level in decibels and frequency), duration, and frequency of the animal's exposure to SGRLPS activities. Once we identified that Steller sea lions (eastern DPS) were likely to be exposed to the aircraft operations and disturbance by human presence and the nature of that exposure, we examined the scientific and commercial data available to determine whether and how Steller sea lions are likely to respond given their exposure. The remainder of our analyses proceeded using the approach we described in the previous section. Although the overall trend for the eastern DPS stock is showing an increase, the stock is declining in the southern portion of its range, which includes California and the action area. Exposure to aircraft and human presence are likely to disrupt one or more behavioral patterns that are essential to an individual animal's life history or to the animal's contribution to the population. However, these behavioral responses are expected to be temporary and are not likely to hinder the reproductive success or recovery of the Steller sea lion and would also not result in the serious injury or mortality of a single individual. Thus, no impact on the population size of breeding stock of Steller sea lions is expected to occur. In addition, the renovation and maintenance activities, including the flight path, will not impact critical habitat, as critical habitat areas will be avoided.

A Brief Background on Sound

The following subsection relies heavily on Richardson *et al.* (1995) for information on sound characteristics and the effects of noise on marine mammals.

Noise is generally thought of as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Noise sources include: transportation; dredging; construction; oil, gas, and mineral exploration in offshore areas; geophysical (seismic) surveys; sonar; explosions; and ocean research activities. Response to noise varies by the type and characteristics of the noise source, distance between the source and the receptor, receptor sensitivity, and time of the day. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or transient sources. Specific concerns of this analysis are the potential continuous or impulse noise effects on marine mammals.

Due to the complex characteristics of sound, a variety of metrics (or units) are necessary to describe the noise environment in specific conditions. Sound is comprised of waves of energy that travel through air or water as vibrations of fluid particles. The rate at which the vibrations occur is referred to as sound frequency, and it is measured in cycles per second, or hertz (Hz).

The range of sound levels that humans are capable of hearing is very large. If the threshold of hearing (faintest sound level one can recognize) is assigned a value of one, then the threshold of pain (highest level that one is capable of hearing), measured on the same scale, would have a value of ten million. In order to make this large range of values more meaningful, a logarithmic mathematical scale is used, the decibel scale. On this scale, the human threshold level is 0 decibels (dB) and the threshold of pain is approximately 140 dB. Thus, the reference level for the decibel scale used to describe airborne sound is the threshold of human hearing. In physical terms, this corresponds to a sound pressure of 20 micro Pascals (μPa). For underwater sound, a reference level of 1 μPa is used.

Sound level meters have been developed to measure sound fields and to show the sound level as a number proportional to the overall sound pressure as measured on the logarithmic scale. This is often referred to as the sound pressure level (SPL). Sound level meters are useful in that they provide a number that is directly related to the human sensation of loudness. Thus, some meters are calibrated to emphasize frequencies in the 1 to 4 kHz range and to de-emphasize higher and especially lower frequencies to which humans are less sensitive. Sound level measurements obtained with these instruments are termed "A-weighted" (expressed in dBA). Airborne sounds are often expressed as broadband A-weighted (dBA) or C-weighted (dBC) sound levels. A-weighting refers to frequency dependent weighting factors applied to sound in accordance with the sensitivity of the human ear to different frequencies. With A-weighting, sound energy at frequencies below 1 kilohertz (kHz) and above 6 kHz are de-emphasized and approximate the human ear's response to sounds below 55 dB. C-weighting corresponds to the relative response to the human ear to sounds levels above 85 dB. While it is unknown whether the pinniped ear responds similarly to the human ear, the pinniped's highest hearing frequency is at higher frequencies that that of humans, therefore, A-weighting is typically used to express in-air hearing for pinnipeds.

Sound in water propagates more efficiently than sound in air but is subject to similar types of transmission loss (TL) (*e.g.*, spherical spreading and attenuation). When sound spreads spherically (in air or water), sound intensity from the source diminishes as the square of the distance from the source ($1/r^2$, or diminishing of sound levels by 6 dB per range with doubling of distance, r, and 20 dB per range when distance increases ten-fold). This is based on the accepted approximation for transmission loss: $TL = 20 \text{ Log } r$. In the underwater environment, sound typically spreads spherically from the sound source until it is reflected by a surface, such as the ocean bottom or a submerged object, and multiple propagation paths are established. Sound can also reflect off various surfaces in the underwater environment, resulting in cylindrical spreading ($1/r$, or sound diminishes by 3 dB per range with a doubling of distance, and a 10 dB difference when distance increases ten-fold).

Ambient noise is background noise, and in the ocean, such noise arises from wind, waves, organisms, fishing boats, etc. Man-made noise can interfere with detection of acoustic signals, such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. If the noise is strong enough relative to the received signal, the signal will be "masked" and undetectable. The size of this "zone of masking" of a marine mammal is highly variable, and depends on many factors that affect the received levels of the background noise and the sound signal.

Sounds may be transient (pulsed), of relatively short duration having an obvious start and end (explosions, sonars, etc.), or they may be continuous, seeming to go on and on *(e.g.*, an operating drillship). The distinction between transient and continuous sounds is not absolute, however, as many sounds are not purely one or the other. In describing a transient sound, it is useful to present the peak level as well as the waveform, a description of how the sound varies with time. When transient sounds are so short so as to be considered impulsive, they are best described in terms of their energy levels. An animal's response to a pulsed sound with a particular peak level can be quite different than its response to a continuous sound at the same level. Since the mammalian ear operates as a detector of energy, temporal integration should be included when assessing effects, including sensation and damaging levels, of transient noise (Madsen 2005). The noise analyzed in this biological opinion is associated with helicopter operations and noise created by maintenance and renovation activities, therefore transient sound versus longer-term sound exposure will be analyzed when describing the effects of sound on marine mammals.

IV. STATUS OF THE SPECIES

NMFS has determined that the actions considered in this biological opinion may affect the following species that are provided protection under the ESA and under NMFS' jurisdiction that may occur in the action area (Table 2):

Table 2. Species that are provided protection under the ESA and under NMFS' jurisdiction that may occur in the action area

Marine Mammals		**Status**
Blue whale *(Balaenoptera musculus)*		Endangered
Fin whale *(Balaenoptera physalus)*		Endangered
Humpback whale (*Megaptera novaeangliae*)		Endangered
Sei whale (*Balaenoptera borealis*)		Endangered
Sperm whale (*Physeter macrocephalus*)		Endangered
Killer whale - southern resident DPS (*Orcinus orca*)		Endangered
North Pacific Right Whale (*Eubalaena japonica*)		Endangered
Steller sea lion - eastern distinct population segment (DPS) (*Eumetopias jubatus*)*		Threatened
Guadalupe fur seal (*Arctocephalus townsendi)*		Threatened
Sea turtles		
Leatherback turtle (*Dermochelys coriacea*)		Endangered
Loggerhead turtle (*Caretta caretta*)		Threatened
Olive ridley (*Lepidochelys olivacea*)**		Endangered/Threatened
Green turtle (*Chelonia mydas*)**		Endangered/Threatened
Marine fish		
Green Sturgeon, southern DPS (*Acipenser medirostris*)***		Threatened
Pacific Eulachon –southern DPS-(*Thaleichthys pacificus*)		Proposed Threatened
Salmonids		
Chinook (*Oncorhynchus tshawytscha*)	Sacramento River winter, evolutionarily significant unit (ESU)	Endangered
	Central Valley Spring ESU	Threatened
	California Coastal ESU	Threatened
Coho (*Oncorhynchus kisutch*)	Central California Coast ESU	Endangered
	S. Oregon/N. California Coast ESU	Threatened
Steelhead (*Oncorhynchus mykiss*)	Southern California DPS	Endangered
	South-Central California DPS	Threatened
	Central California Coast DPS	Threatened
	California Central Valley DPS	Threatened
	Northern California DPS	Threatened

*Critical habitat for the Steller sea lion has been designated at three rookery sites off the California coast, Año Nuevo Island, Southeast Farallon Island, and Sugarloaf Island and Cape Mendocino. Critical habitat extends 3,000 feet above and 3,000 feet around the base of each of the rookeries. See 50 CFR section 226.202 for more information.
**Nesting populations of green and olive ridley sea turtles on the Pacific coast of Mexico are listed as endangered. All others are listed as threatened.
***Critical habitat for green sturgeon: NMFS designated critical habitat for southern DPS of green sturgeon and includes marine waters off of California to a depth of 110 meters beginning at Monterey Bay and extending to the California/Oregon border [See 74 Federal Register 52300, published October 9, 2009, effective November 9, 2009].

Listed Species in the Action Area, but Excluded from the Consultation

The following ESA-listed species may be found in the action area, but are excluded from the consultation, as they would not be adversely affected by the helicopter activities, and not affected by human presence.

Leatherback sea turtles listed as endangered under the ESA, may be observed transiting through the action area. Green turtles, loggerhead, and olive ridley sea turtles, all listed as threatened or endangered under the ESA, would be rare in the action area, but records show that all species have stranded in Northern California and the Pacific Northwest area. Leatherbacks are known to migrate to central and northern California from their natal beaches in Indonesia to feed on jellyfish. The upwelling process that is part of the productive Californian coastal ecosystem provides ideal foraging habitat for leatherbacks and other marine life. During aerial surveys conducted since the early 1990s, leatherbacks were most often spotted off Point Reyes, south of Point Arena, in the Gulf of the Farallons, and in Monterey Bay. Leatherback turtles usually appear in Monterey Bay and California coastal waters during August and September and move offshore in October and November. Other observed areas of summer leatherback concentration include northern California and the waters off Washington through northern Oregon, offshore from the Columbia River plume. In the eastern Pacific, loggerheads have been reported as far north as Alaska, and as far south as Chile. In the U.S., occasional sightings are reported from the coasts of Washington and Oregon, but most records are of juveniles off the coast of California. Although sea turtles may be in the action area, it is unlikely that they would be impacted by the project since their presence is rare and project activities would take place during the winter months, when sea turtles are less likely to be in the area.

The southern population of green sturgeon was listed as a threatened species on April 7, 2006 (71 FR 17757). Critical habitat for green sturgeon has been designated and includes marine waters off of California to a depth of 110 meters beginning at Monterey Bay and extending to the California/Oregon border (74 Federal Register 52300, published October 9, 2009, effective November 9, 2009). This species consists of coastal and Central Valley populations originating from south of the Eel River, with the only known spawning population in the Sacramento River (NMFS 2006b; NMFS 2006c; NMFS 2007a). Based on the physical and chemical characteristics of other bays and estuaries in California, NMFS has confirmed presence of the Southern DPS green sturgeon in: 1) Monterey Bay (Lindley *et al.* 2008), 2) Humboldt Bay (Pinnix 2008), and; 3) coastal waters within the 110 m depth from Monterey Bay, CA to Graves Harbor, AK (including waters off Vancouver Island; Lindley *et al.* 2008). NMFS expects that Southern DPS green sturgeon is also present in California in: 1) the Klamath/Trinity River Estuary, 2) Elkhorn Slough, 3) Tomales Bay 4) Noyo Harbor, 5) Eel River Estuary (S. Lindley 2008, pers. comm.), and 6) coastal marine waters within 100 m depth from the California/Mexico border to Monterey Bay and northwest of Yakutat Bay, AK to the Bering Sea. The presence of green sturgeon has also been confirmed in Oregon in: Coos Bay and in Winchester Bay (NMFS 2006b) and likely present in Alsea River estuary, Siuslaw River estuary, Yaquina Bay, Tillamook Bay (Emmett *et al.* 1991) and the Rogue

River estuary (S. Lindley, 2008, pers. comm.); and in Washington in Willapa Bay, Grays Harbor, Strait of Juan de Fuca (Lindley *et al.* 2008) Puget Sound (Lindley and Moser, unpublished data 2008). Less is known about the green sturgeon's distribution north of its spawning grounds and geographic range. Given the lack of observations or incidences of bycatch in California fisheries, they are likely rare visitors to the action area. Therefore, because their probability of occurring in the action area during the proposed project is sufficiently small to be discountable and because they do not surface to breathe, they would not be affected by airborne noise, and the magnitude of any effect is considered to be insignificant. We conclude that the proposed SGRLPS activities, may affect, but are not likely to adversely affect the southern DPS of green sturgeon. Therefore, the southern population of green sturgeon will not be considered in greater detail in the remainder of this biological opinion. Although, the proposed project area does overlap with critical habitat for green sturgeon (the flight path to and from Northwest Seal Rock), restoration and maintenance activities will not occur in the water and therefore, no impacts to critical habitat for green sturgeon are expected. Therefore, critical habitat for green sturgeon will not be considered in greater detail in the remainder of this biological opinion.

The Pacific eulachon (commonly called smelt, candlefish, or hooligan) are a small anadromous fish from the eastern Pacific Ocean. The proposed rule to list the southern DPS as threatened under the ESA was published on March 13, 2009 (74 FR 10857). The southern DPS of eulachon consists of populations spawning in rivers south of the Nass River in British Columbia, Canada, to, and including, the Mad River in California. Within the range of the southern DPS, major production areas or "core populations" for this species include the Columbia and Fraser Rivers and may have historically included the Klamath River. Eulachon typically spend 3-5 years in saltwater before returning to fresh water to spawn from late winter through early summer. Spawning grounds are typically the lower reaches of larger rivers fed by snowmelt (Hay and McCarter 2000). Little is known regarding the oceanic distribution of steelhead, coho, and chinook salmon originating from Northern California rivers. Because anadromous fish do not surface to breathe and therefore would not be affected by airborne noise, the magnitude of any effect is considered to be insignificant. We conclude that the proposed SGRLPS activities, may affect, but are not likely to adversely affect listed anadromous fish species (*i.e.*, steelhead, coho, chinook salmon, and Pacific eulachon). Therefore, these species will not be considered in greater detail in the remainder of this biological opinion.

There are several endangered cetaceans that may be transiting through the project area: the blue whale, fin whale, humpback whale, sei whale, sperm whale, and North Pacific right whale; however, these animals are typically found farther offshore than the action area. The eastern North Pacific blue whale stock, California/Oregon/Washington fin whale stock, the California/Oregon/Washington humpback whale stock, eastern North Pacific sei whale stock, California/Oregon/Washington sperm whale stock, North Pacific right whale, and Southern Resident killer whale, are the stocks most likely to be found within the action area. There is no designated critical habitat for blue, fin, humpback, sperm, sei, and North Pacific right whales in waters off California, Oregon and Washington. Based on seasonal migration patterns and known distribution, it is highly unlikely for these cetacean species to be present in the action area during the work window. The population of Guadalupe fur seals is considered a single stock because all are recent descendents from one breeding colony at Isla Guadalupe, Mexico. Critical habitat has not been designated for the Guadalupe fur seal in the U.S. While considered rare in the area, Guadalupe fur seals have been observed as far north as Alaska, and several have been rescued in the Crescent City, California area by the North Coast Marine Mammal Center (Lanni Hall, pers. comm. 2007). Consequently, we conclude that the proposed activities may affect, but are not likely to adversely affect blue, fin, humpback, sei, sperm, North Pacific right, and Southern resident killer whales and the Guadalupe fur seal because the probability of those species occurring in the action area during the proposed activities is sufficiently small to be discountable. Therefore, these species will not be considered in greater detail in the remainder of this biological opinion.

Marine Mammals in the Action Area, included in the Consultation

All marine mammals are protected under the MMPA. Four species of marine mammals have been observed on Northwest Seal Rock, the Steller sea lion, California sea lion, Pacific harbor seal, and Northern fur seal. Out of the four marine mammal species observed on Northwest Seal Rock, only the Steller sea lion is listed as threatened under the ESA and will be included in this consultation. No breeding by any of these species has ever been documented on the Northwest Seal Rock (Crescent Coastal Research 2001). Post-breeding and non-breeding sea lions from both species use the site regularly in summer, harbor seals infrequently haul out there, and fur seals are rare visitors; only one has ever been detected on the Northwest Seal Rock (Crescent Coastal Research 2001). In addition, the applicant has agreed to avoid flying near any of the islands where seals and sea lions haul out, should they need to fly from a different location in order to conduct work for SGRLPS. Therefore, no effects to other islands are expected as a result of the proposed action.

Steller Sea Lion

In U.S. waters, there are two separate stocks of Steller sea lions: an eastern U.S. stock, which includes animals east of Cape Suckling, Alaska (144°W), and a western U.S. stock, which includes animals at and west of Cape Suckling (Loughlin 1997). Both the eastern and western stocks were listed as federally threatened in 1990 (55 FR 49204); the western stock was subsequently upgraded to endangered status in 1997 (62 FR 24345). Critical habitat for the eastern DPS of Steller sea lions has been designated (50 CFR 226.202(b)), and is not within the action area. In addition, the applicant has agreed to prohibit helicopter flights within designated Steller sea lion critical habitat, should the helicopter (which is not permanently stationed in Del Norte County) need to fly from a different location in order to conduct work for SGRLPS. Therefore, no effects to critical habitat are expected as a result of the proposed action and effects on critical habitat and will not be considered further in this biological opinion.

Distribution

Steller sea lions range along the North Pacific Rim from the Channel Islands off Southern California to northern Hokkaido, Japan (Loughlin *et al.* 1984), with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands, respectively. The eastern DPS of Steller sea lions, currently listed as threatened, has increased in abundance in California coastal waters, and unlike the observed decline in the western DPS of Steller sea lion, there has not been a concomitant decline in the eastern DPS U.S. stock. The project site occurs in the range of the eastern DPS stock, which includes the population along the coast from central California north to Cape Suckling, in southeast Alaska. The species is also listed as "depleted" under the MMPA and is classified as a "strategic" stock.

Within their range, land sites used by Steller sea lions are referred to as rookeries or haul out sites. Northwest Seal Rock is considered a haul out site for Steller sea lions. Rookeries are used by adult sea lions for pupping, nursing, and mating during the reproductive season (generally from May to July). Haul out sites are used by all age classes of both genders, but are generally not where Steller sea lions reproduce. The continued use of particular sites may be due to site fidelity, or the tendency for Steller sea lions to return repeatedly to the same site, often the site of their birth. Presumably, haul out sites and rookeries are chosen and continue to be used, because they protect sea lions from predators, offer some measure of protection from severe climate or sea surface conditions, and are in close proximity to prey resources (Ban 2005; Call and Loughlin 2005).

The movement patterns of Steller sea lions are not yet well understood. They do not migrate, but exhibit seasonal movements between rookeries and haul out sites (Sease and York 2003). The best scientific information available indicates that sea lions move on and offshore for feeding excursions. At the end of the reproductive season, some females may move with their pups to other haul out sites and males may travel to distant foraging locations (Spaulding 1964; Mate 1973; Porter 1997). Calkins and Pitcher (1982) reported movements of Steller sea lions in Alaska of up to 1500 km and describe widespread dispersion of young animals post-weaning, with the majority of those animals returning to the site of birth, as they reach reproductive age.

Population Trend

The eastern DPS stock of Steller sea lions has been relatively stable to increasing (at 3.1% per year) over the past few decades with variation in trends at different sites (Angliss and Allen 2009). A northward shift in the overall breeding distribution has occurred, with a contraction of the range in southern California and new rookeries established in southeastern Alaska (R. Brown, ODFW, pers. comm., 2005; Pitcher *et al.* 2007; Angliss and Allen 2009). Using the most recent 2002-2005 pup counts available by region from aerial surveys across the range of the eastern DPS stock, the total population of the eastern DPS stock of Steller sea lions is estimated to be 45,095 to 55,832. This is based on multiplying the total number of pups counted in southeast

Alaska (5,510 in 2005; NMFS 2007b *in* Angliss and Allen 2009), British Columbia (3,281 in 2002; Olesiuk and Trites 2003 *in* Angliss and Allen 2009), Oregon (1,128 in 2002; NMFS 2007b *in* Angliss and Allen 2009), and California (818 in 2004; NMFS 2007b *in* Angliss and Allen 2009) by either 4.2 or 5.2 (Pitcher *et al.* 2007). These same values were used to calculate the minimum population estimate of 44,404 (Angliss and Allen 2009). This count has not been corrected for animals that were out at sea.

Trend counts for eastern DPS Steller sea lions in Oregon were relatively stable in the 1980s, with uncorrected counts in the range of 2,000 to 3,000 Steller sea lions (NMFS 1992). Counts in Oregon have shown a gradual increase since 1976, as the adult and juvenile state-wide count for that year was 1,486 compared to 4,169 in 2002 (NMFS 2006 *in* Angliss and Outlaw 2008).

The number of Steller sea lions in California, especially in southern California, has declined from historic numbers. Counts in California between 1927 and 1947 ranged between 4,000 and 6,000 non-pups with no apparent trend, but have subsequently declined by over 50%, remaining between 1,500 and 2,000 non-pups during 1980-2004 (Angliss and Allen 2009). At Año Nuevo Island off 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). From 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 (W. Perryman, pers. comm. *in* Angliss and Outlaw 2007).

In Southeast Alaska, counts of non-pups at trend sites increased by 56% from 1972-2002 from 6,376 to 9,951 (Merrick *et al.* 1992; Sease *et al.* 2001; NMFS 2007b *in* Angliss and Allen 2009). From 1979-2005, counts of pups on the three largest rookeries in Southeast Alaska increased a total of 148%. In British Columbia, counts of non-pups through the Province increased at a rate of 3.2% annually from 1971-2002 (Olesiuk and Trites 2003). Since the 1970s the average annual population growth rate of the eastern DPS of Steller sea lions is 3.1 % (Pitcher *et al.* 2007 *in* Angliss and Allen 2009).

Reproduction

Steller sea lions have a polygynous mating strategy, in which a single male may mate with multiple females. As mating occurs on land (or in the surf or intertidal zones), males are able to defend territories and thereby exert at least partial control over access to adult females and mating privileges. The pupping and mating season is relatively short and synchronous, probably due to the strong seasonality in the Steller sea lions' environment and the need to balance aggregation for reproductive purposes with dispersion to exploit distant food resources (Bartholomew 1970). In May, adult males arrive at the rookeries and compete for territories. In late May, females arrive at the rookeries, where pregnant females give birth to a single pup. Mating typically occurs about one to two weeks later (Gentry 1970). The gestation period is probably about 50-51 weeks, but implantation of the blastocyst is delayed until late September or early

October (Pitcher and Calkins 1981). For females with a pup, nursing continues for months to several years. The nature and timing of weaning is important because it determines the resources available to the pup during the winter season. The maintenance of the mother-offspring bond may also limit their distribution or the area used for foraging.

Hearing

In-air territorial male Steller sea lion sounds are usually low-frequency roars, while females vocalize less and at a higher frequency (Schusterman *et al.* 1970; Loughlin *et al.* 1987). Campbell *et al.* (2002) determined that females have distinctive acoustic signatures. These calls range in frequency from 30 to 30,000 Hz with peak frequencies from 150 to 1,000 Hz; typical duration is 1,000 to 1,500 milliseconds (Campbell *et al.* 2002). Pups produce bleating sounds. The underwater hearing sensitivity of two Steller sea lions was recently tested; with hearing thresholds of the male significantly higher than those of the female (Kastelein *et al.* 2005). The range of best hearing for the male was from 1 to 16 kHz, with maximum sensitivity (77 dB re 1 μPa-m) at 1 kHz. The range of best hearing for the female was from 16 to above 25 kHz, with maximum sensitivity (73 dB re 1 μPa-m) occurring at 25 kHz. It is not known whether the differences in hearing sensitivities are due to individual differences in sensitivity or due to sexual dimorphism in hearing (Kastelein *et al.* 2005).

Threats (Factors impacting Steller sea lions)

Historical

For several thousand years, aboriginals in the North Pacific Ocean and Bering Sea hunted Steller sea lions for food and clothing. In the early 1900s, as a result of fishermen's complaints that the sea lions were affecting catch, substantial numbers were killed for bounty from British Columbia to California. In addition, large numbers of pups were commercially harvested in Alaska from 1959-1972, and Native Americans in the Aleutian and Pribilof Islands harvested hundreds annually in the early 1990s (Reeves *et al.* 2002). The abundance of Steller sea lions has declined across the species' range and this may be due to substantial increases in commercial fishing activities, over the past 30-40 years in the Bering Sea and Gulf of Alaska, or to long-term natural environmental changes in marine communities in the North Pacific, or a combination of these factors (Reeves *et al.* 2002). Diverse explanations of the recent decline have been advanced, although there is no compelling evidence supporting a single cause. Pascual and Adkison (1994) stated that while intrinsic population cycles, historical pup harvests, and environmental cycles are capable of producing declines in the Steller sea lion population, they are unlikely to produce declines of the magnitude and duration observed. The authors concluded that sea lion declines may have been caused by a long-term or catastrophic change in conditions; the magnitude of this change is equivalent to a 30-60% reduction in juvenile survival, or a 70-100% reduction in female fecundity. While the overall trend in the eastern DPS is increasing, the eastern DPS is declining in the southern portion of its range and the reason for this decline remains unknown. However, it is likely a combination of natural and anthropogenic impacts contributing to the decline. A Revised Recovery Plan reviewing current threats to the eastern and western U.S. stocks and proposing actions and guidelines for recovery was released by NMFS in March 2008 (NMFS 2008).

Historic use of the St. George Reef included the harvesting of marine mammals. The Steller sea lion was the most common bone type found in middens of the Tolowa tribe living on the mainland at Point St. George (Gould 1966). The native American settlement at this site persisted until the mid-1800's. Market hunters exploited the marine mammal resources of the St. George Reef in the late 1800's (USDI 1993). The United States has not conducted any commercial harvests of Steller sea lions in the range of the eastern DPS. During the period from 1912 through 1968, government control programs killed thousands of Steller sea lions on rookeries and haulouts in British Columbia (Bigg 1985). Prior to the MMPA, there were both sanctioned and unsanctioned control efforts, and the killing of Steller sea lions by fishermen and others were commonplace (NMFS 2008).

Fishery Interactions

Amendments to the MMPA in 1988 and 1994 required observer programs to monitor marine mammal incidental take in some domestic fisheries. Until 2003, there were six different federally regulated commercial fisheries in Alaska that could have interacted with Steller sea lions and were monitored for incidental take (mortality) by fishery observers. As of 2003, changes in fishery definitions in the List of Fisheries have resulted in separating these six fisheries into 22 fisheries (69 FR 70094, December 2004). However, this change does not represent a change in fishing effort, but provides managers with better information on the component of each fishery that is responsible for the incidental serious injury or mortality of marine mammal stocks in Alaska. According to the most recent List of Fisheries 2009 (73 FR 73032) and fishery observer records during the period from 1990-2005 (in which Steller sea lions from the eastern DPS were taken incidentally), the following fisheries are known to interact with the eastern DPS stock of Steller sea lions: the California/Oregon thresher shark and swordfish drift gillnet fishery; Washington, Oregon, and California groundfish trawl fishery; Northern Washington marine set gillnet; the Gulf of Alaska sablefish longline fishery; British Columbia aquaculture predator control program; the Alaska Southeast salmon drift gillnet fishery; Alaska salmon troll fishery; and the Alaska/Washington/Oregon/California commercial passenger fishing vessel (Angliss and Allen 2009; List of Fisheries 73 FR 73032).

The eastern DPS stock is the only Steller sea lion stock that has been observed to interact with the California Oregon drift gillnet (CA/OR DGN) fishery. However, there has been no observed serious injury or mortality, incidental to the CA/OR DGN fishery in recent years (Carretta 2002; Carretta and Chivers 2003; Carretta and Chivers 2004). During the past 19 years, only two Steller sea lions have been observed taken by the CA/OR DGN fishery, one off southern California in 1992, and one off the California/Oregon border in 1994. Both resulted in mortality. No Steller sea lions have been observed taken or reported since the implementation of the Pacific Offshore Cetacean Take Reduction Plan (POCTRP), in October 1997. Implementing regulations of the POCTRP require fishermen to use 36 foot extenders and pingers[3]. The Steller sea lions taken prior to the implementation of the POCTRP were taken in nets with 20 foot and 30 foot extenders (NMFS 2000). In addition, the pingers used on these nets are within the hearing range of sea lions (Richardson *et al.* 1995), so they likely are alerted to any nets in the water. Therefore, although Steller sea lions and the CA/OR DGN fishery are known to co-occur in areas off the California and Oregon coast, the implementation of the POCTRP appears to have reduced the likelihood of an incidental take of Steller sea lions.

In the Washington/Oregon/California groundfish trawl (Pacific whiting component only), based on observer data from 2000-2004, one Steller sea lion was observed killed in each year from 2001-2003; none were observed killed in 2000[4] or 2004. These observed takes in combination with a mortality that occurred in an unobserved haul (in 2000), resulted in a mean annual mortality level of 0.8 animals per year (Angliss and Allen 2009). No data are available after 1998 for the northern Washington salmon set gillnet fishery (Angliss and Outlaw 2007).

One Steller sea lion mortality was observed in the Gulf of Alaska sablefish longline fishery in 2000. There have been no observer reported mortalities in the Gulf of Alaska sablefish longline since 2000 (Perez unpubl. Master's Thesis *in* Angliss and Allen 2009). The mortality resulted in a mean annual mortality rate of 0.8 (CV = 0.02) Steller sea lions. No mortality was reported by fishery observers monitoring drift gillnet and set gillnet fisheries in Washington and Oregon this decade; though, mortality has been reported in the past (Angliss and Allen 2009).

Steller sea lions were also killed as part of an aquaculture predator control program in the British Columbia Aquaculture Predator Control Program during commercial salmon farming operations. From 2001-2005, 27 animals were killed in 2001 and 15 were killed in 2001. As of 2004, aquaculture facilities are no longer permitted to shoot Steller sea lions (P. Olesiuk, Pacific Biological Station, Canada, pers. comm. *in* Angliss and Allen 2009). Therefore, the mean annual mortality is zero.

Estimates of fishery-related mortality from stranding data are considered minimum estimates because not all entangled animals strand, and not all stranded animals that are found, are reported. In Alaska, from 2001-2005, there were three situations where three Steller sea lions were observed with "flashers" in their mouths. It is not clear whether the entanglement with "flashers" involved recreational or commercial components of the salmon troll fishery. However, based on the Angliss and DeMaster (1998) definition of a "serious injury," it was appropriate to determine these two cases of entanglement with "flashers" a serious injury (Angliss and Allen 2009). Based on Alaska stranding records, this information indicates a rate of incidental mortality of at least 0.6/year from the

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[3] Pingers are acoustic deterrent devices which, when immersed in water, broadcasts a 10 kHz (±2 kHz) sound at 132 dB (±4 dB) re 1 microPascal at 1 meter, lasting 300 milliseconds (+15 milliseconds).
[4] In 2000, a mortality was seen by an observer, but during an unmonitored haul; because the haul was not monitored, an estimated annual mortality could not be extrapolated (Angliss and Allen 2009)

salmon troll fishery. There were no fishery-related strandings of Steller sea lions in Washington, Oregon, or California between 2001 and 2005. From 2007-2008 4 unknown fishery-related strandings were reported in Oregon and Washington: 3 animals stranded alive in Oregon and one mortality in Washington (U.S. Department of Commerce, NMFS Northwest Region, National Marine Mammal Stranding Database, 2009); however, these were not included in the Angliss and Allen (2009) Stock Assessment Report.

Due to the limited observer coverage, no data exist on the mortality of Steller sea lions incidental to Canadian commercial fisheries. As a result, the number of Steller sea lions from the eastern DPS stock taken in Canadian waters is not known. The minimum estimated mortality rate incidental to commercial fisheries (both U.S. and Canadian) is 1.4 Steller sea lions per year, based on observer data (0.8) and stranding data (0.6).

Reduction of Prey due to Fisheries

Steller sea lions prey upon some fish species that are also harvested by commercial, subsistence, and recreational fisheries (*e.g.*, Pacific cod, walleye pollock, Pacific hake, salmon, herring, etc.). Fishery removals have the potential to reduce the availability of these species to sea lions at a variety of spatial and temporal scales. Reduced prey availability can represent an acute or chronic threat to sea lion populations. Acute prey shortages may lead to starvation while chronic prey shortages have been shown in other mammals to reduce reproductive fitness, increase offspring mortality, and increase the susceptibility to disease and predation.

Along the U.S. West coast, Pacific hake is the dominant groundfish biomass in the California Current, supporting the largest fishery on the west coast south of Alaska. Pacific hake ranges from southern and central California spawning grounds during January-March to summer and fall feeding grounds off Washington, British Columbia, and Alaska. Based on scat collected during summer and early fall, Pacific hake appears to be a major prey item of Steller sea lions along Oregon and Washington coasts (Gearin *et al.* 1999).

Steller sea lions no longer breed on the Channel Islands and have declined at Año Nuevo and the Farallon Islands since the 1970s, while Steller sea lion numbers at the northern California and Oregon rookeries (between 42-43° N. lat.; where the summer fall diet appears dominated by hake) have increased significantly in recent years (see *Population Trend* for more details). Meanwhile, the Pacific hake stock (age 3+ fish) has declined steadily with no concurrent change in Steller sea lion population trajectory (NMFS 2008). Under U.S. regulations, the shore-based fishing season opens March 1 and offshore fishing season opens May 15 (at-sea processing and night fishing are prohibited south of 42 ° N. lat. and fishing effort typically concentrates between central Oregon and Cape Flattery). Therefore, the typical distribution of hake fishing effort is well north of the major Steller sea lion breeding and pupping grounds in northern California and southern Oregon. It is perhaps noteworthy to mention that the increasing northern California-southern Oregon Steller sea lion breeding populations, occupy a midpoint in the migratory distribution of the West Coast hake stock, a geographic position that may serve as to buffer those populations from the worst effects of El Niño events on the annual distribution of hake stock.

Subsistence/Native Harvest Information

Both the ESA and the MMPA contain provisions that allow coastal Alaska Natives to harvest endangered, threatened, or depleted species for subsistence purposes. The most recent information on subsistence harvest of Steller sea lions during 2002-2006 is summarized in Wolfe *et al.* (2006). During each year, data were collected 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. Approximately, 16 of the interviewed communities lie within the range of the eastern DPS U.S. stock of Steller sea lions. Table 3 is a summary of the subsistence harvest for the eastern DPS stock of Steller sea lions, adapted from Wolfe *et al.* (2006) and presented in the Alaska Marine Mammal Stock Assessment Report, 2008 (Angliss and Allen 2009). The average number of animals harvested and struck but lost, is 12 animals/year. An unknown number of Steller sea lions from this stock are harvested by subsistence hunters in Canada. The magnitude of Canadian subsistence harvest is believed to be small (Angliss and Allen 2009). 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 (Angliss and Allen 2009).

Table 3. Summary of the subsistence harvest data for the eastern U.S. stock of Steller sea lions, 2002-2006 (Wolfe *et al.* 2003; Wolfe *et al.* 2004; Wolfe *et al.* 2005; Wolfe *et al.* 2006; Wolfe *et al.* 2008; adapted from Angliss and Allen 2009). The number harvested and the number struck and lost do not sum to the estimated number taken due to rounding error in 2003.

Year	Estimated total number taken	Number harvested	Number struck and lost
2002	7	7	0
2003	7	2	4
2004	12	5	7
2005	19	0	19
2006	12.6	2.5	10.1
Mean annual take (2002-2006)	**11.5**	**3.3**	**8.2**

Commercial and Private Marine Mammal Viewing

In addition to vessel operations, private and commercial vessels engaged in marine mammal watching also have the potential to impact Steller sea lions in the proposed action area. NMFS has promulgated regulations at 50 CFR 224.103, which provide specific prohibitions regarding wildlife viewing activities. In addition, NMFS launched an education and outreach campaign to provide commercial operators and the general public with responsible marine mammal viewing guidelines. In January 2002, NMFS also published an official policy on human interactions with wild marine mammals which stated that: "NOAA Fisheries cannot support, condone, approve or authorize activities that involve closely approaching, interacting or attempting to interact with whales, dolphins, porpoises, seals, or sea lions in the wild. This includes attempting to swim, pet, touch, or elicit a reaction from the animals."

Although considered by many to be a non-consumptive use of marine mammals with economic, recreational, educational, and scientific benefits, marine mammal watching is not without potential negative impacts. One concern is that animals become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle *et al.* 1993; Wiley *et al.* 1995). Another concern is that preferred habitats may become abandoned if disturbance levels are too high. There is also direct evidence of pinniped haul out site (Pacific harbor seals) abandonment because of human disturbance at Strawberry Spit in San Francisco Bay (Allen 1991). NMFS has little information on the effects of human disturbance on Steller sea lions in California, particularly during sensitive times of the year when the need to haul out or congregate is greatest (*e.g.*, pupping or breeding seasons), however, close approach by human on foot, aircraft, or in watercraft is likely to disturb Steller sea lions and may disrupt important biological functions. For more information on noise associated with commercial and private marine mammal viewing see *Anthropogenic Noise* Section.

Habitat Degradation

Human activities, including discharges from wastewater systems, dredging, ocean dumping and disposal, aquaculture and additional impacts from coastal development, are also known to impact marine mammals and their prey in their habitat. In the North Pacific, undersea exploitation and development of mineral deposits, as well as dredging of major shipping channels, pose a continued threat to the coastal habitat for marine mammals. Point-dredged materials and sewage effluent, potential oil spills, as well as substantial commercial vessel traffic, and the impact if trawling and other fishing gear on the ocean floor are continued threats to Steller sea lions in the proposed action area.

In taxa such as pinnipeds, which require specific habitat for breeding on land but are constrained by adaptations for feeding at sea (Stirling 1983), understanding the factors important to selection of breeding habitat is particularly important for assessing the prospect for recovery of small populations. Disturbances of Steller sea lion haulouts and rookeries can potentially cause disruption of reproduction, stampeding, or increased exposure to predation by marine predators. Critical habitat for Steller sea lion includes an air zone that extends 3,000 feet (0.9 km) above areas historically occupied by sea lions at each major rookery in California and Oregon, measured vertically from sea level. Critical habitat also includes 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 rookery in California or Oregon. Critical habitat in California for the Steller sea lion, as designated in 50 CFR Pt. 226.203, Table 1, is at Año Nuevo Island (Figure 4), Southeast

Farallon Island (Figure 5), Sugarloaf Island and Cape Mendocino (Figure 6). NMFS comments on actions that may take place in sensitive Steller sea lion critical habitat and regularly reviews and provides recommendations to avoid the most sensitive times and areas in order to minimize the likelihood of having adverse impacts.

Figure 3. Steller sea lion critical habitat in California, Año Nuevo Island, includes a 3,000 foot buffer (50 CFR 226.03).

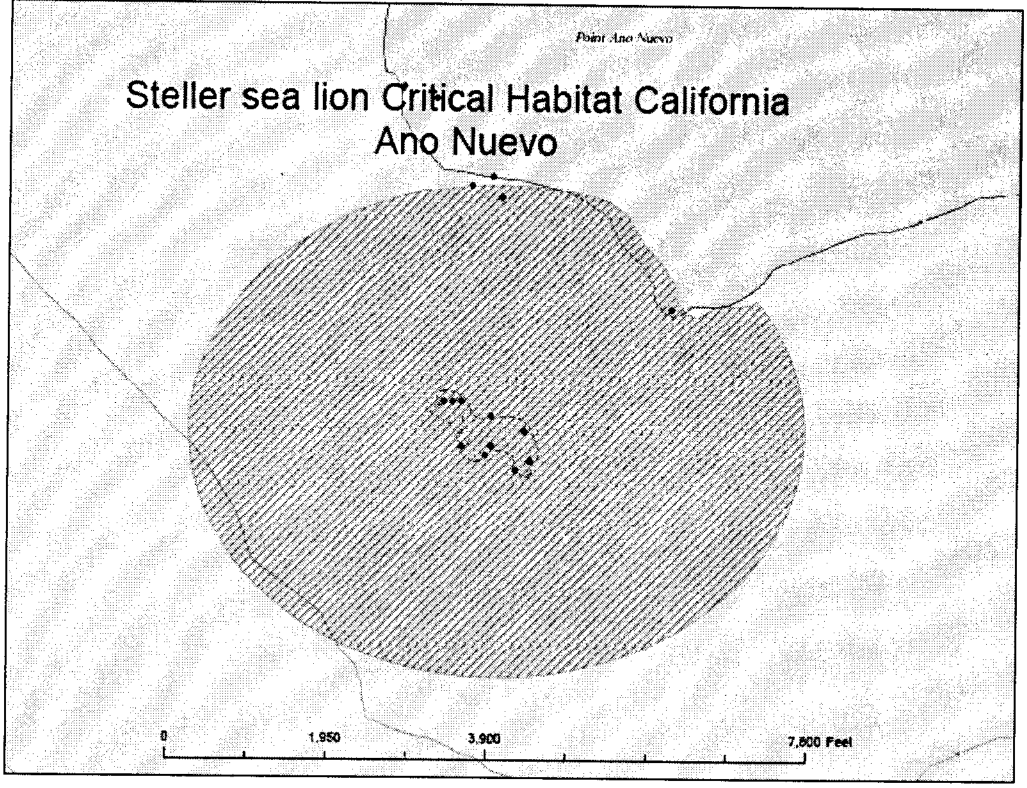


Figure 4. Steller sea lion critical habitat Southeast Farallon Islands, California; includes a 3,000 foot buffer (50 CFR 226.03).

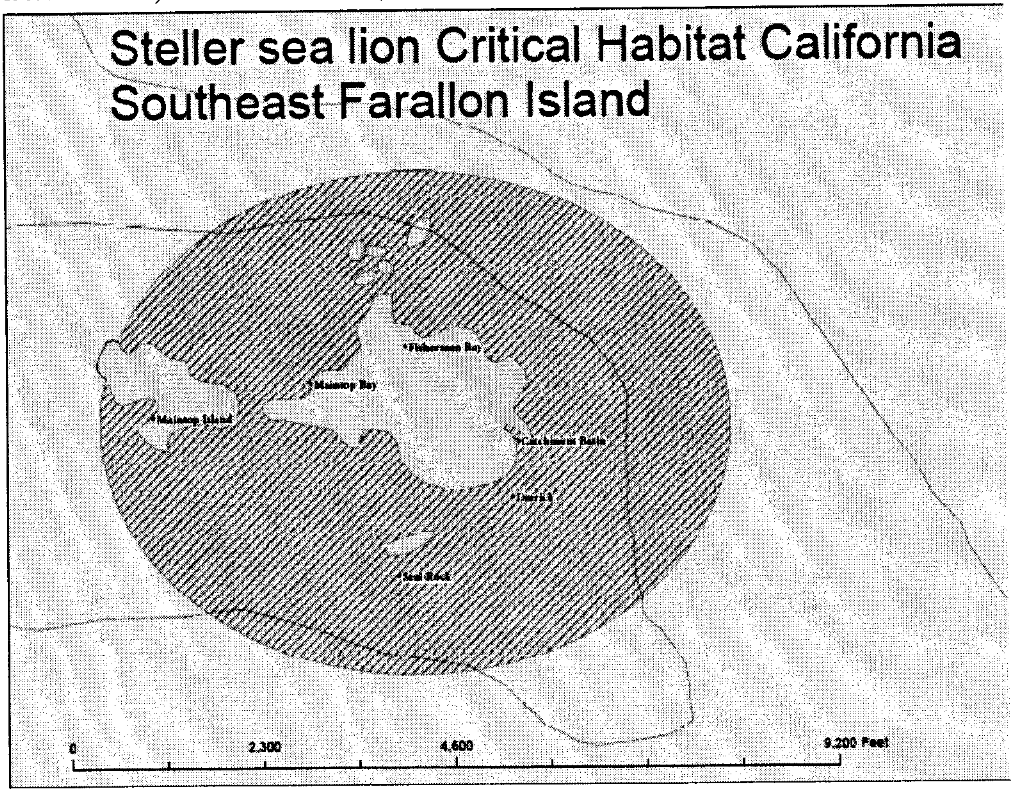
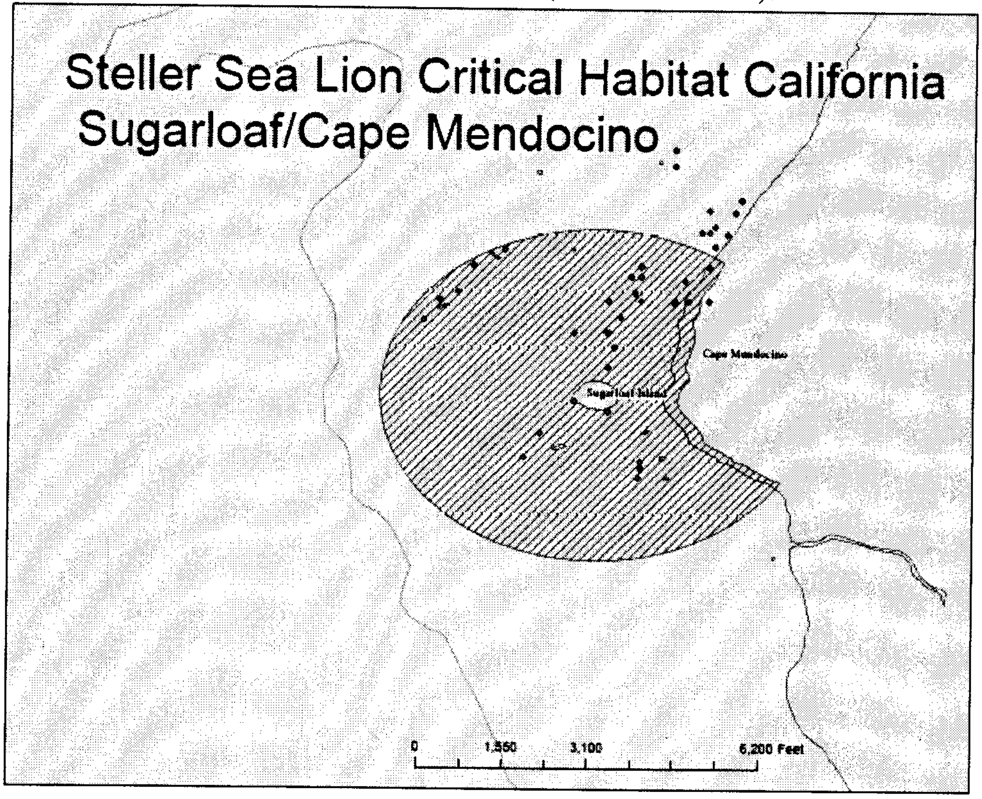


Figure 5. Steller sea lion critical habitat Sugarloaf Island/Cape Mendocino, California; includes a 3,000 foot buffer (50 CFR 226.03).



Anthropogenic Noise

As one of the potential stressors to marine mammal populations, noise and acoustic influences may seriously disrupt marine mammal communication, navigational ability, and social patterns. Many marine mammals use sound to communicate, navigate, locate prey, and sense their environment. Both anthropogenic and natural sounds may cause interference with these functions. Steller sea lions are regularly exposed to several sources of natural and anthropogenic sounds. Anthropogenic noise that could increase ambient noise levels, arise from the following general types of activities in and near the sea, any combination of which, can contribute to the total noise at any one place and time. These noise sources include: transportation; dredging; construction; oil, gas, and mineral exploration in offshore areas; geophysical (seismic) surveys; military activities; sonar; explosions; and ocean research activities (Richardson *et al.* 1995). Several researchers have argued that anthropogenic sources of noise have increased ambient noise levels in the ocean over the last 50 years (Jasny *et al.* 2005; National Resource Council 1994, 1996, 2000, 2003, 2005; Richardson *et al.* 1995). Much of this increase is due to increased shipping due to more numerous ships of larger tonnage (National Research Council 2003). Commercial fishing vessels, cruise ships, transport boats, recreational boats, and aircraft, all contribute sound into the ocean (National Research Council 2003). The military uses sound to test the construction of new vessels ("ship shock trials") as well as for naval operations and exercises. Most observations of behavioral responses of marine mammals to the sounds produced have been limited to short-term behavioral responses, which included the cessation of feeding, resting, or social interactions. Acoustic devices have also been used in fisheries nets to prevent marine mammal entanglement (Goodson 1997; NMFS 1997; Marine Mammal Commission 1999) and to deter seals from salmon cages (Johnston and Woodley 1998), but little is known about their effects on non-target species.

Vessel noise, like aircraft noise, is a combination of narrowband "tonal" sounds at specific frequencies and "broadband" sounds with energy spread continuously over a range of frequencies (Richardson *et al.* 1995). Surface shipping is the most widespread source of anthropogenic, low frequency (0 to 1,000 Hz) noise in the oceans (Simmonds and Hutchinson 1996). The Navy estimated that the 60,000 vessels of the world's merchant fleet, annually emit low frequency sound into the world's oceans for the equivalent of 21.9 million days, assuming that 80 percent of the merchant ships are at sea at any one time (U.S. Navy 2001). Ross (1976) has estimated that between 1950 and 1975, shipping had caused a rise in ambient noise levels of 10 dB. He predicted that this would increase by another 5 dB by the beginning of the 21st century. The National Resource Council (2003) estimated that the background ocean noise level at 100 Hz has been increasing by about 1.5 dB per decade, since the advent of propeller-driven ships.

Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has extremely variable effects on hauled-out sea lions. Michel *et al.* (2001) suggested an association between long-term exposure to low frequency sounds from shipping and an increased incidence of marine mammal mortalities caused by collisions with ships. Pinnipeds, including Steller sea lions, are not as likely to be threatened by vessel noise and ship traffic as cetaceans, since they are smaller and are highly maneuverable in the water. However, sea lion reaction to occasional disturbances ranges from no reaction at all to complete and immediate departure from the haul out area. The type of reaction appears to depend on a variety of factors. When sea lions are frightened off rookeries during the breeding season and pupping season, pups may be trampled or even abandoned. After repeated disturbances, sea lions have temporarily abandoned areas (Thorsteinson and Lensink 1962), but in other situations have continued using areas after repeated and severe harassment. The consequences of such disturbances are difficult to measure. The proximity of their haul out sites to shipping channels and the increase in ship traffic may increase the likelihood of vessel impacts on pinnipeds, but the effects, such as ship strikes or impacts to pinniped communication, are unknown. Stranding data indicates that pinnipeds have been struck by ships and it is likely that the actual number of pinnipeds struck by ships is higher than what is reported in stranding databases, particularly since dead animals are more apt to sink at sea then drift into shore. However, the overall impact of ship strikes to pinnipeds, including Steller sea lions, is unknown. At present, concern about the effects of anthropogenic disturbance focuses on disturbance as an impediment to research on Steller sea lions and whether it might contribute to the decline of the population in the southern portion of their range. Carretta *et al.* (2001) and Jasny *et al.* (2005) identified increasing levels of anthropogenic noise as a habitat concern for whales and other marine mammals because of its potential effect in their ability to communicate.

Oil and Gas development

Human development activities that result in aquatic habitat destruction from the release of contaminants and pathogens (*e.g.*, during construction/demolition) could directly diminish the health and reproductive success of Steller sea lions or cause them to abandon feeding, breeding, or resting sites. Development and discharge proposals associated with oil and gas development typically undergo an ESA section 7 consultation during the Federal permitting process. At this time, there are no proposed development or discharge proposals within the proposed project area. The types of impacts from geophysical surveys and construction (*i.e.*, introduction of noise into the environment and potential vessel collision) are covered under *anthropogenic noise*.

Oil spills are expected to adversely affect Steller sea lions if they contact individual animals, haulouts, or rookeries when occupied, or large proportions of major prey populations (Minerals Management Services 1996). Potential effects include: oil exposure, including surface contact and pelage fouling, inhalation of contaminant vapor, or ingestion of oil or oil-contaminated prey. Since the insulation of nonpup sea lions is provided by a thick layer of fat, rather than pelage whose insulative value could be destroyed by fouling, oil contact is not expected to cause death from hypothermia. However, sensitive tissues (*e.g.*, eyes, nasal passages, mouth, or lungs) are likely to be irritated or ulcerated by exposure to oil of hydrocarbon fumes. Steller sea lions were undoubtedly exposed to oil after the Exxon Valdez oil spill in 1989 in Prince William Sound, Alaska, but no significant adverse effects of the oil were confirmed (Calkins *et al.* 1994).

Natural Mortality

Killer whales and sharks prey on Steller sea lions. Based on mortality rates used in Loughlin and York (2000), about 5,500-6,200 sea lions will die each year in a stable or increasing population of approximately 40,000 animals (NMFS 2008). An unknown portion of the mortality will result from predation by transient killer whales residing in the range of the eastern DPS of Steller sea lion. Long *et al.* (1996) reported white shark bites on 548 live and dead pinnipeds in central California, 53 of which were Steller sea lions. For the period from 1970 to 1992 the number of shark-bitten pinnipeds shows an overall increase attributable to increases in both the predators (sharks) and their primary prey (California and Steller sea lions) (NMFS 2008). Long and Hanni (1993) speculated that white shark predation could impede recovery of Steller sea lions in California, if the number of sea lion declines further and the shark population continues to increase.

Climate Change

Some features of the ecosystems of the Pacific Northwest (California to British Columbia to southeast Alaska) and the northern North Pacific (Gulf of Alaska and Bering Sea) are out of phase, including recruitment of Pacific salmon and some groundfish stocks (Hollowed and Wooster 1992; Hare *et al.* 1999) and zooplankton biomass (Brodeur *et al.* 1996; Roemmich and McGowan 1995). Such variability may be due to patterns of transport in the North Pacific Current when it bifurcates off the coast of British Columbia to form the northward-flowing Alaska Current and the southward-flowing California Current (Wickett 1967; Hollowed and Wooster 1992). The manner and mechanism that periodic shifts in oceanic and atmospheric conditions may have effects on productivity of major fish populations is unknown. The manner and mechanism by which these "regime shifts" and altered fish populations would affect marine mammals, including Steller sea lions, is also poorly understood. However, as observed in other pinnipeds (*e.g.*, California sea lions), these regime shifts likely impact prey resources which could impact pup survival if maternal resources are depleted from a lack of adequate nutrition. It is also possible that regime shifts may impact the availability of haul out sites, but the affect on Steller sea lions remains poorly understood and unresolved.

Sydeman and Allen (1999) investigated correlations between oceanographic features and population dynamics of central California pinnipeds. Multiple regression analysis of sea surface temperatures and upwelling index versus abundance found no relationship for Steller sea lions. Although there have been documented and more frequent oceanographic and climatic changes, the population of Steller sea lions has not responded negatively from a population perspective (NMFS 2008). Unlike the observed decline in the western U. S. stock of Steller sea lion there has not been a concomitant decline in the eastern U. S. stock. The eastern U. S. stock is stable or increasing throughout the northern portion of its range (Southeast Alaska and British Columbia), and stable or increasing slowly in central Oregon through central California. In the southern end of its range (Channel Islands in southern California), it has declined considerably since the late 1930s, and several rookeries and haulouts south of Año Nuevo Island have been abandoned. Changes in the ocean environment, particularly warmer temperatures, may be possible factors that have favored California sea lions over Steller sea lions in the southern portion of the Steller's range (NMFS 2008). The most evident change is that all of the new rookeries in the eastern DPS have been established in Alaska at the northern end of the range, suggesting a population shift north.

Pollution, Contaminants, and Entanglement in Marine Debris

Chronic exposure to the neurotoxins associated with paralytic shellfish poisoning (PSP) via zooplankton prey has been shown to have detrimental effects on marine mammals. Estimated ingestion rates are sufficiently high to suggest that the PSP toxins are affecting marine mammals, possibly resulting in lower respiratory function, changes in feeding behavior, and a lower reproductive fitness (Durbin *et al.* 2002). The impacts of these activities are difficult to measure. However, some researchers have correlated contaminant exposure to possible adverse health effects in marine mammals. Contaminants such as organochlorines do not tend to accumulate in significant amounts in invertebrates, but do accumulate in fish and fish-eating animals.

Steller sea lions are exposed to local and system-wide contaminants and pollutants as they traverse the North Pacific basin. Effects on other pinnipeds have included acute mortality, reduced fecundity and pregnancy rates, immuno-suppression, and reduced survival of first born pups, but there have been no published reports of contaminants or pollutants representing a mortality source for Steller sea lions. However, elevated levels of copper, mercury, and selenium were detected in Steller sea lions that foraged along the coast of central California (Reeves *et al.* 2002). Castellini (1999) found that levels of zinc, copper, and metallothionein were comparable between Steller sea lion pups sampled from the eastern and western DPS, and were lower in captive sea lions. The similarity of levels in both DPSs suggests that heavy metal contamination may be having similar effects on both DPSs. Existing studies on Steller sea lions have shown relatively low levels of toxic substances (with few exceptions), as well as heavy metals, and these levels are not believed to have caused high mortality or reproductive failure (Lee *et al.* 1996), and are not considered significant contributors to observed Steller sea lion declines (NMFS 2008).

The NMFS Northwest Fishery Science Center examined blubber samples from 24 Steller sea lions from southeast Alaska and reported PCB levels of 630-9,900 ng/g wet weight and DDT levels of 400-8,200 ng/g wet weight (NMFS unpublished data in NMFS 2008). PCB levels at the upper end of this range have been shown to reduce juvenile survival rates in sea otters (AMAP 2002), but the consequences for Steller sea lions are not known.

Steller sea lions become entangled in a variety of debris and been observed with packing bands, discarded netting, and other debris around their necks. Such debris can be lethal, if it is not biodegradable. Researchers have recorded the frequency and type of debris observed on Steller sea lions during resight surveys and sometimes, although infrequently, the relative amount and type of debris seen on haulouts and rookeries. Between 2000 and 2005, the Alaska Department of Fish and Game (ADFG) recorded all entangled sea lions during brand-resighting surveys in Southeast Alaska. These surveys occur in the summer and visit virtually all rookeries and haulouts in Southeast Alaska. ADFG reported that 0.21% of the animals observed had some sort of entanglement including packing bands and netting around the neck or fishing gear hanging from the mouth (ADFG unpublished data *in* NMFS 2008). This is a minimum estimate as not all entanglements are visible and some entanglements and deaths occur before and after the survey. It is not known what percentage of entangled animals die as the severity of the injuries varies (NMFS 2008).

Parasitism and Disease

During the past three decades, the scientific community and regulatory agencies have become increasingly aware of the long-term impact of environmental stressors on the sustainability of ecosystems. As demonstrated in the case study by Bickham *et al.* (2000) on Steller sea lions, if genetic variability is lost as a result of some historical factor, the likelihood that Steller sea lions would become extinct, if the populations were challenged by some new disease or parasite, is quite high. Disease can increase the mortality and cause reproductive failure through abortions, stillbirths, neonatal mortality, reduced fecundity, and reduced conception rates, all of which can have major impacts on the dynamics of wild populations (Scott 1988; Gulland 1995). Disease and parasitism are common in all pinniped populations and have been responsible for major die-offs worldwide, but such events are usually relatively short-lived. Disease and parasitism are also potential causes for population decline, and evidence is available indicating that animals have been exposed to diseases and that animals also carry parasites. However, none of the evidence available, at this time, provides any indication that disease or parasitism are causing the decline throughout the southern portion of the Steller sea lion's range or are impeding recovery. Antibodies to *Chlamydophila psittaci*, caliciviruses, herpesviruses, adenoviruses, and *Toxoplasma gondii* were detected at moderate to high frequencies in Steller sea lions in areas of decline and also in areas of the thriving populations (Burek *et al.* 2003). Nutritional stress is widely considered to be the most likely underlying cause of the decline of Steller sea lions in the Gulf of Alaska and Aleutian Islands (Alaska Sea Grant 1993; DeMaster and Atkinson 2002; Trites and Donnelly 2003). Although, the effects of disease and parasitism remain a concern and to date, adequate research has not been conducted to assess the relative nature and magnitude of parasitism in sea lion populations, they do not appear to be significant enough to impede recovery, based on the information currently available.

Parasites that have been reported in Steller sea lions include intestinal cestodes, trematodes, nematodes, acanthocephalans, acarian mites, and anopluran skin louse (Dailey and Brownell 1972; Dailey and Hill 1970). Parasites have been found in Steller sea lions that may cause mortality to malnourished animals. Hookworms are of particular interest because of their ability to cause morbidity and mortality in other pinnipeds. Some research has been conducted on hookworm loads in eastern DPS pups. In pups less than 3 months old examined in 2003 and 2004, total intestinal worm burdens ranged from 18 to 3,477 (Burek *et al.* 2003, 2005). These levels have been shown to cause mortality due to anemia in northern fur seals (Olsen 1958).

Research-related Mortality

Marine mammals have been the subject of field studies for decades. The primary objective of many of these studies has generally been monitoring populations to gather data for behavioral and ecological studies. Over time, NMFS has authorized permits for various non-lethal forms of "take" of marine mammals in the proposed action area. Research in the action area has included biopsy sampling, close vessel and aircraft approaches, photo-identification, tagging, and collection of sloughed skin. Intentional lethal sampling of Steller sea lions was a primary means of collecting reproductive, morphometric, dietary, and histological samples for scientific research in the 1960s and 1970s. After the passage of the MMPA, this sampling method was strictly regulated and was discontinued once the species was listed as threatened under the ESA. Research activities under the MMPA and ESA are highly regulated and closely monitored, and may include the incidental taking or harassment of Steller sea lions in the course of research activities. Research activities, including counting, capturing, and handling animals, may result in inadvertent or indirect Steller sea lion mortality. Efforts are under way to reduce the amount of disturbance on rookeries caused by the presence of researchers for the purpose of counting. Aerial surveys may serve as an alternative to some of the work currently necessitating human presence (NMFS 2008). Between 2002 to 2006, there were a total of 12 incidental mortalities resulting from research on the eastern stock of Steller sea lions, which results in average of 2.4 mortality/year (Angliss and Allen 2009).

NMFS reviews permit applications, which are also reviewed by the Marine Mammal Commission, and are made available for public review. Researchers are required to submit annual plans and reports of research activities and real-time reports of research-related mortality. Cumulative impacts of multiple projects are monitored by NMFS, and all research may be curtailed if incidental mortalities reach a pre-determined cap. In 2007, NMFS issued a Record of Decision regarding Steller Sea Lion and Northern Fur Seal Research (dated June 18, 2007). NMFS determined that the implementation of the preferred alternative will be limited in duration and scope such that it limits research permits to three years (effectively three summer field seasons, June 2007 to August 1, 2009). NMFS will not issue grants for research activities that conflict with this limitation on research permits until a policy is adopted. For further information on the Final Programmatic Environmental Impact Statement (NMFS 2007c) and Record of Decision, please see http://www.nmfs.noaa.gov/pr/permits/eis/steller.htm.

Lewis (1987) examined census-related disturbance of Steller sea lions at a breeding site during summer, noting an increase in activity and female territoriality and aggression, as well as variation in the number of animals hauling out post-disturbance. Lewis' (1987) study documented a marked decrease in numbers of animals in the disturbed area and an increase in numbers at a nearby area where humans had not visited. The reactions of Steller sea lions to direct human approach in the wild are characterized at an individual level by increased vocalization, agitated head movements, movement on the haulout, and fleeing into the water (Kucey 2005).

Other Human Activities

A stranded marine mammal is defined as "any dead marine mammal on a beach or floating nearshore; any live cetacean on a beach or in water so shallow that it is unable to free itself and resume normal activity; any live pinniped which is unable or unwilling to leave the shore because of injury or poor heath" (Gulland *et al.* 2001; Wilkinson 1991). Marine mammals are known to strand for a variety of reasons, but the cause or causes of most strandings are largely unknown (Geraci *et al.* 1976; Eaton 1979; Odell *et al.* 1980; Best 1982). Several studies suggest that the physiology, behavior, habitat relationships, age, or condition of marine mammals may cause them to strand or might pre-dispose them to strand when exposed to another phenomenon. Combinations of dissimilar stressors commonly combine to kill an animal or dramatically reduce its fitness, even though one exposure without the other does not produce the same result (Chroussos 2000; Creel 2005; DeVries *et al.* 2003; Fair and Becker 2000; Foley *et al.* 2001; Moberg 2000; Relyea 2005a, 2005b; Romero 2004; Sih *et al.* 2004). For example, several studies of stranded marine mammals suggest a linkage between unusual mortality events and body burdens of toxic chemicals in the stranded animals (Kajiwara *et al.* 2002; Kuehl and Haebler 1995; Mignucci-Giannoni *et al.* 2000).

Illegal shooting of Steller sea lions in U.S. waters was thought to be a potentially significant source of mortality prior to the listing of Steller sea lions as "threatened" under the ESA in 1990. Such shooting has been illegal since the species was listed under the ESA. In addition, the 1994 Amendments to the MMPA made intentional lethal take of any marine mammal illegal, with the exception of subsistence hunting by Alaska Natives or where imminently necessary to protect human life. According to Angliss and Allen (2009), records indicate that there were two cases of illegal shootings of Steller sea lions in southeast Alaska between 1995 and 1999. Both cases were successfully prosecuted by the NMFS Alaska Enforcement Division. There are no records of illegal shootings from the eastern (DPS) stock in the NMFS Enforcement Records for 1999-2003 (NMFS, unpublished data *in* Angliss and Allen 2009).

During the period from 2001 to 2005, strandings of animals with gunshot wounds from this stock occurred in Oregon and Washington (one in 2004 and three in 2005) resulting in an estimated annual mortality of 0.8 Steller sea lions from this stock. This estimate is considered a minimum, since not all stranded animals are found, reported, or cause of death determined by necropsy by trained personnel (Angliss and Allen 2009). An additional 11 animals were recorded with gunshot wounds between 2006 and 2007 (U.S. Department of Commerce, NMFS Northwest Regional Office, National Marine Mammal Stranding Database, 2008), but have yet to be included in the estimated annual mortality calculations in the Stock Assessment Reports. In addition, human-related stranding data are not available for British Columbia. Reports of stranded animals in Alaska with gunshot wounds are not included in annual mortality estimates because it is not clear whether the animal was illegally shot or struck and lost by subsistence hunters (in which case the mortality would have been legal and accounted for in the subsistence harvest estimate).

Steller sea lions have also become entangled in rope that was not associated with recreational or commercial fisheries. Between 2001 and 2005 there were three reported non-fishery related serious injuries or mortality to Steller sea lions in Washington and Oregon: one with a head injury (2001), one with a piece of cargo net around its neck (2003), and one mortality due to blunt trauma (2004). If the number of these interactions (3) is averaged over five years, these "other" interaction rates would be a minimum of 0.6 animals per year (Angliss and Allen 2009). An additional two animals were observed entangled in 2007, but were not included in the Alaska Stock Assessment Report, as the Steller sea lion report included in the Angliss and Allen (2009) was revised on October 29, 2007. One animal was also struck by a ship in 2006 in Oregon (U.S. Department of Commerce, NMFS, National Marine Mammal Stranding Database, 2007) and one was reportedly struck in Washington in 2008, but could not be confirmed (U.S. Department of Commerce, NMFS, National Marine Mammal Stranding Database, 2009). These were also not included in the most recent Alaska Stock Assessment Report (Angliss and Allen 2009).

IV. Environmental Baseline

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, Federal or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that affect the survival and recovery of the Steller sea lion in the action area.

A number of human activities have contributed to the current status of the Steller sea lion population in the action area. Some of those activities, most notably commercial sealing, occurred extensively in the past, ended, and no longer appear to affect this Steller sea lion population, although the effects of these reductions likely persist today. Other human activities are ongoing and appear to continue to affect Steller sea lions (See *Status of the Species* Section for specific information).

Of all activities that are normally considered in an environmental baseline, the activities that appear to have the greatest effect on the survival and recovery of the Steller sea lion considered in this biological opinion generally fall into four categories: unnatural changes to vital demographic rates, fisheries, intentional taking (including subsistence hunts), and research activities associated with reducing those impacts. Other activities, like possible pollution and contaminants, entanglement in marine debris, and disruptions (including anthropogenic) of the marine ecosystem, also appear to have effects on the survival and recovery of threatened pinnipeds, but those effects are much more difficult to evaluate. Steller sea lions exhibit natal site fidelity but are also known to travel great distances (*i.e.*, recorded 1500 km), therefore, Steller sea lions born in California, may be subjected to threats throughout their range, which includes Oregon, Washington, and Alaska.

The following information summarizes the primary human and natural phenomena in the action area that are believed to affect the status and trends of the eastern DPS of the Steller sea lion.

Environmental Setting

The project area is on the continental shelf, and associated with the Coast Ranges California geomorphic province. The Pacific Ocean coastline in this region is uplifted, terraced and wave-cut. The St. George Reef is a series of rocks that extend out to sea about 6 miles northwest from the mainland tip of Point St. George (Figure 1). The rocks of the St. George Reef are void of soil and vegetation, which is typical haul out habitat for Steller sea lions. Northwest Seal Rock is either composed of marine sediments or pillow basalt, and is similar to other barren islets in the area (Osborne 1972), providing ideal haul out site characteristics for Steller sea lions. The largest islet associated with the reef is Southwest Seal Rock, which supports one of five major breeding rookeries for the Steller sea lion in California (NMFS 2008; Figure 1). Northwest Seal Rock, the site of the Lighthouse, is the westernmost islet in the chain. The total area of the rock is 40,000 square feet (1.6 acres), with a peak elevation of about 20 feet above mean sea level. It was cut down from its original height of about 50 feet for the Lighthouse construction. The island is surrounded by water up to 200 fathoms deep (NOAA chart # 18010).

Northwest Seal Rock is subject to intense wave energy and is frequently inundated by waves that crash over the peak elevations of the island and up onto the Lighthouse structure (Figure 7). Wave heights average about 6 feet, but can be as high as 30 feet in this area (Figure 8). When Northwest Seal Rock is inundated by waves, the availability to use it as a haul out site is greatly reduced, if not eliminated.

Air and sea temperatures are closely related at this offshore site (www.ndbc.noaa.gov). Climate data from the automated St. George's buoy indicate that air temperatures average 10-12°C throughout the year, with warmest temperatures from July-October. The prevailing winds are from the northwest and average wind speed is 5-20 knots. Sustained winds of up to 40 knots are not unusual in any month and peak wind gusts of 50-55 knots are typical from November through February. The mean annual rainfall for the region is 75 inches, with heaviest precipitation in winter.

The northern California coast is a very rich biological area within the California Current System. The combination of productive waters and numerous offshore islands along the coast have created an environment where marine life is abundant and diverse. Large populations of seabirds and marine mammals are present in the area. The second largest colony of seabirds in the state of California, Castle Rock NWR, is located about 1 km south of Point St. George, and 7 km from the St. George Reef Lighthouse (Carter *et al.* 1992). This refuge also provides important habitat for four species of pinnipeds, including non-breeding Steller sea lions. Very small numbers of seabirds breed on the St. George Reef, as most rocks within the reef are very small and wave-washed. All rocks and islands along the California coast that have not been specifically reserved for other purposes are protected by the Bureau of Land Management as part of the California Coastal National Monument (USDI 2004).

Wildlife use of the island apparently increased following decommissioning by the USCG in 1975. Seabirds were first documented nesting on the window ledges of the Lighthouse in 1989 (Carter *et al.* 1992). A restriction in the Quitclaim deed to the SGRLPS precluded access to the Lighthouse, for any purpose, from March 15-September 30. This restriction was placed by the USFWS with the intent of protecting breeding seabirds and other wildlife from disturbance. Due to requests from the SGRLPS for increased access during the closure period, USFWS recommended that the SGRLPS conduct a study of wildlife use of the island. The SGRLPS funded surveys of marine birds and mammals that spanned a four year period, 1997 to 2000 (Crescent Coastal Research 2001). No seabirds were found nesting at the Lighthouse during that period; the most significant wildlife use of the island was by non-breeding sea lions (Crescent Coastal Research 2001).

Northwest Seal Rock is used as a haulout for several species of pinnipeds, including the federally threatened Steller sea lion. There is a breeding rookery about 4 km (2.49 miles) to the south of the project site, at Southwest Seal Rock (NMFS 2008). Although there is evidence for occasional birth of Steller sea lion pups at Northwest Seal Rock (R. Brown, ODFW, pers. comm., 2005; M. DeAngelis, NMFS pers. comm., 2005), the site is not considered a breeding rookery, at this time (R. Brown, ODFW, pers. comm., 2005). Annual aerial survey data collected by NMFS and the ODFW indicate that annual use of the site by the Steller sea lion has been stable to increasing through the period of Lighthouse restoration. The Lighthouse restoration and maintenance schedule has been devised to avoid the season when most Steller sea lions haul out on the on the island and when young pups may be present.

The nearest Steller sea lion breeding area relative to the project site is at Southwest Seal Rock (41^0 49'00" N, 124^0 21'00" W) (Figure 1) about 4 km (2.49 miles) south of the project site. The rookery comprises a significant portion of the California total population, and numbers of pups born there have ranged from 293 to 444. The population at the site has been increasing at an annual rate of about 4% since the mid-1970's (R. Brown, ODFW, pers. comm., 2005; Table 1). A portion of the Steller sea lion population using the Northwest Seal Rock (location of the Lighthouse) in the spring are adult males, females (including pregnant females), and juveniles. In the fall all age classes are likely present, including females and pups that have presumably dispersed from the rookery at Southwest Seal Rock (Figure 5). Up to 19 pups were observed at Northwest Seal Rock in October 1998. Pups have not been detected on Northwest Seal Rock during the July aerial photo surveys (M. Lowry, NMFS, unpubl. data). Occasional pupping appears to take place at the haulout at on Northwest Seal Rock. One pup was seen on the island in 1991 (Crescent Coastal Research 2001) and one newborn was observed from the Lighthouse during the site visit by NMFS on May 13, 2005 (M. DeAngelis, NMFS, pers. comm., 2005). The pup, observed in 2005, was abandoned by its mother and died overnight (G. Towers, SGRLPS, pers. comm., 2005).

As mentioned previously, Steller sea lions are not known to migrate, but may disperse widely outside the breeding season. There appears to be a post-breeding movement of females and pups to haul out in the vicinity of Southwest Seal Rock, including Northwest Seal Rock, Castle Rock NWR and associated shoals (M. Lowry, NMFS, unpubl. data; Crescent Coastal Research 2001) (Figure 1). Although the rookery is just south of the Northwest Seal Rock, animals may continue to increase their use of Northwest Seal Rock over time; possibly as a pupping area, at some point in the future (R. Brown, ODFW, pers. comm., 2006). Monthly surveys during 1998 indicated that pups first showed up at the project site (Northwest Seal Rock) in August (Crescent Coastal Research 2001). Numbers of Steller sea lions are presumed to be low during winter at Northwest Seal Rock, although data are lacking. Data from July aerial surveys suggests that use of Northwest Seal Rock as a post-breeding haulout has been persistent with no apparent trend since 2000 (Table 4). Steller Sea lions are present at Castle Rock year round (Jaques and Strong 1995, unpubl. data).

Figure 7. Northwest Seal Rock inundated by waves that crash over the peak elevations of the island and up onto the St. George Reef Lighthouse structure.

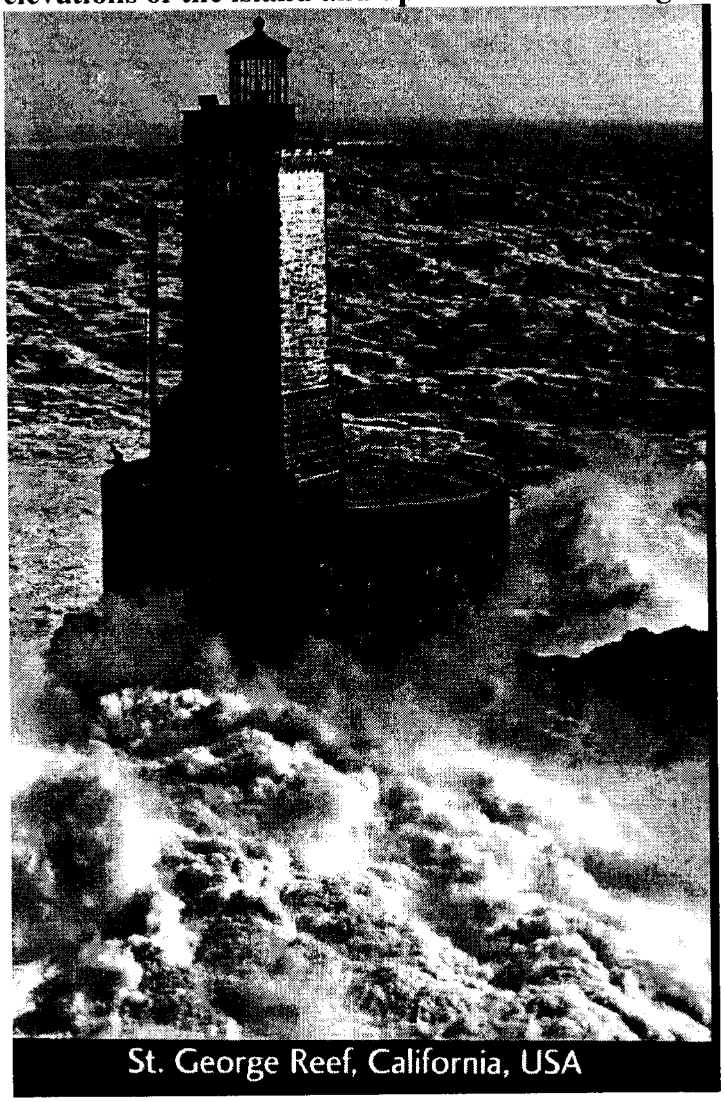
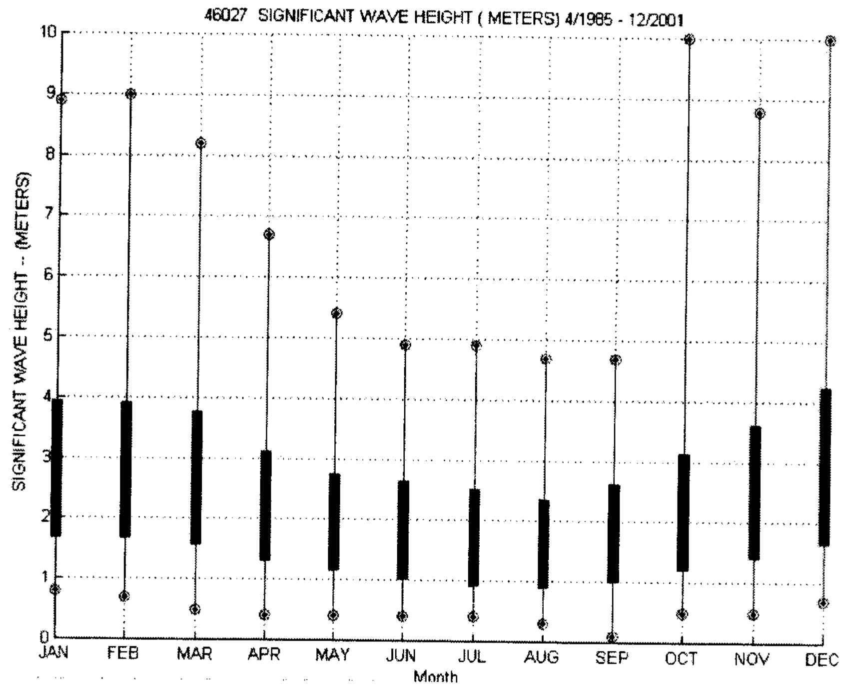


Figure 8. Climatological wave data for St. George Reef from 1985-2001 (adapted from Crescent Coastal Research 2001).



Steller sea lions are present on Northwest Seal Rock from at least April through mid-October with greatest numbers in June and July (Crescent Coastal Research 2001). During the 1997-2000 study, numbers of Steller sea lions were very low in April, but increased during May to a mean of 87 animals (range = 20-186, N= 4 (years)). Maximum counts are 355 animals in late June (Crescent Coastal Research 2001) and 354 in July (Table 5; Figure 9). Numbers decrease to relatively low levels by early fall. In September-October, 1998, 55-56 Steller sea lions were present. Winter use is presumed to be minimal, due to inundation of the natural portion of the island by large swells. Sex and age class data (Crescent Coastal Research 2001), also indicates a seasonal shift in haul out use (Figure 10) at Northwest Seal Rock. NMFS annual survey data from 2000-2004 does not indicate a negative trend in use of the site during the last five years of Lighthouse restoration and maintenance activities (Table 4).

Table 4. Steller sea lion count data for the St. George Reef and Castle Rock, July 5-17, 2000-2004. Data from M. Lowry, NMFS, Southwest Fisheries Science Center.

	Year				
Location	**2000**	**2001**	**2002**	**2003**	**2004**
NW Seal Rock*	334	335	175	220	354
SW Seal Rock non-pups	532	455	541	583	738
SW Seal Rock pups	293	338	367	458	444
Castle Rock	12	66	692	100	918

*Project site

Figure 9. Steller sea lion counts at St. George Reef Lighthouse (1997-2000) adapted from data presented in Crescent Coastal Research (2001). Different colors represent different days counts were taken during the same month and year.

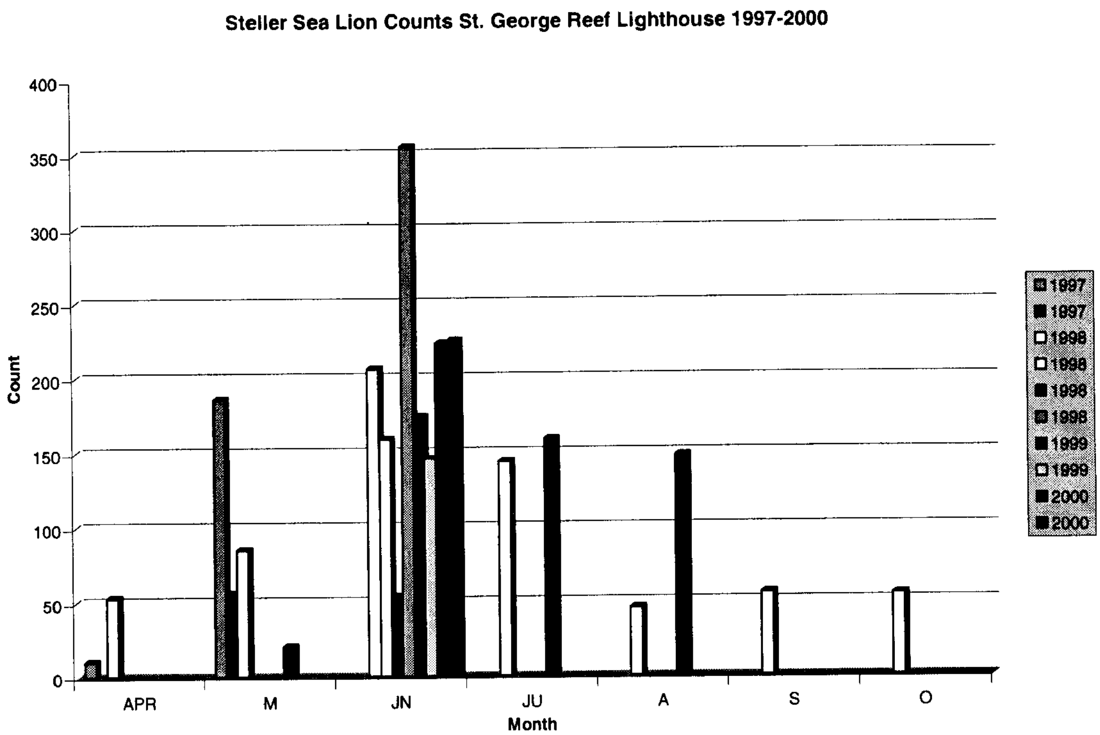
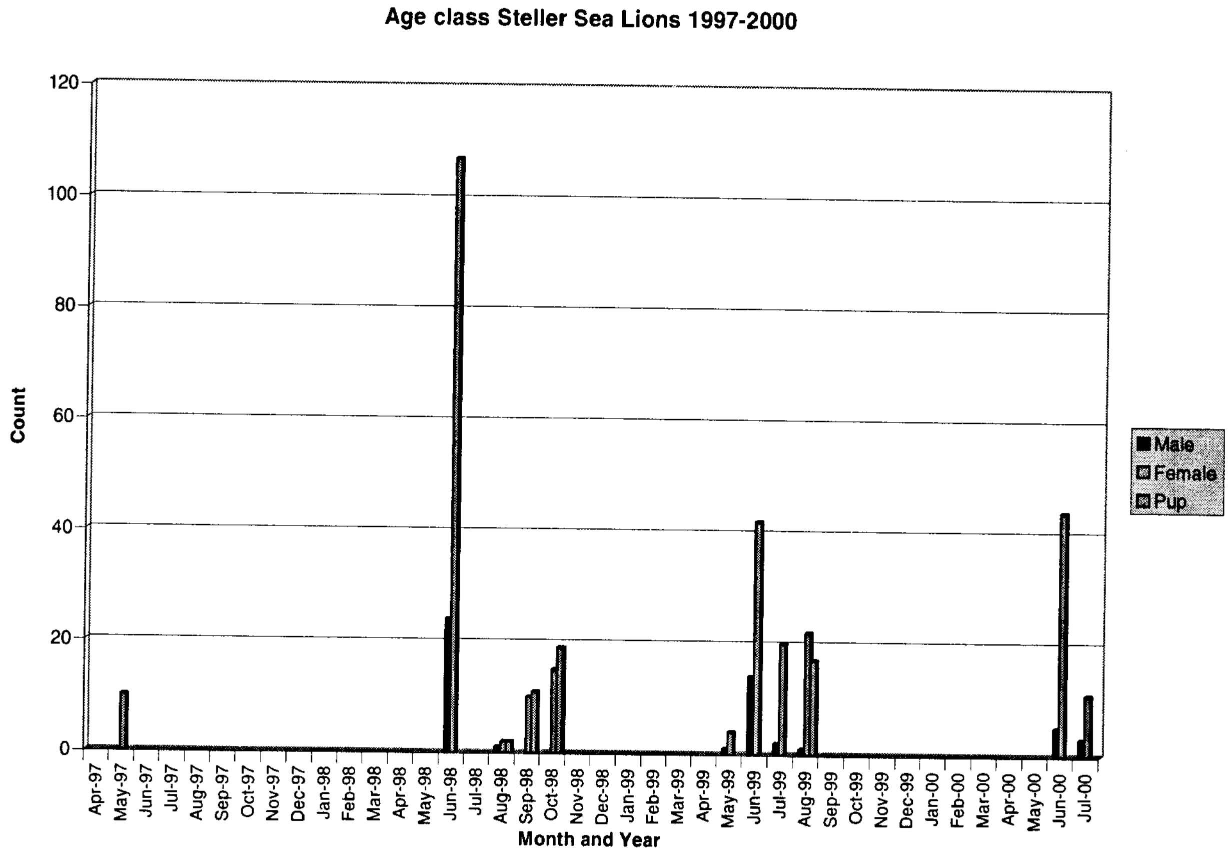


Figure 10. Sex and age classes of Steller sea lion at St. George Reef Lighthouse (1997-2000) adapted from data presented in Crescent Coastal Research (2001). Note that months shown with no data reflect a lack of survey effort, not presence/absence of Steller sea lions.



Aircraft Noise

McNamara Airport in Crescent City (Figure 11), California, is part of the action area and services approximately 22 aircraft operations per day. Approximately 75% of those aircraft operations are for local general aviation, 20% for transient general aviation, 3% for air taxi, and 2% for military (from http://www.airnav.com/airport/CEC). There are 26 aircraft based on the field, 20 are single engine airplanes and 6 are multi-engine airplanes. The airport is approximately 2.41 km (1.5 miles) from Castle Rock, 9.7 km (6 miles) from Southwest Seal Rock, and 12.9 km (8 miles) from Northwest Seal Rock; the nearest Steller sea lion haul out sites or rookeries to McNamara Airport. In general, Steller sea lions, like other pinnipeds, select haul out sites and rookeries in areas where there is little disturbance. Therefore, it is likely that the haul out sites and rookery in Del Norte County, near McNamara Airport, are at a distance far enough away where the animals are not disturbed or the majority of animals have habituated to airport activities.

The Impact of the Environmental Baseline on Listed Resources

Although Steller sea lions are exposed to a wide variety of past and present State, Federal or private actions; other human activities that have already occurred or continue to occur in the action area; Federal Actions that have already undergone formal or early section 7 consultation under the ESA; and State or private actions that are contemporaneous with this consultation, the impact of those activities on the status, trend, or the demographic processes of threatened and endangered species remains largely unknown.

The action area for the proposed action encompasses the flight path from McNamara Airport in Crescent City, CA to Northwest Seal Rock, Del Norte County, California. As such, this area includes all waters located within the boundaries of this action area as previously described, and any islands or rock formations that fall within this boundary. We refer the reader to the *Status of the Species* section for general information on the species' biology, ecology, status, and population trends at the species scale. This section identifies many of the major existing stressors that Steller sea lions are exposed to at the same time they will be exposed to the stressors of the proposed operations.

Historically, seal hunts had caused Steller sea lions to decline to the point where they faced risks of extinction. Since the end of commercial hunting, this primary threat to the eastern DPS has been eliminated. However, these species have not yet recovered from those historic declines and scientists cannot determine if those initial declines continue to influence current populations of Steller sea lions. In addition, it is not clear what influence climate change or other factors may have on the current distribution of the eastern DPS of Steller sea lions across their range, particularly with the decrease in their range in California and the establishment of new haul out areas and rookeries in Alaska. The relationships between specific sound sources, or anthropogenic sound in general, and the responses of marine mammals to those sources are still subject to scientific investigation, but no clear patterns have emerged. As a result, the potential consequences of anthropogenic sound on Steller sea lions also remain uncertain. Over the past 6 years (2002-2007), 25 dead Steller sea lions have been recorded in California and 4 animals were rescued, rehabilitated, and released alive (U.S. Department of Commerce, NMFS, Southwest Regional Office California Marine Mammal Stranding Database 2008). Of these, 3 of the dead animals and all of the rehabilitated animals were recorded in Del Norte County. The proposed project activities have occurred since 1996; therefore, the number and timing of stranding events in California were also examined to detect potential relationships within the conduct of the proposed project activities. Based on the information, we are unable to find a correlation between the stranded animals and the project activities. The 5 year data set examined (2002-2007), does not include the pup observed by M. DeAngelis (NMFS-SWR) in May 2005 on St. George Reef during a site visit. M. DeAngelis was unable to conclude whether the dead pup was abandoned by natural or human-related causes (M. DeAngelis, NMFS, pers. comm., 2005); however, the abandonment did lead to its death.

V. Effects of the Proposed Action

In this section of the biological opinion, the potential effects of proposed action activities on the eastern DPS of Steller sea lions, is described. As explained in the *Approach to the Assessment* section, we identified several aspects of the proposed project that may affect Steller sea lions. In the following section, we discuss how individual animals may be affected by the proposed action and assess whether any changes in the survival or reproduction of any affected pinniped might be expected. We relate any reductions in fitness to population level consequences and finally the species level.

The ESA does not define harassment nor has NMFS defined this term, pursuant to the ESA, through regulation. However, the MMPA of 1972, as amended, defines harassment as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" [16 U.S.C. 1362 (18)(A)].

For this biological opinion, we define "harass" for ESA purposes, similarly to the MMPA's definition of harassment: an intentional or unintentional human act or omission, that creates the probability of injury to an individual animal by disrupting one or more behavioral patterns that are essential to the animal's life history or its contribution to the population the animal represents. We are particularly concerned about behavioral disruptions that may result in animals that fail to feed or breed successfully or fail to complete their life history because these responses are likely to have population-level consequences.

Potential Responses to Stressors

Up to 6 trips (*e.g.*, one renovation/maintenance activity (lasting three days each) during each of the months from November to April) could be carried out. Each trip could include activities that would result in several physical and chemical effects to the air and water. Several potential stressors associated with the proposed action were considered: discharges and potential pollutants associated with renovation and maintenance activities and those from the helicopter, sounds generated by the helicopter and renovation/maintenance activities, and the presence of humans and sounds generated by humans. Based on our review of the available data, the proposed activities are likely to cause three primary stressors: 1) disturbance by human presence; 2) acoustic energy introduced into the marine environment by the helicopter; and 3) acoustic energy introduced into the marine environment by restoration and maintenance activities. Pollutants are not a factor based on the information provided by the applicant on restoration and maintenance activities, and NMFS concurs that no pollutants will be released into the environment. The narratives that follow describe these three stressors in greater detail, describe the probability of Steller sea lions being exposed to these stressors based on the best scientific and commercial evidence available, then describe the probable responses of this listed species, given probable exposures, based on the evidence available.

Based on our review of the data available, Steller sea lions are likely to be exposed to the three stressors mentioned above. We assume that all four of the pinniped species (Steller sea lions, California sea lions, Pacific harbor seals, and Northern fur seals) could be present during the activities because of limited sighting data or facts about their habitats and presence in similar locations in coastal zones. Any measures to minimize impacts to Steller sea lions would also be beneficial to the other pinniped species known to use the area.

Helicopter Disturbance

Although information exists regarding aircraft disturbance and marine mammals, there is very little specific information regarding helicopter disturbance and its effect on pinnipeds. Therefore, we used surrogate species to assess probable impacts of helicopter disturbance on pinnipeds, specifically Steller sea lions.

Airborne sounds from aircraft may directly affect marine mammals that haul out on land or ice, and perhaps any marine mammal at the surface. The complex process of air-to-water transmission affects the characteristics of aircraft sound received by marine mammals below the surface. When determining the propagation characteristics of aircraft sound, an altitude of 300 m is the usual reference distance for in-air measurements and predictions (Richardson *et al.* 1995). Aircraft are powered by either reciprocating or turbine engines. The primary sources of sound from aircraft, aside from their turbojet or turbofan, are their propellers or rotors. Turbine engine sounds are characterized by the whine of the blades within different stages of the engine; tones occur at frequencies from several hundred Hertz to well above 1kHz. For example, a two-bladed helicopter rotor turning at 330 rpm results in a tone at 11 Hz (Richardson *et al.* 1995). The larger the number of blades, the higher the fundamental frequency for a given rotation rate. Dominant tones in noise spectra from helicopters and fixed-wing aircraft generally are below 500 Hz (Richardson *et al.* 1995). According to Richardson *et al.* (1995) helicopters tend to be noisier than similar-sized fixed wing aircraft, large aircraft tend to be noisier than smaller ones, and aircraft on takeoff or climb tend to be noisier than those during cruise or approach. The escape responses (*i.e.*, leaving the ice) of hauled out ringed seals (*Phoca hispida*) to a low-flying (150 m) fixed-wing twin-engine aircraft (Partenavia PN68 Observer) during strip censuses in eastern Greenland (June 1984) and to a low-flying (150 m) helicopter (Bell 206 III) during reconnaissance in northwestern Greenland (May 1992) were recorded by Born *et al.* (1999). Seals escaped less than about 600 m in front of the fixed-winged aircraft. The overall probability of escaping was 0.21 within a 200-m-wide center zone, 0.06 on the side of the aircraft (100-300 m from the flight track), and 0.02 between 300 and 500 m from the track. Overall, about 49% of all seals escaped as a response to the helicopter. Seals entered the water a maximum of about 1250 m in front of the helicopter. The study by Born *et al.* (1999) indicated that the risk of scaring ringed seals into the water could be substantially reduced if helicopters do not approach them closer than about 1500 m, and small fixed-winged aircraft not closer than about 500 m.

Helicopter disturbance of wild animals may cause physiological and/or behavioral responses that compromise the animal's survival, growth, reproductive fitness, ability to raise young, energy budgets, and habitat use. One relationship is clear between aircraft and wildlife responses: the closer the aircraft, the greater the probability that the animal will react and the greater the response (Yeomans 2002). Panic reactions and escape responses to overflights can be energetically "expensive" to animals. Disturbed animals usually run or otherwise move away from aircraft, thus increasing their energy expenditure (National Park Service 1994). Many studies have examined the responses of wildlife to mechanized recreational activities and human disturbances. Perching or nesting birds may flush when disturbed, for example. A study of bald eagles demonstrated that over 40% of eagles elicited responses when helicopters approached at distances of under 3,050 m (10,000 ft) (Watson 1993). In contrast, eagles defending their nests did not flush until encounters were under 30 m (99 ft) (Watson 1993). Cote (1996) recorded, during 32% of observations of helicopter disturbance events, mountain goats walked or ran >100 m or were vigilant for >10 min post-overflight. Of the remaining observations, 42% of goats were lightly disturbed (moved <10 m or vigilant for <2 min) and 26% were moderately disturbed (moved 10-100m or vigilant >2 min and <10 min). Distance between animals and helicopters was the most important factor affecting goat responses; the behaviors noted above were observed 85% of the time when helicopters approached <500 m (1,640 ft). Research indicates that flight altitude, noise output, speed, approach pattern, and reproductive status, are the most important factors in determining an animal's reaction to an overflight (McKechnie and Gladwin 1995), and researchers have concluded that helicopter traffic is more disruptive than fixed winged aircraft traffic (Belanger and Bedard 1989; Harrington and Veitch 1991; Watson 1993; Richardson *et al.* 1995; Albright and Kunstel 2001; National Research Council 2005).

Stemp (1983) found that both behavioral and cardiac responses of sheep to helicopters with overflights at 400 m above ground, resulted in elevated heart rates lasting for up to one hour post-disturbance in Rocky Mountain Bighorn sheep. However, both MacArthur *et al.* (1982) and Stemp (1983) noted the poor correlation between cardiac and observable behavioral responses. Scotton and Pletscher (1998) studied bighorn sheep ewe-lamb disruptions and found larger, turbine-powered helicopters (Hughes 500) caused ewes to move farther from lambs than did smaller, piston-powered helicopters (Robinson R-22).

Helicopter regulations as they pertain to marine mammals do not exist in California. However, guidance has been developed for other species and information is available regarding other wildlife and aircraft. On the Federal Aviation Association (FAA) website (http://www.faa.gov) "Bird Hazards and Flight Over National Refuges, Parks, and Forests," Section 7-4-6 addresses "Flights Over Charted U.S. Wildlife Refuges, Parks, and Forest Service Areas." Subsection b states "pilots are requested to maintain a minimum altitude of 2,000 feet [600 m] above the surface of the following: National Parks, Monuments, Seashores, Lakeshores, Recreational Areas, and Scenic Riverways administered by the National Park Service, National Wildlife Refuges, Big Game

Refuges, Game Ranges and Wildlife Ranges administered by the U.S. Fish and Wildlife Service, and Wilderness and Primitive areas administered by the U.S. Forest Service (http://www.faa.gov/atpubs/aim/Chap7/aim0704.html). While California State law is not specific to helicopters and wildlife disturbance, the State (in both Fish and Game Code and the State law) does not allow harassment of wildlife. An approach to within 60 m (200 ft) would constitute harassment (S. Torres, pers. comm. *in* Wilson and Shackleton 2001) regarding regulations governing the use of aircraft near wildlife, but this pertains to hunting (Wilson and Shackelton 2001).

Individual animal behavior is difficult to predict and is likely influenced by many factors. Therefore, broad management guidelines need to be based on the range of behaviors that can be expected under different disturbance scenarios. Guidelines should be based on the most sensitive animals in a population (Wilson and Shackleton 2001).

Noise testing performed on the R44 Raven Helicopter, the helicopter to be used during renovation/maintenance activities, as required for FAA approval, required overflight at 150 m (492 ft) above ground level, 109 knots and maximum gross weight (2400 lb or 2500 lb depending on the model). The noise levels measured on the ground at this distance and speed, were 81.9 dB(A) for the model R44 Raven I, or 81.0 dBA for the model R44 Raven II (S. Turnour, Raven Helicopters, pers. comm., 2006). It is assumed that noise levels increase as the distance between the helicopter and the receiver of the noise decreases. Steller sea lions have been disturbed by some activities associated with Lighthouse restoration. The most significant impact is from helicopter landings and departures from the site. A small helicopter is used to transport people and materials to the site, since boat based landings are not feasible. Helicopter landings take place on top of the engine room, or caisson, about 15 m (48 ft) above the surface of the rocks on the island. The most common response to landings is temporary displacement into the water from the haulout by a portion, or all, of the animals present. No deaths or injuries to adult animals have been documented due to past activities conducted by the SGRLPS. The only other injury that eventual led to mortality documented at the project site of any other age class was that of the Steller sea lion pup that was observed alive on May 13, 2005 (M. DeAngelis, NMFS, pers. comm.) and died during the night (G. Towers, SGRLPS, pers. comm., 2005).

Exposure to sound energy may result in a range of physiological effects in marine mammals. The auditory system is thought to be the most sensitive to sound exposure, but sound exposure may cause non-auditory physiological effects such as stress and tissue injury. Exposure of marine mammals to high intensity sound may cause a temporary threshold shift (TTS), or a temporary loss in hearing (Finneran *et al.* 2005). Permanent threshold shifts (PTS) or permanent loss of hearing sensitivity can result when animals are exposed even briefly to very intense sounds, over a long duration and/or to moderately intense sounds, or intermittently, but repeatedly, to sounds sufficient to cause TTS (Clark 1991). Indirect ecological effects may occur if ecologically related species are affected by anthropogenic sound, thereby changing the nature of their relationship with marine mammals or the structure of the affected ecosystem. If and when such effects occur, they may reduce the foraging efficiency of marine mammals, potentially compromising their growth, condition, reproduction, and survival.

As mentioned above, noise testing performed on the R44 Raven Helicopter, at 492 ft above ground level, measured noise levels at 81.9 dB(A) for the model R44 Raven I, or 81.0 dB(A) for the model R44 Raven II (S. Turnour, Raven Helicopters, pers. comm., 2006). In past consultations, NMFS has used a conservative estimate of the SEL at which TTS (Level B harassment) may be elicited in-air in harbor seals and California sea lions and northern elephant seals (*Mirounga angustirostris*), to be 145 dB re $20\mu Pa^2$-sec and 165 dB re $20\mu Pa^2$-sec, respectively (Lawson *et al.* 1998). However, studies have shown that when exposed to sound levels between 98.9 and 101 dB re $20\mu Pa^2$-sec from a rocket launcher, harbor seals responded by fleeing into the water, but many returned to land within several hours. Like harbor seals, Steller sea lions are skittish by nature, and it is not unreasonable to assume that if Steller sea lions are exposed to sound pressure levels between 98.9 and 101 dB re $20\mu Pa^2$-s, they would respond in the same manner as harbor seals. It is likely that the initial approach of the helicopter, the visual cue and approaching engine/rotor sound, will cause the majority of animals hauled out on the island to alert and flush into the water. As the helicopter approaches, it is expected that the sound levels would increase above the measured noise levels (81-81.9 dBA at 150 m (492 ft) above ground level)), since the helicopter will be landing on a platform that is 15 m (48 ft) above the rocks where animals haul out (Figure 12) and the platform is built approximate 6 m (20 ft) above sea level. Since the actual sound levels of the helicopter below 150 m (492 ft) are not known, we assume that animals remaining at the site (below the helicopter landing platform) could be exposed to TTS-inducing SELs.

Observations by Crescent Coastal Research (2001) and M. DeAngelis (NMFS-SWR, pers. comm., 2005) lead us to conclude that by the time the helicopter lands on the platform, 100% of the animals are expected to have left the island and flushed into the water. The noise emanating from the helicopter is not expected to penetrate the water column because the airborne sounds will likely reflect or refract from the water surface. In addition, while in transit, the helicopter will maintain a 2.0 mile diameter safety zone from other known Steller sea lion haul out sites, to avoid impacts to other pinnipeds, including Steller sea lions, hauled out at other islands within the St. George Reef island chain, including the rookery at Southwest Seal Rock. This evidence, in combination with the estimated sound pressure levels produced by the helicopter and restoration and maintenance activities, suggests that no pinnipeds, including Steller sea lions, will be exposed to PTS- inducing SELs during project activities. For those very few animals that may remain hauled out as the helicopter approaches the Lighthouse (the top of the Lighthouse is 150 feet from the base of Northwest Seal Rock), it is expected that they will eventually flush into the water before the helicopter lands at the platform (the base of Northwest Seal Rock is 68 feet from the landing area on the platform). It is not expected that any Steller sea lions would remain hauled out at the base of Northwest Seal Rock once the helicopter begins its descent towards the platform. However, since it is not known what sound levels are associated with the helicopter below 150 feet, we assume that those few animals that remain hauled out at the base of Northwest Seal Rock could be exposed to TTS-inducing SELs, but for a very short period of time (< 1 minute; M. DeAngelis, NMFS, pers. comm. 2005).

Human Presence (not associated with helicopter activity)

Animals respond to disturbance from humans in the same way as they respond to the risk of predation, by avoiding areas of high risk, either completely or by using them for limited periods (Gill *et al.* 1996). There is increasing recognition that the effect of human disturbance on wildlife is highly dependent on the nature of the disturbance (Burger *et al.* 1995; Klein *et al.* 1995; Kucey 2005). Generally, human disturbance to hauled out pinnipeds may be categorized by purpose: scientific investigation, ecotourism, and recreation. Of the three types of human disturbances, ecotourists and recreators are not likely to be aware of the negative impacts that their presence may have on wildlife. Foot traffic at distances of 25-50 m resulted in short-term (several minutes) heart rate increases among Rocky Mountain bighorn sheep in Alberta, Canada (MacArthur *et al.* 1982). Hicks and Elder (1979) studied interactions between humans and California bighorn sheep in the Sierra Nevada Mountains. The authors found that the reactions of sheep to humans were related to distance to humans and to group size and composition. Scientists often need to closely monitor demographic parameters and their work often present the most intense kinds of disturbance: entering rookeries or haulouts and capturing and handling animals. However, most scientists are aware of the potential harmful effects of their work, and any scientific research permit issued takes into account any potential impacts the research could have on individual animals and the population. Disturbance of elephant seal harems caused by visits by researchers resulted in direct but transient changes in some types of behavior; no long-term changes in behavior (period of weeks) was implied from the comparison made between the areas of high and low human presence (Engelhard *et al.* 2002)

Disturbances resulting from human activity and other causes can impact pinniped haul out behavior (Renouf *et al.* 1981; Schneider and Payne 1983; Terhune and Almon 1983; Allen *et al.* 1984; Stewart 1984; Suryan and Harvey 1999; Mortenson *et al.* 2000; Kucey and Trites 2006), both in the short- and long-term. The apparent skittishness of both harbor seals and Steller sea lions raises concerns regarding behavioral and physiological impacts to individuals and populations experiencing high levels of human disturbance. It is well known that human activity can flush harbor seals off haul out sites (Allen *et al.* 1984; Calambokidis *et al.* 1991; Suryan and Harvey 1999; Mortenson *et al.* 2000). Researchers have also observed that human disturbances in the form of boat traffic and people walking on the beach, can flush seals into the water from haul out sites and impact seal haulout numbers (Renouf *et al.* 1981; Schneider and Payne 1983; Terhune and Almon 1983). Lelli and Harris (2001) found that the level of boat traffic (including motor and paddle boats) in Gun Point Cove, Maine, was, by far, the single strongest predictor of harbor seal haulout numbers. Of the 85 incidents in which harbor seals were flushed, 93% were caused by boats.

The Hawaiian monk seal has been shown to avoid beaches that have been disturbed often by man (Kenyon 1972). Stevens and Boness (2003) concluded that after the 1997-98 El

Niño when populations of the fur seal, *Arctocephalus australis*, in Peru declined dramatically, seals abandoned some of their former primary breeding sites, but continued to breed at adjacent beaches that were more rugged (*i.e.*, less likely to be used by humans). Abandoned and unused sites were more likely to have human disturbance than currently used sites. Human disturbance appeared to cause Steller sea lions to desert a breeding area at Northeast Point on St. Paul Island, Alaska (Kenyon 1962).

Restoration and Maintenance Activities

In addition to the information presented under the *Helicopter Disturbances* and *Human Disturbance* Sections, restoration and maintenance activities would also include activities such as: removal of peeling paint and plaster, restoration of interior plaster and paint, refurbishing structural and decorative metal, reworking original metal support beams throughout the lantern room and elsewhere, replacing glass as necessary, upgrading the present electrical system, and annual light maintenance. Any noise associated with these activities is likely to be from "light" construction (*e.g.*, sanding, hammering, or use of hand drills). Since the restoration and maintenance activities will be conducted by volunteers and require the use of the helicopter to transport the materials, for the remainder of this biological opinion, restoration and maintenance activities will be discussed under the aircraft and human presence sections.

EXPOSURE ANALYSIS

Exposure analyses are designed to identify the listed resources that are likely to co-occur with these effects in space and time and the nature of that co-occurrence. In this step of our analysis, we try to identify the number, age (or life stage), and gender of individuals that are likely to be exposed to an Action's effects and the populations or subpopulations those individuals represent.

Air Traffic and Human Presence

Steller sea lions are regularly observed hauled out on Northwest Seal Rock and the nearby islands. These animals could be present during the proposed project. The probability of their presence in the area of the proposed project is likely to depend on the season, including variable oceanographic conditions, wave height, and availability of prey. Steller sea lions use the island as a haul out site year-round, however the number of animals decreases during the winter months (November-end April).

Animals may be disturbed or temporarily displaced from the area. Any behavioral disruptions resulting from the presence of aircraft, are expected to be temporary (*e.g.*, animals are expected to return to use the haul out by the end of the work day).
It is expected that during the work window (November 1–April 30), one restoration trip per month, consisting of a total of 3 days, will occur. During the restoration trip, approximately 12-15 volunteers will arrive on the first day and most will remain until the third day (overnights the 1st and 2nd day); however, some may return to the mainland on the 2nd day. On the third day, as volunteers are leaving the island, approximately 36

different tourists will visit the project site and will arrive and depart from the project site using the same helicopter used to transport materials, equipment, and volunteers to and from the project site. It is expected that up to 11 flights in addition to those needed to transport the remaining volunteers, materials, and equipment, may occur to transport tourists to and from the island, for a total of 17 flights (Table 1).

Estimated Exposure

If we assume that 100% of the animals hauled out at Northwest Seal Rock might be exposed to renovation and maintenance activities (including helicopter and human presence), then this estimate represents the number of times a sea lion might be "taken" in the form of harassment. We do not anticipate any of these sea lions to die or exhibit responses that might constitute harm or injury. Estimates of the number of Steller sea lions that might be present during the work window, November 1-April 30, either do not exist or are limited. However, we used the best available raw count data taken during the fall and spring months for the proposed project area (Table 5). However, these data were only taken one or two days during each of the months of April, September, and October, in 1997 and 1998. Therefore, to account for variability throughout the month and season, we estimate using a 95% confidence interval, the population variance for Steller sea lions hauled out between November 1-April 30, to lie between 1 and 172 animals. The increased wave height during the winter months (Figures 7 and 8) will reduce the available haul out space and as a result, the number of animals hauling out at Northwest Seal Rock. Therefore, it is likely that less than a maximum of 172 Steller sea lions will be hauled out at one time during the work window period (Table 5).

Each work day is considered a day of "new" take, therefore, since 6 trips are planned during the work window period, and there are 3 days that constitute a trip, there are a total of 18 days per year where take may occur as a result of proposed activities. We assume that at the beginning of each work day, 100% of the animals hauled out will be harassed, between 1 and 172 individual animals, as a result of project activities, specifically helicopter activities. While each new day represents a new take, the number of animals hauled out each day is expected to range between 1 and 172 individuals. According to the Crescent Coastal Research Report (2001), up to 40% of the Steller sea lions present on Northwest Seal Rock have been observed to enter the water on the first of a series of helicopter landings, with the remainder entering the water with the arrival of the 2nd flight (M.DeAngelis, NMFS, pers. comm., 2005). Steller sea lions move to the lower edges of the haul out site closest to the water as the helicopter approaches, and if remain hauled out, are at the farthest distance from the helicopter as it lands on Northwest Seal Rock. Therefore, if we assume 100% of the animals are taken by harassment by the first few helicopter flights, any take associated with human presence after those first few helicopter flights would likely impact individuals previously taken by helicopter activities (*i.e.,* it is unlikely that a "new" animal that was not previously hauled out prior to the commencement of helicopter activities would haul out after the first flight). Therefore, it is possible that individual animals may be exposed to helicopter activities and human presence multiple times during each day of project activities (see Table 6). Table 6 provides the estimate of potential exposures to harassment on an annual basis using the estimate for population variance in the absence of actual count data. This annual exposure estimate is likely a gross overestimate and does not equate to the number of individual animals expected to be hauled out at St. George Reef Lighthouse, during the proposed work window (between 1-172 individuals). Individuals may be exposed more than once during each day and it is expected that some of the same individuals will be impacted over the 3-day work window. Table 6 represents an estimate of the number of exposures that may occur over the three year period from November 1-April 30. Although, the take estimate represents the initial take of an animal at the beginning of each day (*i.e.*, 100% taken by harassment) of project work (the initial take will likely be due to helicopter activity, since the helicopter is the most disruptive and the first activity to occur as part of restoration and maintenance activities), the maximum number of 172 animals is likely an overestimate of animals expected to be hauled out on any one day during the work window.

Table 5. Actual Steller sea lion count data taken by Crescent Coastal Research (2001) at St. George Reef; multiple entries for the same year indicate multiple days counted during that year for that same month. Shaded columns are the fall-spring counts used to estimate numbers of animals that are expected to be taken as a result of the proposed project activities.

YEAR	MONTH						
	April	May	June	July	August	September	October
1997	10	186					
1997		56					
1998	53	85	206	144	46	56	55
1998			159				
1998			54				
1998			355				
1999			174	159	148		
1999			146				
2000			223				
2000			225				

Table 6. Estimated annual exposure of Steller sea lions at St. George Reef Lighthouse. The number of exposures does not represent the number of individuals taken by harassment.

Month	Number of animals	Number of days/month	Number of animals exposed to harassment multiplied by number of days
November	1-172	3	3-516
December	1-172	3	3-516
January	1-172	3	3-516
February	1-172	3	3-516
March	1-172	3	3-516
April	1-172	3	3-516
Emergency Work*	1-172	2	2.0-224**
Annual Total without Emergency Work			**18-3,096**
Annual Total with Emergency Work*			**20.0-3,320****

*Additional exposure for Emergency work is estimated from the anticipated 0-4 incidents over the 3-year proposed work period (*i.e.*, a maximum of 1.3 incidents a year over the 3-year work period). If Emergency work occurs outside of the 3-day restoration and maintenance activity, additional exposure may occur. These values incorporate an additional exposure if emergency work does not coincide with restoration and maintenance trips.
** Numbers are rounded up.

RESPONSE ANALYSIS

Potential Responses to Air Traffic

Noise generated from helicopter activities may cause harassment of Steller sea lions, both hauled out and in the water (at or directly below the surface). The physical presence of aircraft could also lead to non-acoustic effects on marine mammals involving visual or other cues. Airborne sound from a low-flying helicopter or airplane may be heard by marine mammals while at the surface or underwater. In general, helicopters tend to be noisier than fixed-wing aircraft of similar size, and larger aircraft tend to be louder than those that are smaller. Underwater sounds from aircraft are strongest just below the surface and directly under the aircraft. Noise from aircraft would not be expected to cause direct physical effects but have the potential to affect behavior. The primary factor that may influence abrupt movements of animals is engine noise, specifically changes in engine noise. Responses by mammals could include hasty dives or turns, change in course, or flushing and stampeding from a haul out site. There are few well-documented studies of the impacts of aircraft overflight over pinniped haul out sites or rookeries, and many of those that exist, are specific to military activities (Efroymson *et al.* 2001). Several factors complicate the analysis of long- and short-term effects for aircraft overflights. Information on behavioral effects of overflights by military aircraft (or component stressors) on most wildlife species is sparse. Moreover, models that relate behavioral changes to abundance or reproduction, and those that relate behavioral or hearing effects thresholds from one population to another are generally not available. In addition, the aggregation of sound frequencies, durations, and the view of the aircraft into a single exposure metric is not always the best predictor of effects and may also be difficult to calculate. Overall, there has been no indication that single or occasional aircraft flying above pinnipeds in-water cause long-term displacement of these animals (Richardson *et al.* 1995). The Lowest Observed Adverse Effects Levels (LOAELs) are rather variable for pinnipeds on land, ranging from just over 150 m (492 ft) to about 2000 m (6,562 ft) (Efroymson *et al.* 2001). A conservative (90^{th} percentile) LOAEL according to Efroymson et al. (2001) is 1150 m. Most thresholds represent movement away from the overflight. Bowles and Stewart (1980) estimated an LOAEL of 305 m (1,000 ft) for helicopters (low and landing) in California sea lions and harbor seals observed on San Miguel Island, CA; animals responded to some degree by moving within the haulout and entering into the water, stampeding into the water, or clearing the haulout completely. Both species always responded with the raising of their heads. California sea lions appeared to react more to the visual cue of the helicopter than the noise. Thus, if we assume the most "severe" reaction described by Bowles and Stewart (1980) would occur at the Lighthouse, then it is likely that a helicopter landing at the Lighthouse would cause 100% of the animals to flush into the water. During the site visit by M. DeAngelis (NMFS-SWR) on May 15, 2005, 100% of all of the pinnipeds hauled out at the Lighthouse did flush into the water as a response to the helicopter activity. However, animals are expected to resume their migration, feeding, or other behaviors without consequences to their survival or reproduction from aerial disturbance (Kucey 2005) at the end of the work period each month.

Potential Responses to Human Presence

Potential impacts on sea lions from human disturbance could range from a physiological stress response, to sea lions leaving the haulout either temporarily or permanently (Orsini 2004). Short-term effects of human presence include disruptions of sea lion daily activities and potential redistribution of animals within and among sites. However, the effects of repeated short-term disturbance at the population level are unknown, particularly in research-related disturbances (NMFS 2002). Displacements may increase population numbers and density at alternate sites or force individuals to inhabit sub-optimal habitat (Creel *et al.* 2002).

Long-term effects of human disturbance that significantly reduces the time that sea lions haul out, or substantially interferes with the activity pattern of hauled out sea lions, could potentially have consequences on life cycles and activities (Orsini 2004). Steller sea lion research in Alaska and British Columbia has focused on both the western DPS (declining) and eastern DPS (increasing) populations. Comparable research on both these populations has not revealed any discernable negative effects on either population. Constantine *et al.* (2004) argued that the long-term effects of reduced resting behavior on long-lived species, such as sea lions, might affect their fitness, individual reproductive success and population size; however, the lack of any obvious long-term effect and the apparent resilience of sea lions to human encroachment and hunting pressures, argues in favor of the resiliency of sea lions to intermittent disturbances (Kucey 2005). Sea lions at certain haul out sites may become habituated to repeated disturbance stimuli, or conversely, may exhibit increased levels of response (Frid and Dill 2002). However, sea lions can still experience continued physiological stress with frequent human approach despite an apparent habituated response to high levels of intrusion (Fowler 1999). Regardless of the level of habituation, Kucey (2005) determined that it was clear that Steller sea lions demonstrate a flight response to sudden movements, noises, smells, and approaches (in particular with aircraft and vessels).

Stress Responses

Acute responses to sounds may be difficult to quantify, but they are much more tractable to investigation than are responses to repeated or chronic sounds. Classic stress responses begin when an animal's central nervous system perceives a potential threat to its homeostasis. That perception triggers stress responses regardless of whether a stimulus actually threatens the animal; the mere perception of a threat is sufficient to trigger a stress response (Moberg 2000; Sapolsky 2005; Seyle 1950). Once an animal's central nervous system perceives a threat, it mounts a biological response or defense that consists of a combination of the four general biological defense responses: behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune response.

Although stress-induced pathologies have been hard to identify in free-ranging marine mammals, based on work with terrestrial mammals, it is likely that marine mammals would experience similar responses. The stress caused by pursuit and capture activates similar physiological responses in terrestrial mammals (Harlow *et al.* 1992) and cetaceans (St. Aubin and Geraci 1992). In the case of many stressors, the first and most economical (in terms of biotic costs) response is behavioral avoidance of the potential stressor or avoidance of continued exposure to a stressor. An animal's second line of defense to stressors involves the autonomic nervous system and the classical "fight or flight" response, which includes the cardiovascular system, the gastrointestinal system, the exocrine glands, and the adrenal medulla to produce changes in heart rate, blood pressure, and gastrointestinal activity that humans commonly associate with stress. These responses have a relatively short duration and may or may not have significant long-term effect on an animal's welfare.

An animal's third line of defense to a stressor involves its neuroendocrine systems, usually hormones associated with the hypothalmus-pituitary-adrenal system (most commonly known as the HPA axis in mammals or the hypothalamus-pituitary-interrenal axis in fish and some reptiles). Unlike stress responses associated with the autonomic nervous system, virtually all neuroendocrine functions that are affected by stress – including immune competence, reproduction, metabolism, and behavior – are regulated by pituitary hormones. In the majority of stress studies, the HPA axis has been the primary neuroendocrine axis monitored. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction (Moberg 1987; Rivier

1995) and altered metabolism (Elasser *et al.* 2000), immune competence (Blecha 2000) and behavior. Increases in the circulation of glucocorticosteroids (cortisol, corticosterone, and aldosterone in marine mammals) have been equated with stress for many years.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and distress, is the biotic cost of the response. When stressed, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response does not pose a risk to the animal's welfare.

However, when an animal has insufficient biotic reserves to satisfy the biotic cost of a stress response, then resources must be shifted away from other biotic functions. When sufficient reserves are diverted from these functions, the functions are impaired. For example, when stress shifts metabolism away from growth, young animals no longer thrive, and growth is stunted. When energy is shifted from supporting reproduction, reproductive success is diminished. In these cases, animals have entered a pre-pathological state (pathological state and are experiencing "distress;" *sensu* Seyle 1950) or "allostatic loading" (*sensu* McEwen and Wingfield 2003). This period of distress will last until the animal replenishes its biotic reserves sufficient to restore normal function. Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses have also been documented fairly well through controlled experiments; because this physiology exists in every vertebrate that has been studied, it is not surprising that stress responses and their costs have been documented in both laboratory and free-living animals (Holberton *et al.* 1996; Hood *et al.* 1998; Jessop *et al.* 2003; Krausman *et al.* 2004; Lankford *et al.* 2005; Reneerkens *et al.* 2002; Thompson and Hamer 2000). Although no information has been collected on the physiological responses of marine mammals upon exposure to anthropogenic sounds, studies of other marine animals and terrestrial animals would lead us to expect some marine mammals to experience physiological stress responses and, perhaps, physiological responses that would be classified as "distress" upon exposure to certain frequency sounds.

For example, Jansen (1998) reported on the relationship between acoustic exposures and physiological responses that are indicative of stress responses in humans (for example, elevated respiration and increased heart rates). Jones (1998) reported on reductions in human performance when faced with acute, repetitive exposures to acoustic disturbance. Trimper *et al.* (1998) reported on the physiological stress responses of osprey to low-level aircraft noise while Krausman *et al.* (2004) reported on the auditory and physiology stress responses of endangered Sonoran pronghorn to military overflights. Smith *et al.* (2004a, 2004b) identified noise-induced physiological stress responses in hearing-specialist fish that accompanied TTS and PTS hearing losses. Welch and Welch (1970) reported physiological and behavioral stress responses that accompanied damage to the inner ears of fish and several mammals.

Hearing is one of the primary senses marine mammals use to gather information about their environment and to communicate with conspecifics. Although empirical information on the relationship between sensory impairment (TTS, PTS, and acoustic masking) on marine mammals remains limited, it seems reasonable to assume that reducing an animal's ability to gather information about its environment and to communicate with other members of its species would be stressful for animals that use hearing as their primary sensory mechanism. Therefore, we assume that acoustic exposures sufficient to trigger onset PTS or TTS would be accompanied by physiological stress responses because terrestrial animals exhibit those responses under similar conditions (NRC 2003). More importantly, marine mammals might experience stress responses at received levels lower than those necessary to trigger onset TTS. Based on empirical studies of the time required to recover from stress responses (Moberg 2000), we also assume that stress responses are likely to persist beyond the time interval required for animals to recover from TTS and might result in pathological and pre-pathological states that would be as significant as behavioral responses to TTS. It is not expected that Steller sea lions would exhibit the accompanied physiological stress response from exposure to PTS levels, since they are not expected to be exposed to PTS levels. However, for the few animals that may remain hauled out at the water's edge of Northwest Seal Rock as the helicopter approaches and could be exposed to TTS levels, they may exhibit the accompanied physiological stress response from exposure to TTS levels.

Behavioral/Disturbance Responses

There is mounting evidence that wild animals respond to human disturbance in the same way that they respond to predators (Beale and Monaghan 2004; Frid 2003; Frid and Dill 2002; Gill *et al.* 2000; Gill *et al.* 2001; Harrington and Veitch 1992; Lima 1998; Romero 2004). Based on the evidence available, marine mammals are likely to exhibit several behavioral responses upon being exposed to loud sound transmissions. They will: try to avoid exposure, respond to the exposure as they would respond to other human activities (behavioral disturbance), experience social disruptions, exhibit behaviors associated with distress (see the Stress Response Section), habituate to the stressors, or they will not respond. These responses manifest themselves as stress responses (in which an animal perceives human activity as a potential threat and undergoes physiological changes to prepare for a flight or fight response or more serious physiological changes with chronic exposure to stressors), interruptions of essential behavioral or physiological events, alteration of an animal's time budget, or some combinations of these responses (Frid and Dill 2002; Romero 2004; Sapolsky *et al.* 2000; Walker *et al.* 2005). These responses have been associated with abandonment of sites (Sutherland and Crockford 1993), reduced reproductive success (Giese 1996; Mullner *et al.* 2004), and the death of individual animals (Daan *et al.* 1996; Feare 1976). The narratives that follow summarize the information available on these behavioral responses and since there isn't a wealth of information on a marine mammal's response to human disturbance, we assume that marine animals would likely follow similar responses to other wild animals, even though the studies presented were not all conducted on marine mammals.

When encountering disturbance stimuli, ranging from the low-flying helicopter to the wildlife photographer, an animal's response appears to follow the same economic principles used by prey when they encounter predators (Berger *et al.* 1983; Madsen 1994; Gill *et al.* 1996, 2001; Gill and Sutherland 2000). This verbal model is called the risk-

disturbance hypothesis. It predicts that responses by disturbed animals track short-term changes in factors characterizing disturbance stimuli, with responses being stronger when perceived risk is greater. The level of perceived risk may result from a combination of factors that characterize disturbance stimuli, along with factors related to natural predation risk (Frid 2001; Papouchis *et al.* 2001).

Existing studies of behavioral effects of man-made sounds in marine environments remain inconclusive, partly because of their limited ability to detect behavioral changes that are significant to the biology of the individual animals being observed. These studies are further complicated by the variety of responses that can occur within a single species of marine mammals, which can exhibit a wide range of responses to man-made noise that can vary by individuals and their circumstances. Under certain circumstances, some individuals will continue the normal activities in the presence of high levels of man-made noise; in other circumstances, the same individual or other individuals may avoid an acoustic source at much lower received levels (Richardson *et al.* 1995).

Determining the significance of noise disturbance to marine mammals remains a challenge for scientists. A workshop held by the National Research Council in 2004, examined the threshold for "biologically significant" effects of noise on marine mammals; that is, noise from an action that affects the ability of an animal to grow, survive, and reproduce. These can also have population-level consequences and affect the viability of the species. The National Research Council recommended that a predictive model be developed to determine the biological significance of behavioral change in response to noise. The consensus of participants in the workshop was that at least a decade would be required to have the data and understanding to turn such a conceptual model into a functional tool (National Research Council NRC 2005).

Probable Responses of Steller sea lions to the proposed action

Since Steller sea lions are skittish by nature, it is likely that loud, frequent, unfamiliar noises, such as aircraft, hammering, clanging of materials, or shouting, are likely to disrupt resting sea lions or those foraging in the water near the sound source. Steller sea lions would likely abandon haulouts, or dive if foraging in the water, if disturbed by project activities. Generally, animals return to their previous behavior within an hour (Porter 1997) or a few days (Kucey 2005), depending on the level and length of disturbance. Because there is a paucity of information on how Steller sea lions react to renovation and maintenance activities, a conservative approach is warranted. The proposed action to cease project activities after April 30 and before November 1, the breeding and molting period for Steller sea lions in Del Norte County, would reduce the chance that a large number of Steller sea lions would be negatively impacted by activities.

Aircraft

Responses by Steller sea lions to the approach and landing of a helicopter near their haul out site could include hasty dives or turns, change in course, or flushing and stampeding from a haul out site. There are few well-documented studies of the impacts of aircraft overflight over pinniped haul out sites or rookeries, and those that exist are specific to military activities (Efroymson *et al.* 2001). Overall, there has been no indication that single or occasional aircraft flying above pinnipeds in-water cause long-term displacement of these animals (Richardson *et al.* 1995). It is expected that, as observed by Bowles and Stewart (1980), Steller sea lions would react similarly to aircraft (including visual cues) as California sea lions and harbor seals that were observed on San Miguel Island, CA; animals responded to some degree by moving within the haulout and entering into the water, stampeding into the water, or clearing the haulout completely. Both species always responded with the raising of their heads. It is expected that 100% of the animals hauled out would flush into the water as a result of project activities, particularly the presence of the helicopter.

Human Presence

Determining the effects of human disturbance on individual Steller sea lion behavior depends on what is considered normal or baseline behavior. Kucey (2005) determined that significant seasonal differences in the behaviors between Steller sea lions that remained on land and those that returned to the water did exist. Animals that returned to the water showed a decrease in rates of total numbers of behaviors and interactions in the winter/spring, when compared to summer, and an increase following a research disturbance. Seasonal considerations that may have affected haulout behavior may include: reproductive status, prey availability correspondence to foraging efforts, distances traveled between haul out sites and rookeries, and possible climate conditions on the haulout or in the water. Individual sea lions took longer to "settle down" in winter/spring than in summer. This may be related to the fact that sea lions typically spend longer at sea during winter/spring months (Merrick and Loughlin 1997; Sease and York 2003), and may behave differently onshore after their winter trips. Kucey (2005) who observed that it took sea lions longer to "settle down" in winter/spring than in summer, determined that this may be explained by weather conditions or fatigue due to greater physical exertion during the trips (*i.e.*, sea lions may need more rest after winter trips and are less likely to flush completely, but may shift around the haul out site or show signs of "agitation" before resting).

In addition, Kucey (2005) observed similar rates of behavior for animals remaining on land, but substantially different rates among age and sex classes for animals that returned to the water. Such age and sex class behavioral differences may be related to the social, physical, or reproductive status of individual animals and their varying energetic expenditures (Harkonen *et al.* 1999). From spring to summer breeding seasons, sea lions distribute themselves within and among sites according to their reproductive status. Disturbance that displaces adult male sea lions from their territories, for example, especially during the breeding season, increases the likelihood of aggressive interactions occurring among males (NMFS 2002). In contrast, adult males may also provide a stabilizing influence in the summer months that shortens the time it takes the other sea lions to "settle down" after hauling out. Lewis (1987; *in* Richardson *et al.* 1995) reported 22 out of 23 stampedes of Steller sea lions were caused by human disturbance during censuses. Although a few pups were killed, there were changes in some animals' behavior, which included reduced mother-pup contact.

Overall, Steller sea lions showed a short-term effect of disturbance at a local population level, whereby mean numbers of sea lions using haul out sites dropped following a major disturbance, and according to Kucey (2005), did not recover for 2-4 days.

VI. 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 ESA.

During this consultation, NMFS searched for information on future State, tribal, local, or private actions that were reasonably certain to occur in the action area. Most of the action area, other than the Northwest Seal Rock where the Lighthouse exists (which is leased to SGLRPS from Del Norte County), is owned by either Del Norte County or is part of a Refuge. It is likely that any future projects conducted by SGRLPS would obtain funding from a private donor or citizens (G. Towers, SGRLPS, pers. comm., 2006) and will likely need a federal permit either from the USCG or NMFS. NMFS conducted electronic searches and those searches produced no evidence of future private actions, other than the proposed, in the action area that would not require federal authorization or funding and is reasonably certain to occur. As a result, NMFS is not aware of any actions of this kind that are likely to occur in the action area during the foreseeable future.

VII. Integration and Synthesis of Effects

In this assessment, we measure risks to listed individuals using changes in the individual's "fitness" or the individual's growth, survival, annual reproductive success, and lifetime reproductive success. When we do not expect listed plants or animals exposed to an action's effects to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (Anderson 2000; Mills and Beatty 1979; Brandon 1978; Stearns 1977, 1992). As a result, if we conclude that listed plants or animals are *not* likely to experience reductions in their fitness, we would conclude our assessment.

The following narratives summarize the probable risks the proposed project, particularly air traffic and human presence, pose to Steller sea lions, over a 3 year period (the expected length of time it would take to complete the proposed project). These summaries integrate the results of the *Exposure* and *Response* analyses presented in previous sections of this biological opinion. It is reasonable to assume that the proposed project will create sounds within the Steller sea lion's hearing range (*e.g.*, aircraft, human voices, hammering, drilling, etc.). However, as mentioned previously in the *Effects* section, we do expect the project to result in the incidental harassment of animals, but no pinnipeds, including Steller sea lions, will be exposed to PTS-inducing SELs during project activities. We assume that any animals remaining at the site (including those that flushed and then returned), once the helicopter has landed, may be exposed to TTS-inducing SELs during project activities. However, we expect the likelihood of this exposure to be very low as all Steller sea lions were observed by M. DeAngelis (NMFS-SWR) to flush from the project site, while the helicopter was nearing the island and did not return until the helicopter activities had ended for the day (M. DeAngelis, NMFS-SWR, pers. comm. 2005). In addition, the distance between the Steller sea lions and the helicopter will be greater than the 150 m (492 ft) distance on approach and when the helicopter is hovering above the Lighthouse, as described in the *Effects* section (Section V), that produced 81-81.9 dBA noise levels, and it is expected that most if not all Steller sea lions will flush into the water before the helicopter lands on the platform, and therefore would not be exposed to TTS levels. Since we assume that the noise levels will decrease the farther the helicopter is from the Steller sea lions, for those very few animals that remain hauled out during the initial approach, it is expected that they would retreat to the base of the Northwest Seal Rock which is 68 ft away from the helicopter landing platform. Any exposure to TTS levels would only be for a short period (< 1 minute) until the helicopter begins to descend towards the platform (typically as the helicopter approaches and nears the top of the Lighthouse (which is 150 ft high from the base of Northwest Seal Rock) the remaining animals flush into the water and none remain once the helicopter lands on the platform (M. DeAngelis, NMFS, pers. comm., 2005)).

Steller sea lions likely to be exposed to the proposed project include those animals from the eastern DPS. The minimum size of the population can be estimated as the actual count of hauled out sea lions of 44,404 (as corrected); this does not account for animals at sea (Angliss and Allen *et al.* 2009). We assume any age or gender may be exposed, however since the work window is outside of the pupping season, few, we do not expect any exposure to newborn pups. In addition, although the overall trend for the eastern DPS stock of Steller sea lions is showing an increase, the stock is declining in the southern portion of its range, which includes California and the action area.

For the purposes of this biological opinion, if Steller sea lions are present, we assumed that 100% of the animals hauled out at St. George Reef Lighthouse might be exposed to renovation and maintenance activities (including helicopter and human presence), and this represents the number of individuals that might be "taken" in the form of harassment. If on land, the animals will likely depart from the haulout into the water, swim with their head above water, vocalize, or dive. If the sound(s) persist, animals may vacate and depart from the area near the sound source. A maximum of about 355 animals were observed during one day during the surveys conducted over the summer months and less than 60 were observed in late fall (Crescent Coastal Research 2001; Table 5; Figure 9). It is expected that the total number of animals impacted by this project will be similar, if not less, than the late fall counts taken by Crescent Coastal Research (2001). However, due to a lack of data during the proposed work window, using the data collected from Crescent Coastal Research (2001) and a 95% confidence interval, up to 172 individual animals may be hauled out at one time at Northwest Seal Rock. Thus, at the beginning of each work day, 100% of the animals hauled out will be harassed, between 1 and 172 animals, as a result of project activities, specifically helicopter activities. The estimated number of individuals exposed to the activities, a maximum of 172 annually, is likely an overestimate of the number of animals that will potentially be harassed by activities, but was calculated using the best available science and the pinniped survey counts conducted by Crescent Coastal Research on Northwest Seal Rock during September, October, and April of 1997, 1998, 1999, and 2000 (see Table 5) (Crescent Coastal Research 2001), then calculated for the average monthly abundance and multiplied by six to account for the six months of the proposed restoration project between November 1 and April 30. The exposure values in Table 6 are also likely to be an overestimate as they are based on the above calculation and thus, represent a conservative estimate. Should emergency work occur during the work window, it is anticipated that 0-4 incidents may occur during the 3-year proposed project period. Emergency work outside of the proposed work window period is not considered in this biological opinion and was not included in the take estimate. As mentioned previously, the minimum population estimate for the eastern DPS of Steller sea lions is 44,404, therefore this project may incidentally harass 0.4% of the total population annually, and this includes emergency work within the proposed 3-day work window; these estimates would be slightly higher should emergency work occur in addition to the 3-day work trip during the work window.

The only type of harassment expected is displacement into the water. We expect no mortality or injury to Steller sea lions, in particular to younger animals, since the work window is outside of the pupping season and the risk of stampedes is reduced by the proposed directed helicopter approach protocol to the island. While the other pinnipeds, specifically California sea lions, on Northwest Seal Rock appear to show habituation to helicopter landing and departure, it is likely that Steller sea lions would not. During the site visit on May 15, 2005, by M. DeAngelis (NMFS-SWR), it was confirmed that California sea lions did return to the site during helicopter activities, but Steller sea lions did not return to the site until helicopter activities had ceased for the day. According to the Crescent Coastal Research Report (2001), while up to 40% of the California and Steller sea lions present on the rock have been observed to enter the water on the first of a series of helicopter landings, as few as 0% have flushed on subsequent landings on the same date. However, we use the conservative estimate that it is likely that up to 100% of all of the pinnipeds hauled out at the Lighthouse, including Steller sea lions, will be flushed during the entire series of daily helicopter landings. Data collected in 1998 indicated that relatively few animals responded to the disturbance when helicopter landings occurred at short intervals (Crescent Coastal Research 2001). The estimated 17 landings on Sunday, for example, at relatively short intervals on a given restoration day, are considered as one bout of "taking" with variable impacts on each landing.

The disturbance responses associated with direct effects of project activities (*i.e.*, aircraft and human presence) are expected to have short duration; they are likely to result in acute stress responses (*e.g.*, physiological and hormonal changes in animals that are normally associated with "fight or flight" responses), but not likely to impair the overall health of sea lions by depleting their energy reserves since the response intensity and duration is not likely to exceed the received threshold above 90dBA re 20 μPa_{RMS} ,where we would expect permanent impacts. It is not expected that this project will impact the prey base;

therefore depletion of energy reserves via a lack of a food source, is also not expected. Some of the same Steller sea lions may be exposed multiple times over the course of the project (some animals could be impacted all of the 18 days/season), but these actions are not likely to impair the overall health of those sea lions by depleting their energy reserves since the response intensity and duration is not likely to exceed the threshold where we would expect permanent impacts (above the received level of 90dBA re 20 μPa $_{RMS}$). Although we acknowledge that some individuals may suffer reduced fitness (from stress caused by the harassment) due to effects of the proposed action, we do not expect that a large proportion of Steller sea lions using the project site would suffer reduced fitness (that is, their response to the proposed action is not expected to reduce a sea lion's probability of surviving to age "x" and its probability of reproducing at age "x"), and therefore, we do not expect a subpopulation effect. In addition, any effects of the action on individual fitness would likely not exceed the natural variability in the subpopulation. Because we do not expect the action to have adverse consequences on the viability of the subpopulations that sea lions in the action area represent, we would not expect the eastern DPS population of Steller sea lions to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild. Given this and the likely response by Steller sea lions to the proposed project (*i.e.,* harassment as defined in this document), individual Steller sea lions are likely to be adversely affected by aircraft and possibly by human presence during proposed project activities, but as mentioned previously, the proposed project is not expected to appreciably reduce the eastern DPS of Steller sea lion's likelihood of surviving or recovering in the wild.

Although the biological significance of the animal's behavioral responses to renovation and maintenance activities remains unknown, exposure to aircraft and human presence are likely to disrupt one or more behavioral patterns that are essential to an individual animal's life history or to the animal's contribution to a population. For the proposed action, behavioral responses that result from aircraft and human presence and any associated disruptions, are expected to be temporary and are not likely to affect the reproduction, survival, or recovery of the Steller sea lion.

As mentioned previously, no impact on the population size or breeding stock of Steller sea lions is expected to occur. It is expected that all or a portion of the marine mammals hauled out on the island will depart and move into the water upon initial helicopter approaches (Crescent Coastal Research 2001). The movement to the water is expected to be gradual, as opposed to a stampede, due to the disturbance minimization approach technique (see *Terms and Condition 1*), small size of the aircraft, relatively quiet rotors, and behavioral habituation on the part of the animals, as helicopter trips continue throughout the day. During bouts of helicopter activity some animals may be temporarily displaced and either raft in the water or relocate to other haul out sites. Most animals are expected to return soon after helicopter activities cease for that day or shortly after the final day of renovation and maintenance activities for that trip (activities last up to 3 days). The long term effect on the island as a non-breeding haulout is expected to be negligible. As mentioned previously, NMFS annual survey data from 2000-2004 does not indicate a negative trend in use of the site during the last five years of Lighthouse restoration and maintenance activities (Table 4). In summary, the proposed project consists of the following activities that may contribute to take:

1) One to three day bouts of restoration activity, including helicopter landings that may cause taking, are expected to occur as many as 18 times (6 months, 1-3 day trips per month) per season during November 1- April 30. This activity will terminate approximately three years after the issuance of the NMFS permit and be replaced by a lesser degree of routine maintenance (expected to be no more than 2 maintenance trips per year).

2) Light maintenance will occur at least once, but no more than twice, in one year between November 1 and April 30. The light maintenance will occur in conjunction with restoration activities described in number 1.

3) Emergency maintenance may be necessary. If the emergency work occurs during the work window, it is expected that 0-4 incidents during the three year period may occur. If emergency work is necessary outside of the work window, from May 1-October 31, the SGRLPS will contact NMFS-SWR and USCG immediately and prior to, beginning any emergency as this action is not covered by this biological opinion.

We do expect that the action will result in the incidental harassment of Steller sea lions, as defined in the MMPA, even though mitigation measures will be in place. These measures will reduce the severity of the harassment, but will not resolve the likelihood of incidental harassment.

VII. CONCLUSION

After reviewing the best available scientific information and commercial information on the current status of the threatened Steller sea lion, the environmental baseline for the action area, the effects of the action proposed between November 1 and April 30; beginning in January 2010 until April 30, 2012, and the cumulative effects, it is NMFS' biological opinion that the St. George Reef Lighthouse Preservation Society's activities in waters off Del Norte County may adversely affect, but are not likely to jeopardize, the continued existence of Steller sea lions under NMFS' jurisdiction.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibits 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. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. 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 the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be implemented by the St. George Reef Lighthouse Preservation Society, U.S. Coast Guard, and NMFS-OPR in order for the exemption in section 7(o)(2) to apply. If either of these entities fails to implement and adhere to the terms and conditions of this Incidental Take Statement, the protective coverage of section 7(o)(2) may lapse.

A marine mammal species or population stock which is listed as threatened or endangered under the ESA is, by definition, also considered depleted under the MMPA. The ESA allows takings of threatened and endangered marine mammals only if authorized by section 101(a)(5) of the MMPA. Until the proposed action receives authorization for the incidental taking of marine mammals under section 101(a)(5)(D) of the MMPA, the incidental takes of marine mammals described below are not exempt from the taking prohibition of section 9(a), pursuant to section 7(o) of the ESA. The St. George Reef Lighthouse Preservation Society submitted an application for a Letter of Authorization in June, 2006 (deemed incomplete by NMFS), which was later modified in October, 2006 (deemed complete by NMFS). Issuance of an Incidental Harassment Authorization (not a Letter of Authorization-application received October 2006 from SGRLPS to NMFS-OPR), is anticipated by January 2010.

Amount or Extent of the Take Anticipated

The effects analyses contained in this biological opinion concluded that individual Steller sea lions may be exposed to and are likely to respond to, aircraft and human presence associated with the proposed renovation and maintenance activities.

This biological opinion concluded that Steller sea lions are likely to be exposed to and likely to respond to, helicopter and human presence in ways that constitute "harassment" for the purposes of the ESA. The closer these seals are to the activities and the greater the number of times they are exposed to these activities, the greater their likelihood of being exposed to and responding to, that exposure. Based on our analysis, NMFS does not expect any Steller sea lions to be injured or killed as a result of exposure to the proposed action (refer to the *Effects of the Action* section of this biological opinion for further discussion).

The estimated six (and as many as 17 on Sunday) landings, at relatively short intervals, on a given restoration day may be considered as one bout of "taking" with variable impacts on each landing. For the purposes of this biological opinion and Incidental Take Statement, we assumed that 100% of the animals hauled out at St. George Reef Lighthouse might be exposed to renovation and maintenance activities (including helicopter and human presence), and this represents the number of times a sea lion might be "taken" in the form of harassment. Table 6 provides the estimate of anticipated exposures (Column 3 of Table 6) based on the estimated number of individuals expected to be taken (Column one of Table 6) on an annual basis using the estimate for population variance in the absence of actual count data detailed in the *Exposure Analysis* and *Integration and Synthesis* Sections). This annual estimate is likely a gross overestimate of the number of animals expected to be hauled out at St. George Reef Lighthouse, during the proposed work window. The estimated 172 individual animals expected to be taken by harassment does not take into account that multiple individuals may be exposed more than once during each day and it is expected that some of the same individuals will be impacted over the 3-day work window (as demonstrated in the Table 6 exposure estimates). Should emergency work occur during the work window, it is anticipated that 0-4 incidents (Table 6) may occur during the 3-year proposed project period. The minimum population estimate for the eastern DPS of Steller sea lions is 44,404, therefore this project may incidentally harass 0.4% of the total minimum population, annually, and this includes emergency work within the proposed 3-day work window; these estimates would be slightly higher should emergency work occur in addition to the 3-day work trip during the work window.

It is estimated that approximately 172 individual Steller sea lions could be potentially affected by Level B behavioral harassment over the course of the proposed IHA. Estimates of the numbers of marine mammals that might be affected are based on consideration of the number of marine mammals that could be disturbed appreciably by approximately 30 hours of aircraft operations during the course of the proposed activity. This estimate is also based on pinniped survey counts conducted by Crescent Coastal Research on Northwest Seal Rock in 1997, 1998, 1999, and 2000 (September, October, and April; see Table 5) (Crescent Coastal Research 2001), calculated for the average monthly abundance, then multiplied by six to account for the six months of the proposed restoration project between November 1 and April 30. All of the potential takes are expected to be Level B behavioral harassment only. Because of the mitigation measures that will be required and the likelihood that some pinnipeds will avoid the area during restoration and maintenance activities, no injury or mortality to pinnipeds is expected or requested.

Effect of Take

In the accompanying Biological Opinion, NMFS has determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

NMFS believes the following reasonable and prudent measures are necessary and appropriate for NMFS-OPR and the USCG to minimize the impacts of incidental take on threatened and endangered species:

1. Require that the St. George Reef Lighthouse Preservation Society shall implement measures to reduce the probability of exposing Steller sea lions to renovation and maintenance activities during the work window (November 1 to April 30) beginning January 27, 2010 and ending April 30, 2012.

2. Require that the St. George Reef Lighthouse Preservation Society shall implement a monitoring program that allows the U.S. Coast Guard and NMFS to evaluate the assumptions contained in this Biological Opinion and that underlie this incidental take statement.

3. Require that the St. George Reef Lighthouse Preservation Society shall immediately cease lighthouse restoration and maintenance activities should an injured or dead Steller sea lion be found in the vicinity of Northwest Seal Rock; and that injury or death is attributed, by NMFS, to lighthouse construction or maintenance-related activities.

4. Require that the St. George Reef Lighthouse Preservation Society shall submit a report that evaluates its mitigation measures and reports the results of its monitoring program.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Endangered Species Act of 1973, as amended, the agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements, as required by the section 7 regulations (50 CFR 402.14(i)).

In addition to implementing the proposed mitigation measures NMFS-OPR and the USCG should, as detailed in the Description of the Action section of this Biological Opinion, include the following Terms and Conditions to implement Reasonable and Prudent Measure Number 1:

1A. *Avoidance of a stampede, harassment, or other impacts to other islands.* The helicopter shall maintain a 2.0 mile diameter "safety zone," when possible without endangering the pilot and passengers, while in transit, to avoid impacts to other Steller sea lions hauled out at other islands within the St. George Reef island chain, including the rookery at Southwest Seal Rock. The helicopter shall avoid rapid and direct approaches by approaching Northwest Seal Rock at a relatively high altitude (e.g., 800-1,000 ft or 244-305 m). Before the final approach, the helicopter shall circle lower, and approach from the area where the density of Steller sea lions is lowest. If, for any safety reasons (e.g., wind conditions of visibility) such helicopter approach and timing techniques cannot be achieved, the SGRLPS must abort the restoration and maintenance session for that day.

1B. *Fuel spills.* Should a fuel spill occur, be aware of the location and application of fuel spill kits and use them when necessary and use best management practices when using fuel.

1C. *Secure cargo.* Ensure that cargo is secure so items are not inadvertently lost from external loads.

1D. *Barricade platform door.* Ensure that the door to the Lighthouse's lower platform remains closed and barricaded at all times.

1E. *Appropriate conduct when in the vicinity of marine mammals.* Provide instructions to SGLRPS members, the restoration crew, and if applicable, to tourists, on appropriate conduct when in the vicinity of hauled out marine mammals. The SGRLPS member, restoration crew, and if applicable, tourists, shall avoid making unnecessary noise while on Northwest Seal Rock and must not view Steller sea lions around the base of the Lighthouse.

The following Terms and Conditions implement Reasonable and Prudent Measure Number 2:

2A. *Monitoring.* A biologist shall be present throughout restoration and maintenance activities. The biologist should be on the first flight out to the Lighthouse and either remain overnight throughout restoration activities or take the last flight out and first flight back each subsequent day of activities. The biologist and monitoring protocols are subject to approval by NMFS. A skilled aerial photographer shall complete a photographic survey of Northwest Seal Rock to compare marine mammal presence pre- and post-restoration. Photographs shall be taken at an altitude greater than 300 m (984 ft) during the first arrival flight to Northwest Seal Rock and during the last departure flight from Northwest Seal Rock.

1) At least for the first year of work, the biologist shall be present during all workdays at the Lighthouse. This requirement may be modified depending on the results of the first year of monitoring.

2) *Report any incident.* An incident is an occurrence that is not expected in the usual course of events and that has had, or could have had, adverse effect on human or wildlife safety.

2B. *Schedule of submission of Interim Monitoring Reports to NMFS.* Interim monitoring reports shall be submitted to NMFS-SWR on a monthly basis during the work window. In addition, a comprehensive Draft Interim Monitoring Report shall be submitted to NMFS-SWR at the conclusion of and within 90 days of, the work window for that year. A Final Interim Monitoring Report must be submitted to the SWR Regional Administrator within 30 days after receiving comments from the SWR Regional Administrator on the Draft Interim Report. Once comments are received, a Final Interim Report must be submitted to the Regional Administrator. If no comments are received from NMFS, the Draft Interim Monitoring Report will be considered to be the final report. Information to be included in the reports is detailed in the Incidental Harassment Authorization Permit requirement for this action.

The following Terms and Conditions implement Reasonable and Prudent Measure Number 3:

3A. *Report any injured or dead animal.* If an animal has died or become injured in the vicinity of the Northwest Seal Rock all operations must cease and officials must immediately notify the SWR Stranding Coordinator at 562-980-4017 and the Marine Mammal Center at 707-465-6265. Officials must also contact the SWR Protected Resources Division at 562-980-3232 before resuming operations to determine if the death was attributed to project activities.

The following Terms and Conditions implement Reasonable and Prudent Measure Number 4:

4A. *Schedule of submission of Final Monitoring Report to NMFS.* A draft Final Monitoring Report shall be submitted to NMFS no later than 90 days after the project is completed in 2012. A Final Monitoring Report must be submitted to the SWR Regional Administrator within 30 days after receiving comments from the SWR Regional Administrator on the Draft Monitoring Report. Once comments are received, a Final Monitoring Report must be submitted to the SWR Regional Administrator. If no comments are received from NMFS, the Draft Monitoring Report will be considered to be the final report. Information to be included in the reports is detailed in the Incidental Harassment Authorization Permit requirement for this action.

CONSERVATION RECOMMENDATIONS

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

The following conservation recommendations would provide information for future consultations involving the issuance of marine mammal permits that may affect ESA-listed pinnipeds, specifically Steller sea lions, as well as reduce harassment related to research activities:

1. Investigate the use of a remotely operated video camera to document biological information such as species and times of no disturbance/times of disturbance, including: estimates of actual take, estimated time animals take to return to haul out site, the number of stampedes, and/or any mortalities.
2. Observe flight and approach paths described; Alternative flight paths may be used if listed distances from wildlife are maintained.
3) Avoid flying over concentrations of wildlife.

4) Where the flight paths are such that a choice exists, approach wildlife concentration sites from down-wind to reduce any disturbance from noise, exhaust fumes, and dust.
5) Fly, land, or position cargo in a way that will not result in the significant modification of the habitat or population of any native animal.
6) Avoid "banking," particularly in helicopters, as this significantly increases the amount of noise generated.
7) Consider noise impacts if flying under low clouds when near wildlife concentrations.
8) Restrict fueling and maintenance activities to designated areas in the field or at the stations.
9) Research and adopt any other practical means of, minimizing the potential environmental impacts of aircraft activities.

REINITATION NOTICE

This concludes formal consultation on the U.S. Coast Guard's and NMFS' proposal to permit the St. George Reef Lighthouse Preservation Society to maintain the St. George Reef Lighthouse as a Private Aid to Navigation and undertake maintenance and renovation activities from November through April, beginning January 2009 to April 30, 2012. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or 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. In instances where the amount or extent of authorized take is exceeded, the U.S. Coast Guard and NMFS must immediately request reinitiation of section 7 consultation.

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