STATUS REVIEW OF THE EASTERN DISTINCT POPULATION SEGMENT OF STELLER SEA LION (*Eumetopias jubatus*)

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National Oceanic and Atmospheric Administration

Cover photo: Steller sea lion (*Eumetopias jubatus*) adult female with pup photographed at Yasha Island in Southeast Alaska on August 23, 2006. Photo credit: L.A. Jemison, Alaska Department of Fish and Game. Research conducted under NOAA Permit No. 358-1769.

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EXECUTIVE SUMMARY

On June 29, 2010, the National Marine Fisheries Service (NMFS) provided notice it was initiating the first 5-year status review of the eastern Distinct Population Segment (DPS) of Steller sea lion, listed as "threatened" under the Endangered Species Act (ESA), and opened a public comment period (75 FR 37385, June 29, 2010; 75 FR 38979, July 7, 2010). A 5–year status review is a periodic process conducted to ensure that the listing classification of a species is accurate and is based on the best available scientific and commercial data. During the ensuing comment period, NMFS received two petitions to delist this DPS: from the States of Washington and Oregon; and from the State of Alaska. NMFS released a Draft Status Review of the eastern DPS on April 18, 2012. Concurrently, NMFS published a proposed rule to remove this DPS from the List of Endangered and Threatened Wildlife (77 FR 23209). NMFS requested public comment on these documents. Further, NMFS obtained peer review on the draft Status Review. The public comment and peer review ended on June 18, 2012. This status review has been revised in response to those comments.

This Status Review considers the biological (demographic) criterion and the threats-based ESA listing-factor criteria set forth in the 2008 Recovery Plan for the Steller Sea Lion, Eastern and Western Distinct Population Segments (Recovery Plan) (NMFS 2008), as well as the five listing factors included in section 4(a) of the ESA, which NMFS must consider when making a determination whether a species should be removed from the list of threatened species (16 U.S.C. 1533(c)(2)(B)).

As part of this status review, NMFS reviewed and evaluated the best scientific and commercial data available. NMFS considered whether either the portion of the population breeding in California or the portion of the population within the California Current System met the definition of a DPS. NMFS determined that they did not. NMFS therefore concluded that the evaluation of the status of the eastern DPS, as currently recognized under the ESA, is appropriate.

Demographic data and demographic recovery criteria: NMFS evaluated data on population status and trend summarized in the Recovery Plan (NMFS 2008) as well as new survey data that became available after the finalization of that plan. While the Recovery Plan did not include demographic criteria for subareas within the eastern DPS, we provide trend estimates for approximately the past 3 decades in each subarea within the breeding range of the eastern DPS of Steller sea lion - Southeast Alaska, British Columbia, Washington, Oregon and California. In the Recovery Plan, NMFS (2008) specified that the eastern DPS would be considered for delisting when "…[t]he population has increased at an average annual growth rate of 3% per year for 30 years." The best available information indicates the eastern DPS has increased from an estimated 18,040 animals in 1979 to an estimated 70,174 (90% CI = 61,146 – 78,886) animals in 2010. The estimated (posterior model and based on pup counts) annual population growth rate from 1979-2010 for the eastern DPS was 4.18% (90% CI = 3.71% - 4.62%). Based on these data, the probability that the growth rate exceeded the required 3% was 0.9999. Based on non-pup counts, the estimated trend for the eastern DPS overall is 2.99% with a 90% confidence interval of 2.62% - 3.31% (Johnson and Gelatt 2012). Thus, information on trends based on estimates of population abundance based on pup counts, and information about trends based on non-pup counts, both indicate that the population has realized a sustained increase. NMFS concludes that the best available scientific information indicates that the demographic criterion specified in that Recovery Plan has been met.

NMFS shares concerns raised by commenters about the lack of recolonization at the southernmost portion of the range, poor performance at the Farallon Islands, and the lack of increase in the nonpup portion of the eastern DPS in California overall. The reasons for this are not clear. However, NMFS

concludes that the demographic pattern in parts of California is likely a response to a complex suite of factors including climate-induced northward range shift, competition for space on land (haulouts and rookery sites), possibly competition for prey with other pinniped species, and possibly contaminants or other human activities. NMFS (2008) recognizes that it is not unusual to have poorer performance at the ends of a species' range. This pattern in the southern part of the range does not, by itself, cause this species to be in danger of extinction now or in the foreseeable future. However, one of the key patterns to monitor for post-delisting is whether the area in which there is poor performance begins to expand northward (Goodman 2006).

Listing factors and related recovery criteria and recovery actions: NMFS evaluated information contained in the Recovery Plan as well as newly available data for each of the following threat factors and the related criteria set forth in the Recovery Plan:

- The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range
- Overutilization for Commercial, Recreational, or Educational Purposes
- Diseases, Parasites, and Predation
- The Inadequacy of Existing Regulatory Mechanisms
- Other Natural or Anthropogenic Factors Affecting Its Continued Existence

After a review of potential existing, residual, and/or emerging threats under each of these factors, NMFS concludes the ESA listing factor recovery criteria specified in the Recovery Plan have been met, and the eastern DPS of the Steller sea lion is not likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. Residual and emerging threats may adversely affect eastern DPS Steller sea lions in the future at various locations in the range. These include climate warming (especially in the southern part of the range) (NMFS 2008), ocean acidification, toxic substances, disease, entanglement, disturbance, illegal shooting, and fishery interactions. NMFS concludes that these threats do not appear to be having population level effects sufficient to keep this population from continuing to recover and we do not have information indicating they will cause population level effects in the foreseeable future.

NMFS also concludes that the recommended Recovery Plan actions are in place or have otherwise been met through current programs, projects, and regulatory activities of existing legislation (e.g., the Marine Mammal Protection Act (MMPA)). In particular: mechanisms are in place to monitor and respond to disease outbreaks via existing Marine Mammal Standing Networks; outreach programs exist; a Steller sea lion coordinator is on staff at NMFS; and NMFS and the State of Alaska reached agreement that the State of Alaska had adequately described and addressed the eastern DPS-related Recovery Plan recommendation regarding a description of its fishery management plans relevant to the range of the eastern DPS, actions the State will take to minimize the take of Steller sea lions, and how its future actions will comport with the MMPA.
A key action recommended by NMFS (2008) in the Recovery Plan was the development of a Post Delisting Monitoring Plan (PDMP) to guide monitoring activities for 10 years post delisting. NMFS, working with state, tribal, and other partners, has developed a PDMP (see Appendix 3).

Status Review Conclusion: After a detailed review of the best available information, NMFS concludes the biological (demographic) criterion and ESA listing factor recovery criteria set forth in the Recovery Plan for the eastern DPS of the Steller sea lion have been met. The analysis of possible threats under the ESA listing factors indicates none are likely to cause the eastern DPS of Steller sea lion to be likely to become

endangered in the foreseeable future throughout all or a significant portion of its range. NMFS concludes that, in the event that the eastern DPS is delisted, the MMPA and other laws can provide the protection necessary to ensure the continued survival and recovery of the eastern DPS of Steller sea lions for the foreseeable future.

1 INTRODUCTION AND BACKGROUND

1.1 Introduction

The National Marine Fisheries Service (NMFS) prepared this document to: a) evaluate the current status of the eastern Distinct Population Segment (DPS) of the Steller sea lion (*Eumetopias jubatus*); and b) assess past, present, and likely future threats to this species. As part of this review, NMFS evaluated whether the best scientific and commercial data available indicate that this species meets the definition of a threatened or endangered species. Preparation of the Status Review was announced with a notice in the Federal Register (75 FR 37385, June 29, 2010) and shortly thereafter (August 30, 2010) two petitions were submitted by the states of Washington/Oregon and Alaska to remove the eastern DPS of Steller sea lions from the list of threatened and endangered species under the Endangered Species Act (ESA) (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/edps/status.htm). Following receipt of these petitions, NMFS continued with preparation of the status review. NMFS will decide whether to propose changes to the ESA listing status of this taxon after consideration of this status review, a review of other relevant biological and threat information not included herein, consideration of efforts being made to protect the species, and a review of relevant laws, regulations, and policies. NMFS will announce this decision in the *Federal Register* and post it on the NMFS website (refer to: http://www.nmfs.noaa.gov/pr/species/).

NMFS and others have recently released documents that provide and synthesize a large amount of information concerning the life history, current status, and ecology of the Steller sea lion (e.g., Department of Fisheries and Oceans Canada (DFOC) 2011; NMML 1995; NMFS 2008, 2009a, 2010c). Many of these documents also provide information about kinds, levels, and significance of impacts from various human and naturally-occurring threats to this species. NMFS refers readers to these documents for details beyond the level provided in this status review.

The conclusions within this document do not represent a decision by NMFS on whether this taxon should be removed from the list of threatened and endangered species.

1.2 ESA-Related Background

Section 3 of the ESA defines a “species” as “any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” Section 3 of the ESA further defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range” and a threatened species as one “which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” Thus, we interpret an "endangered species" to be one that is presently in danger of extinction. A "threatened species," on the other hand, is not presently in danger of extinction, but is likely to become so in the foreseeable future (that is, at a later time). In other words, the primary statutory difference between a threatened and endangered species is the timing of when a species may be in danger of extinction, either presently (endangered) or in the foreseeable future (threatened). "

Section 4 of the ESA provides the basis for determining a species status under the Act. Under the ESA, a listing determination can address a species, subspecies, or a DPS of a vertebrate species (16 U.S.C. 1532 (16)). Under section 4(a)(1) of the ESA, NMFS must determine whether a species is threatened or endangered as a result of any one or a combination of the following factors:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;
(B) over-utilization for commercial, recreational, scientific, or educational purposes;
(C) disease or predation;
(D) the inadequacy of existing regulatory mechanisms; or
(E) other natural or manmade factors affecting its continued existence.

The agency determines whether or not a species should be listed solely on the basis of the best scientific and commercial data available, after conducting a review of the status of the species and taking into account efforts made by any state or foreign nation to protect such species.

Regulations implementing the ESA provide the rules and criteria for revising the Lists of Endangered and Threatened Wildlife and Plants and, where appropriate, designating or revising their critical habitats (50 CFR 424). The implementing regulations also contain the factors to consider for delisting a species (50 CFR 424.11(d)) which are the same five factors that the agency must consider when determining whether to list a species, as set forth above. A species may be delisted for one or more of the following reasons: the species is extinct; the species has recovered and is no longer endangered or threatened; or investigations show the best scientific or commercial data available when the species was listed, or the interpretation of such data, were in error (50 C.F.R. 424.11(d)(1)-(3)).

1.3 ESA Listing History

On November 21, 1989, the Environmental Defense Fund, joined by 17 other organizations, petitioned NMFS to publish an emergency rule listing the Steller sea lion as an endangered species under the ESA and to begin rulemaking to make such listing permanent. On April 5, 1990 (55 FR 12645) NMFS issued an emergency interim rule that listed the Steller sea lion as a threatened species under the ESA, established protective interim measures, and requested public comment. In this emergency rule, NMFS summarized that "… the number of …sea lions observed on certain rookeries in Alaska declined by 63% since 1985 and by 82% since 1960. The declines are spreading to previously stable areas and accelerating…The cause(s) of these declines have not been determined..." (55 FR 12647; see also summary in 55 FR 49204). NMFS announced the implementation of the following emergency conservation measures in an attempt to aid recovery: 1) Initiation of a program to make monthly estimates of the level of incidental killing of Steller sea lions in certain fisheries by use of data from fishery observer programs with estimates of fishing effort; 2) Aggressive enforcement of the emergency regulation; 3) Establishment of a recovery program, including the establishment of a recovery team; 4) Prohibition of shooting near or at Steller sea lions; 5) Establishment of buffer zones around certain rookeries (none of the protected rookeries were within the breeding range of the eastern DPS); and 6) Establishment of a quota for lethal incidental take in fisheries west of 141° W longitude. NMFS corrected errors to this rule two weeks later (55 FR 17442). On April 10, 1990 (55 FR 13488), the Fish and Wildlife Service (FWS) took emergency action to add the Steller sea lion to the List of Endangered and Threatened Wildlife for 240 days. On July 20, 1990 NMFS took two actions related to protecting the Steller sea lion under the ESA: 1) It published a proposed rule to list the species as a threatened species under the ESA (55 FR 29793); and 2) NMFS issued (55 FR 29792) an advanced notice of proposed rulemaking that requested public comments to assist its efforts to designate critical habitat and to develop separate, more comprehensive, regulations to protect the species.

On November 26, 1990 (55 FR 49204) NMFS published a final rule to list the Steller sea lion as a threatened species under the ESA (a technical amendment to the rule was published on November 18, 1991: 56 FR 58184). On December 4, 1990, FWS published a final rule to make permanent the addition of

the Steller sea lion to the List of Endangered and Threatened Wildlife (55 FR 50005). In the Final Rule to list, NMFS summarized that it was listing this species:

> because of significant declines in the Steller sea lion population. The number of Steller sea lions observed on certain rookeries in Alaska has declined by 63% since 1985 and by 82% since 1960. Declines are occurring in previously stable areas. Significant declines have also occurred on the Kuril Islands, USSR.

At the time of this listing, NMFS concluded that:

> NMFS must consider the status of the entire species, including areas where Steller sea lion abundance is increasing or not declining significantly, because there is not sufficient information to consider animals in different geographic regions as separate populations.

In 1997, based on demographic and genetic dissimilarities, NMFS identified two DPSs of Steller sea lions under the ESA: a western DPS and an eastern DPS (May 5, 1997, 62 FR 24345). Due to persistent decline, the western DPS was reclassified as endangered, while the increasing eastern DPS remained classified as threatened. FWS made this revision to the List on June 5, 1997 (62 FR 30772). Figure 1 depicts the geographical delineation of these two DPSs.

Federal Register documents for the Steller sea lion are publicly available: http://www.alaskafisheries.noaa.gov/protectedresources/stellers/default.htm.

1.4 Steller Sea Lion Protective Measures and Critical Habitat Designation

NMFS established (50 CFR 227.12) protective measures for Steller sea lions "similar to those in the [1990] emergency interim rule" (55 FR 49209), including: 1) prohibiting shooting at or near Steller sea lions; 2) prohibiting, with limited exceptions, the entry of vessels within 3 nm of certain rookeries and the approach of individuals on land within 0.5 miles (0.8 km) or within sight of a listed rookery in the Gulf of Alaska and the Bering Sea/Aleutian Islands area; and 3) limited allowable annual take of Steller sea lions incidental to commercial fisheries to 675 animals in Alaskan waters and adjacent areas of the Exclusive Economic Zone (EEZ) west of 141 W longitude.

Following listing, NMFS implemented further measures under the Magnuson Fishery Conservation and Management Act to reduce impacts on Steller sea lions, their prey and their habitat. Since these initial post-listing protection measures, NMFS has modified protection measures for Steller sea lions multiple times (see summary of history of protection measures in NMFS 2010c). Many of the protections put into place since 2000 are measures intended to seasonally and spatially disperse fishery efforts and removals. These measures were primarily within the breeding range of the western DPS but include measures within areas in which individuals from the eastern DPS may feed.

Section 3 of the ESA clarifies that "[T]he term "critical habitat" for a threatened or endangered species means—

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and

> (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). At the time of designation, Steller sea lions were listed as a single species (not two DPSs) and, thus, the designation includes sites within the breeding range of both the eastern DPS (Figure 2) and the western DPS (Figure 3).

In the final rule that designated critical habitat for Steller sea lions (58 FR 45269), NMFS summarized that:

> The physical and biological habitat features that support reproduction, foraging, rest, and refuge are essential to the conservation of the Steller sea lion. For the Steller sea lion, essential habitat includes terrestrial, air and aquatic areas.

With respect to terrestrial critical habitats, NMFS differentiated between rookeries and haulouts. Rookeries are "…defined as those sites where males defend a territory and where pupping and mating occurs on a consistent annual basis." NMFS clarified that haulouts are "areas used for rest and refuge by all ages and both sexes of sea lions during the non-breeding season and by non-breeding adults and subadults during the breeding season." NMFS also recognized that sites used as rookeries during the breeding season may be used as haulouts at times of the year other than the breeding season. Citing Mate (1973), NMFS (58 CFR 45269) noted that the suitability of a particular area as a rookery or haulout is determined by factors such as "…substrate, exposure to wind and waves, the extent and type of human activities and disturbance in the region, and proximity to prey resource."

In identifying aquatic habitats as part of critical habitat, NMFS specifically highlighted several components of such habitats: nearshore waters around rookeries and haulouts, traditional rafting sites, food resources, and foraging habitats. NMFS designated critical habitat that includes marine waters within 20 nautical miles of rookeries and haulouts within the breeding range of the western DPS and within three special aquatic foraging areas in Alaska (50 CFR 226.202, a and c, respectively). NMFS designated critical habitat that includes marine waters within 3,000 feet of rookeries and haulouts in California and Oregon, and within the Alaska portion of the breeding range of the eastern DPS (50 CFR 226.202 a and b).

Figure 1. Range and breeding rookeries of the Steller sea lion and delineation at 144°W longitude between the western and eastern distinct population segments.

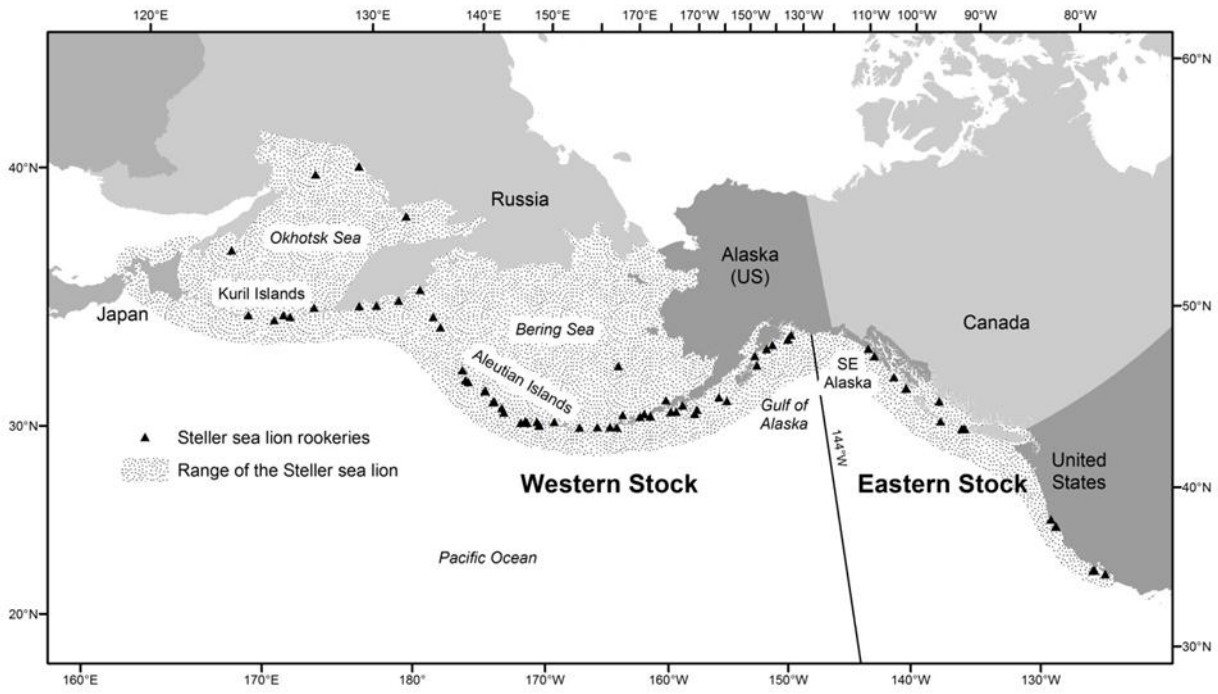


Figure 2. Map depicting designated Steller sea lion critical habitat east of 144°W longitude (50 CFR 226.202). See text and regulations for full description of critical habitat areas including aquatic zones and air zones associated with terrestrial critical habitat.

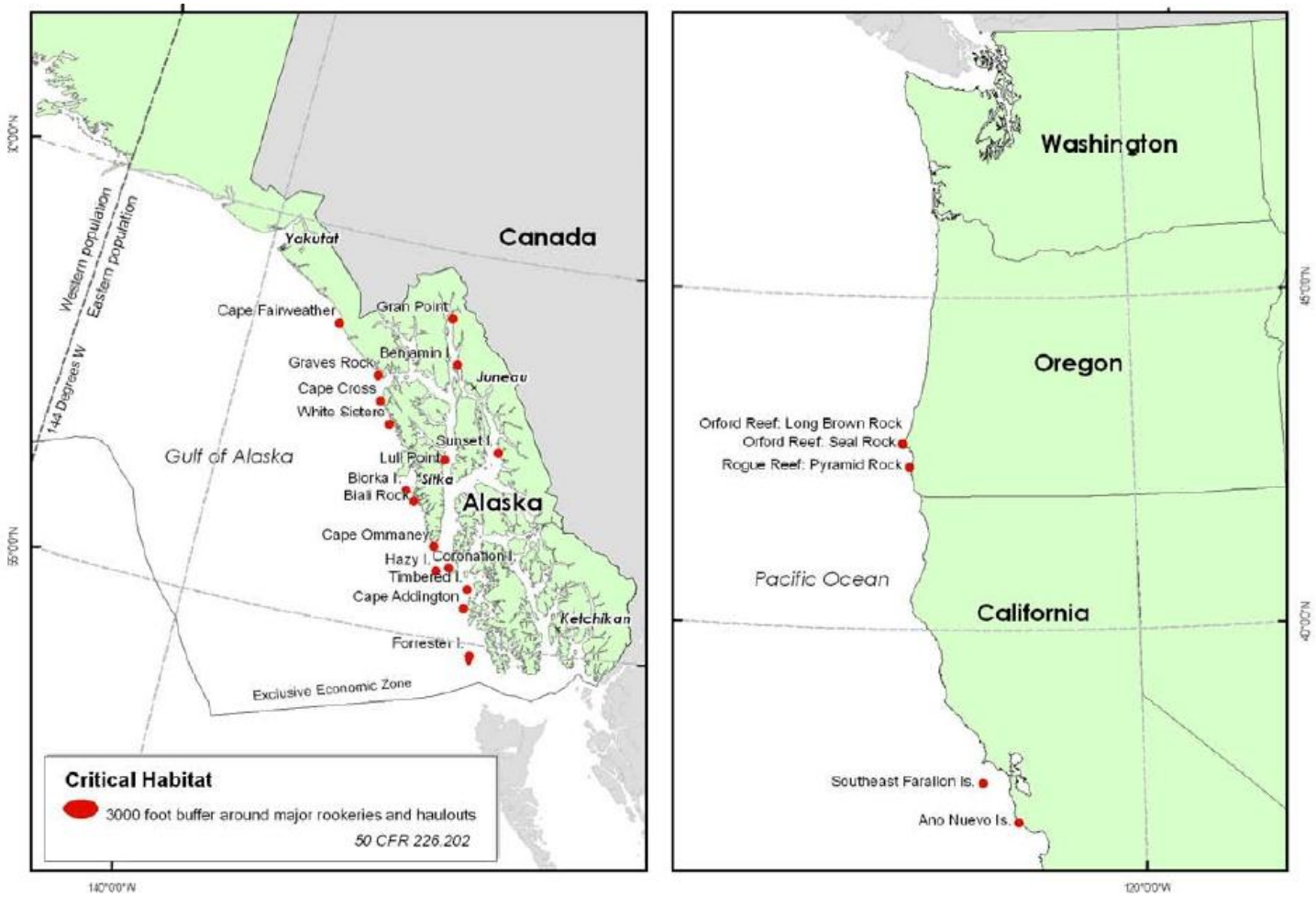
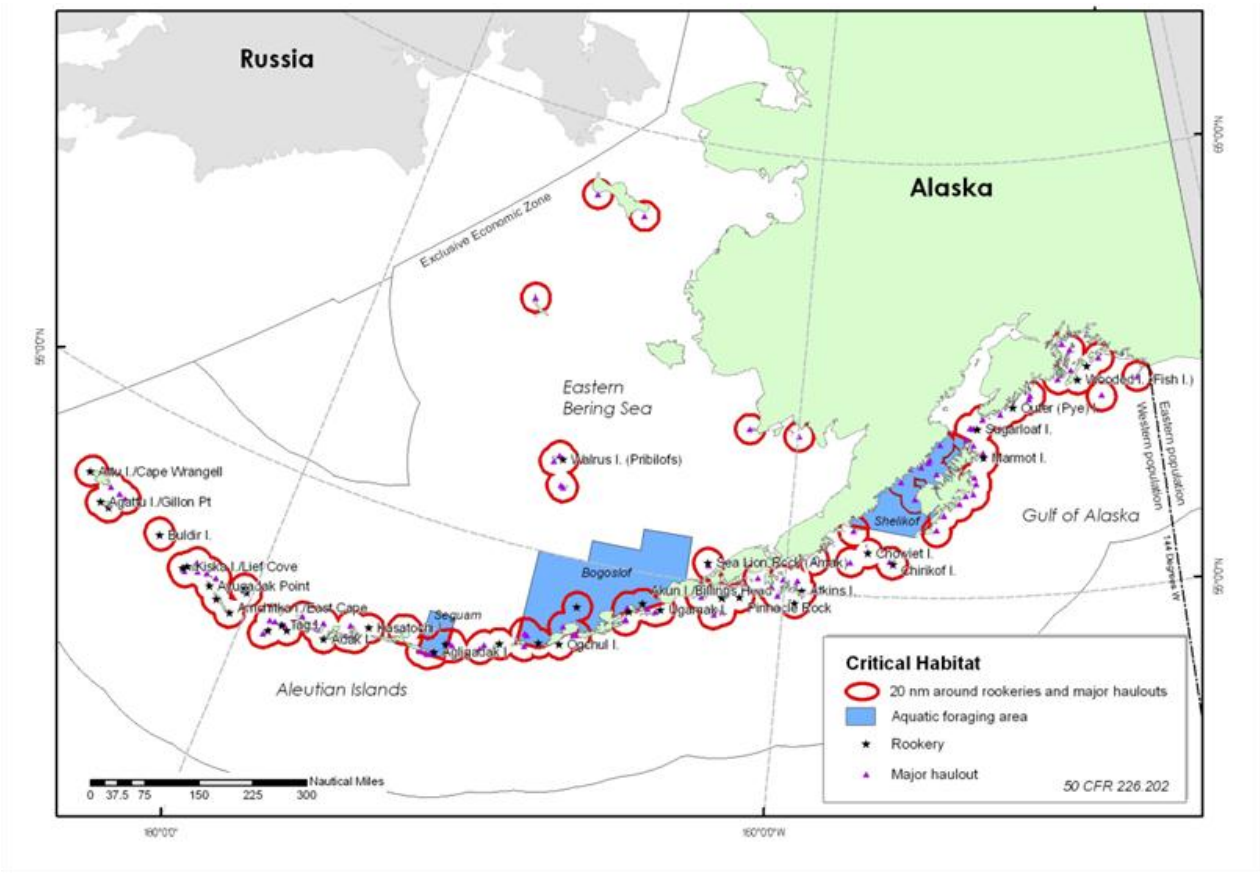


Figure 3. Map depicting designated Steller sea lion critical habitat west of 144°W longitude (50 CFR 226.202). See text and regulations for full description of critical habitat areas including terrestrial, aquatic zones, and air zones associated with haulouts and rookeries, as well as the three special aquatic foraging zones.



1.5 Recovery Planning, Criteria, and Priority

The eastern DPS of Steller sea lion has a recent, final, and approved Recovery Plan that contains objective, measurable criteria upon which to base decisions about its ESA listing status (NMFS 2008).

1.5.1 Recovery Planning

NMFS has formally undertaken recovery planning for Steller sea lions for over two decades including recovery planning specifically for the eastern DPS.

In March, 1990, NMFS convened a Steller Sea Lion Recovery Team (see summary in 55 FR 49204). This team drafted the first Recovery Plan which was released for public review and comment on March 15, 1991. The Final Steller Sea Lion Recovery Plan was finalized in December 1992 and released on January 7, 1993 (58 FR 3008). Because the entire species was listed as threatened under the ESA at that time, this recovery plan provided recovery tasks, reclassification criteria and delisting criteria for the species as a whole.

In 2001, NMFS assembled a new Steller Sea Lion Recovery Team (Team) to assist NMFS in revising and updating the Recovery Plan. NMFS released a Revised Final Recovery Plan for Eastern and Western Distinct Population Segments of the Steller Sea Lion (Recovery Plan) (NMFS 2008).

With respect to the status of the eastern DPS of Steller sea lion, the Recovery Plan (NMFS 2008: xiii) noted:

> …no threats to continued recovery were identified for the eastern DPS. Although several factors affecting the western DPS also affect the eastern DPS (e.g., environmental variability, killer whale predation, toxic substances, disturbance, shooting), these threats do not appear to be at a level sufficient to keep this population from continuing to recover, given the long term sustained growth of the population as a whole. However, concerns exist regarding global climate change and the potential for the southern part of the range (i.e., California) to be adversely affected. Future monitoring should target this southern portion of the range… The eastern DPS has been recovering…since the late 1970s and should be considered for removal from the List.

The Recovery Plan identified two recovery actions for the eastern DPS: 1) Monitoring; and 2) Protection from other natural or anthropogenic factors and administration of the recovery program. The key monitoring task identified in the Recovery Plan was the development of a post delisting monitoring plan which would guide monitoring activities for 10 years post delisting. NMFS (2008) stated that the objectives of this monitoring plan were to ensure that necessary recovery actions remain in place and that NMFS could confirm that there are no threats to the population's continued existence. NMFS has developed such a monitoring plan (Appendix 3). The specific task identified under the second general recovery action for the eastern DPS was the initiation of a status review to determine whether to delist this DPS. The current document is that status review.

1.5.2 Existence and Adequacy of Recovery Criteria

In the revised Recovery Plan, NMFS (2008) identified specific objective and measurable recovery criteria that comprise the core standards upon which to base decisions about whether the eastern DPS of Steller

sea lions should be delisted. These criteria were developed with the assistance of the Steller Sea Lion Recovery Team. NMFS (2008a:VII-2) clarified that:

> The ESA requires that recovery plans, to the maximum extent practicable, incorporate objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the List (50 CFR 17.11 and 17.12). The recovery criteria comprise the core standards upon which the decision to delist a species will be based.
>
> To remove the eastern DPS of Steller sea lion from the List, NMFS must determine that the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Any new factors identified since listing must also be addressed in this analysis to ensure that the species no longer requires protection under the ESA.
>
> Recovery criteria must include the elimination of threats to the species as well as measures of demographic health. Both sets of criteria serve as checks on one another – one set of criteria requires evidence that the threats to Steller sea lions have been eliminated or controlled and are not likely to recur (listing factor criteria), and the other set of criteria requires evidence that the population status of Steller sea lions has improved in response to the reduction in threats (biological criteria).

During the process of developing the Recovery Criteria, the Recovery Team recommended, and NMFS contracted for, a population viability analysis (PVA) (Goodman 2006, Appendix to NMFS 2008) to estimate the risk of extinction of the two DPSs based on recovery scenarios. However, the Recovery Plan clarifies that while the PVA analysis and the process of going through the analysis helped the Recovery Team focus on development of the criteria, the biological recovery criteria were not developed directly from the PVA. Rather, a weight of evidence approach was adopted. The Recovery Plan specified that a weight of evidence approach included: 1) the review and synthesis of all available biological and ecological information; 2) the determination of key demographic parameters and other factors that would indicate the species is no longer at risk of extinction, including the performance of the population over a substantial time period and a demonstration of a reduction of threats as identified in the Recovery Plan (NMFS 2008).

Before being completed, the draft Recovery Plan underwent independent peer review (undertaken through the Center for Independent Experts) and was also available for public comment. The results of these reviews are publically available: (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/recovery.htm). In general, the peer review comments indicated that the weight of evidence approach to recovery criteria was appropriate and supported the recovery criteria for the eastern DPS.

Based on the rationale presented in the 2008 Recovery Plan (NMFS 2008), as well as our review of the aforementioned recovery criteria, peer reviews, and new information that has become available since NMFS issued the 2008 Recovery Plan, we conclude that the recovery criteria are based upon, and/or are consistent with, consideration of the best available and the most up-to date information on the biology of the species and its habitat. The recovery criteria also address all of the five listing factors that are

relevant to the species and provide an appropriate framework in which to consider new information regarding existing or new threats.

The Recovery Plan noted: "the Eastern DPS of Steller sea lion will be considered for delisting if all the following conditions are met:

1. The population has increased at an average annual growth rate of 3 percent per year for 30 years.

2. The ESA listing factor criteria are met" (NMFS 2008:viv).

NMFS provided specific delisting criteria for some of the listing factors (see Section 4). NMFS (2008:VII-4) clarified that "It is imperative that threats to the species be controlled prior to removal from the List. This includes all threats identified at the time of listing, as well as any new threats…" The specified recovery criteria were developed to ensure that threats to population viability have been eliminated and that there is strong evidence of demographic health. Such strong evidence was determined to include an average annual growth rate of 3%/yr for 30 years. The requirement for a sustained period of overall increase in abundance provides confidence, not only that the trend is sustained, but also that the population is resilient, at least to the level of environmental change that has occurred over that time frame (30 years).

We discuss the delisting criteria in more detail in Section 4, below.

1.6 Status Review History and Receipt of Petitions to Delist

To determine whether a change in classification to endangered status was warranted, NMFS initiated a status review of Steller sea lions on November 1, 1993 (58 FR 58318). NMFS (62 FR 24346) determined that:

> To complete the status review…population viability analyses…were only necessary for the western population segment, because the eastern population segment is likely to maintain current abundance for the foreseeable future.

This status review was completed in February 1995 (NMML 1995). Based on the review, NMFS concluded that genotypic dissimilarities, as well as associated distributional, population response, and phenotypic information, indicated that there were two DPSs of Steller sea lions, including an eastern DPS, the breeding range of which extended from southeastern Alaska to parts of California. Several key conclusions from this review are relevant to the eastern DPS (NMML 1995:ii-iii):

> The United States (U.S.) population of Steller sea lions…, which numbered close to 192,000 adults and juveniles (non-pups) 30 years ago, declined by 64% to less than 69,100 non-pups by 1989…Most of this decline occurred in southwestern Alaska…Numbers in southeast Alaska, Oregon, and northern California remained stable, although declines have continued in central California…Southeast Alaska and Oregon pup production also remained stable.
>
> The eastern stock is expected to remain stable or increase for the foreseeable future if past population trends continue…

> …After 100 years, the only Steller sea lions remaining in U. S. waters may be restricted to the area from Southeast Alaska through northern California.

NMFS retained the threatened listing for the eastern DPS.

On June 29, 2010, NMFS (2010a) provided notice of the initiation of a 5-year status review of the eastern DPS of Steller sea lion under the ESA and opened a public comment period (75 FR 37385, June 29, 2010; 75 FR 38979, Wednesday, July 7, 2010). The comment period ended August 30, 2010 and was reopened on August 31, 2010 until October 14, 2010 (75 FR 53272). During the initial comment period following the initiation of the 5-year review, NMFS received two petitions to delist this species: on August 30, 2010 from the States of Washington and Oregon; and on September 1, 2010 from the State of Alaska. Both petitions contended that the eastern DPS of Steller sea lions has recovered, is not in danger of extinction, and is not likely to become in danger of extinction for the foreseeable future. NMFS considered these two petitions jointly in making the required 90-day finding. In this finding, NMFS (2010b) summarized that both petitions made multiple references to statements, information, and conclusions from the Revised Final Recovery Plan (NMFS 2008), and literature cited within this document. For example, the State of Alaska petition called attention to the NMFS Recovery Plan conclusion that:

> [n]o threats to recovery [of the Eastern DPS of the Steller sea lion] have been identified and the population has been increasing for over 25 years, new rookeries have been created, and the population is at historical high levels. 2008 Recovery Plan at VII–7.

NMFS (2010b) also summarized that the petitions provided new information not available at the time of the 2008 Recovery Plan, but that was readily available in NMFS files at the time of receipt of the petitions (e.g., a recently published paper: Boyd 2010; new aerial survey data). Lastly, the petitions presented new information that was not readily available in NMFS files (NMFS 2010b). Based on the information presented and referenced in the petition, as well as all other information readily available in NMFS files, on December 13, 2010 (75 FR 77602) NMFS found that the petitions present substantial information indicating that the petitioned action may be warranted. NMFS provided notice that the status review of the eastern DPS was continuing to determine if the petitioned action is warranted. The comment period following the 90-day finding closed on February 11, 2010.

NMFS (2012a) released a Draft Status Review of the eastern DPS on April 18, 2012. This draft status review contained a draft post-delisting monitoring plan as an appendix. Concurrently, NMFS published a proposed rule to remove this DPS from the List of Endangered and Threatened Wildlife (77 FR 23209). NMFS requested public comment on all of these documents. Further, NMFS sent the documents out for peer review. The public comment and peer review ended on June 18, 2012.

2 SPECIES DELINEATION AND APPLICATION OF THE 1996 DISTINCT POPULATION SEGMENT (DPS) POLICY

2.1 Background

A key task in any ESA status review is the delineation of the biological entity whose status it is appropriate to consider under the ESA. The ESA defines a "species" to include:

> …any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.

Thus, an ESA-listing (or delisting) determination can address a species, subspecies, or a DPS of a vertebrate species (16 U.S.C. 1532 (16)).

The USFWS and NMFS (1996) policy regarding DPS recognition provides that "(T)hree elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for addition to the lists of endangered and threatened wildlife and plants, reclassification, and removal from the lists:

1. Discreteness of the population segment in relation to the remainder of the species to which it belongs;
2. The significance of the population segment to the species to which it belongs; and
3. The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

2.2 Evaluation of Whether the Eastern DPS, as Currently Recognized, Meets the Definition of a Distinct Population Segment

In development of the draft status review, NMFS evaluated whether the eastern DPS continues to meet the criteria for a valid distinct population segment under the 1996 DPS policy (Appendix 1A). NMFS concluded that the eastern DPS of Steller sea lions, as currently delineated "does meet the criteria of a DPS and therefore this population is able to be considered discrete for the purposes of listing, delisting, and reclassifying."

The AFSC (2011) concluded that:

- Sea lion movement data corroborate extensive finding from genetics research indicating there has been strong separation between the two currently recognized DPSs.
- The area in which there is movement of western DPS animals into the eastern DPS range is small. While there is no evidence to suggest such a rate of exchange is sufficient to merge distinct populations, it may be sufficient to prevent genetic differentiation among populations within a DPS (such as within the entire eastern DPS).
- There is an "…overwhelming collection of morphological, ecological and behavioral, and genetic evidence" (AFSC 2011:11) indicating the eastern and western DPSs remain discrete entities.
- Interbreeding along a contact zone such as now occurs near the DPS boundary is not unexpected.
- The 1996 policy (61 FR 47222) makes it clear that "*The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment*".
- The recognition of two DPSs is also supported by the published recommendation (Phillips et al. 2009*a*) and recognition for subspecies designation of the two distinct population segments (e.g, by the Taxonomic Committee of the Society for Marine Mammalogy (http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=420&Itemid=340).

With respect to discreteness, the AFSC (2011:12) found that "…the persistent population trend trajectories combined with the physical and physiological differences, and behavioral characteristics unique to each DPS indicate that all of the potential factors in the discreteness criteria contribute to this

continued separation and as such the population segment as described for this status review should be considered discrete."

The AFSC (2011) also concluded that the current conservation and management plan for Steller sea lions in Canada (where part of this species resides and where some individuals that breed in the U.S. spend part of the year) provides protections similar to the protection measures provided by the MMPA, and thus, that the population segment is not delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

With respect to the significance of the eastern DPS as currently identified, the AFSC (2011) concluded:

- There is evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.
- The loss of the DPS would result in a significant gap in its range.
- The ecological setting of southeast Alaska, British Columbia, and southward to Central California is unique but that with almost one half of the global population residing in the area, it is not unusual.
- There is no evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.

In the memo transmitting the AFSC (2011) evaluation, DeMaster (2011; see Appendix 1A) noted:

> The AFSC has completed a thorough review of the best available scientific information and has determined that the eastern DPS of Steller sea lions, as currently designated under the ESA, does satisfy the first condition of the policy for discreteness (61 FR 4722). The eastern DPS of Steller sea lions comprise a distinct population segment as defined under the ESA and the eastern DPS is significant to the taxon. This conclusion is based on an extensive body of research that includes sea lion population genetics, ecology, behavior, and details regarding the physical and physiological characteristics of the species.

2.3 Evaluation of Whether the Portions of the Population that Breed in the California Current Ecoregion/System or in California Meet the Definition of a Distinct Population Segment

During the public comment period following the release of the draft status review and proposed rule to delist, commenters contended that the "… California Current population meets the discreteness criterion for designating a DPS because the population is markedly separate from other populations of Steller sea lion farther north as a consequence of ecological factors" (SCB and ASM 2012:11). To address this comment, NMFS has evaluated whether Steller sea lions that breed in the California Current System constitute a DPS separate from the Steller sea lions in areas influenced by the Alaska Current. Further, because of similar concerns raised in public comment, NMFS has also evaluated whether Steller sea lions occurring in California constitute a DPS separate from the rest of the range.

2.3.1 Are Steller sea lions in the California Current or in California discrete?

2.3.1.1 A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors; or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the ESA. Quantitative measures of genetic or morphological discontinuity may provide evidence of marked separation but are not the only characteristics through which such discontinuity may be apparent. Below we address whether Steller sea lions in the California Current System satisfy this test. We also address whether those in California satisfy this test.

Ecological areas inhabited.--The eastern DPS of Steller sea lion includes sea lions born on rookeries in California and areas north through Southeast Alaska (Figures 1, 9, 10, 11). The SCB and ASM (2012) argued that the discreteness criterion was met for a California Current DPS because the population is markedly separate from other "populations" to the north due to ecological factors. They stated that as "...there are no breeding rookeries between the northern end of Vancouver Island and the breeding rookery in southern Oregon, ...the two breeding rookeries in southern Oregon on the border of the Columbian Pacific ecoregion and the Montereyan Pacific Transition (following Wilkinson) easily would fit into a California current DPS unit. The next closest Steller sea lion colony is over 500 miles to the north in the Alaskan/Fjordlan Pacific ecoregion, which is influenced by the Alaska Current."

The best available information indicates that there is meaningful ecological variability within the range of the eastern DPS. There have been several classification systems that delineate and describe ecological disjunctions within this region.

One classification concept is the "Large Marine Ecosystem" (LME), which NOAA, working in cooperation with the Univ. of Rhode Island, developed three decades ago to "...implement ecosystem approaches to assessing, managing, recovering, and sustaining LME resources and environments" (NOAA Office of Science and Technology, Large Marine Ecosystem webpage: http://www.st.nmfs.noaa.gov/ecosystems/lme/index). Spaulding et al. (2007:574) described LMEs as "expert-derived system[s] with a rigorous, replicable core definition" that were conceived primarily for management issues. As the classification system is described by NOAA and the United Nations Environment Programme (UNEP) (Sherman and Hempel 2008), the breeding range of the eastern DPS of Steller seal lion, as currently recognized, spans two LMEs: the California Current LME and the Gulf of Alaska LME (Figure 4). This scheme supports the idea that within the eastern DPS range, there are two major ecological systems.

The California Current LME (CCLME) spans nearly 3,000 km from approximately the northern tip of Vancouver Island, British Columbia, to Baja California, Mexico (Levin and Schwing 2011). There is also meaningful ecological variability within that area. While the graphic (Figure 4) seems to delineate the LMEs at the border between British Columbia and Washington State, the underlying literature indicates a more northerly boundary. Levin and Schwing (2011:3) explained that:

> "The California Current is formed as the eastern leg of the North Pacific Gyre. The intensity of transport in the California Current is not well-known, but probably varies by season, year, and decade. It fluctuates in part relative to the position and strength of the North Pacific Current/West Wind Drift, which traverses the subarctic North Pacific Ocean and bifurcates from

> British Columbia to northern Oregon into the Alaska and California currents. While Washington and southern British Columbia may be considered a transition zone, we define the northern boundary of the CCLME as the northern tip of Vancouver Island, British Columbia, due to frequent upwelling along this section of the coastline in spring and summer…Based on physical and biological attributes, Parrish et al. (1981) subdivided the CCLME into three distinct sub-ecosystems:
>
> > Southern British Columbia, Washington, and Oregon to Cape Blanco;
> > Cape Blanco, southern Oregon, to Point Conception, California; and
> > Southern California (below Point Conception) and Baja California. "

Under this same classification scheme, the Gulf of Alaska LME (GOA LME) is described (Aquarone and Adams 2009) as lying off the southern coast of Alaska and the western Coast of Canada and being separated from the East Bering Sea LME by the Alaska Peninsula (see Figure 4).

The LME classification system indicates that there are major differences in the marine ecology of habitats within which rookery sites occur in British Columbia and Southeast Alaska versus those in Oregon and California. Under the LME classification, all or nearly all of the haulouts along the west coast of Vancouver Island would be grouped into the California Current LME with those in Washington and points south, but the rookeries and haulouts north of Vancouver Island would be in the Gulf of Alaska LME. The two current rookeries in southern Oregon would be in the same sub-ecosystem as that at St. George Reef, Farallon Islands, and other active rookeries in California. Based on the description given by Levin and Schwing (2011:3), Washington and Southern British Columbia occur in "…a transition zone". While there are no actual rookeries in Washington State, there is a low level of pupping, and under the LME system, these animals would be grouped with some of the Oregon haulouts and haulouts in southern B.C. The locations of the boundaries of the LMEs are not hard and fast: they vary somewhat year to year due to current strength and location, etc. Thus, the characteristics of the ecosystem as experienced by Steller sea lions in some locations will vary year to year.

King et al. (2011) described the California Current System similarly to Levin and Schwing (2011) (see Figure 5, reproduced from King et al. 2011: Figure 1). Citing Strub et al. 1990 and Mendelssohn et al. 2003), King et al. (2011:2) also noted that within the California Current System there is "….great spatial diversity in physical and biological processes…". They recognized the same three subareas as Parrish et al. (1981) (see above) (see Figure 6, reproduced from King et al. 2011: Figure 3).

Brand et al. (2007) delineated the Northern California Current Ecosystem (NCCE), which they described as extending from Point Conception, California to the U.S.-Canada border and out to the 1,200 isobath. They reported that: "The marine area off the coast of Washington, Oregon, and northern California is characterized by an eastern boundary current system flowing over a narrow continental shelf, linking cooler subarctic waters to the north and warmer subtropical water to the south. These currents interact with distinctive oceanographic and geomorphic features of the North American continent to create the complex and dynamic Northern California Current Ecosystem (NCCE). The pronounced latitudinal oceanographic variation of this system directly impacts the physical and chemical variables which drive primary production and affect the growth, survival, and spatial distributions of fauna ranging from zooplankton to large predatory fishes, sea birds, and marine mammals…". This classification system aligns ecosystem boundaries with political boundaries, i.e., it indicates a split at the U.S.-Canada border.

Spalding et al. (2007:574) developed a biogeographic classification system for marine coastal and shelf areas of the world, called the “Marine Ecoregions of the World” (MEOW) system. Spalding et al.'s (2007:574-575) biogeographic classification scheme identified three hierarchical and nested levels: realms (the largest), provinces, and ecoregions. Relevant to the discreteness issue in this DPS analysis, Spalding et al. (2007) stated that provinces are (bolded added here) "Large areas defined by the presence of **distinct biotas that have at least some cohesion over evolutionary time frames**...Although historical isolation will play a role, many of these distinct biotas have arisen as a result of distinctive abiotic features that circumscribe their boundaries...**In ecological terms, provinces are cohesive units likely, for example, to encompass the broader life history of many constituent taxa, including mobile and dispersive species**...". In many areas, provinces are similar in scale to the LMEs mentioned above.

Under Spalding et al.'s (2007: see their Box 1) classification system, the entire historic and breeding range of the eastern DPS Steller sea lion as currently recognized falls within the Temperate North Pacific Realm and the entire current breeding range falls within the Cold Temperate North Pacific (CTNP) Province (see Figure 7, panel a). Only the most southern portions of the historic breeding range (e.g., at San Miguel Island in the Channel Islands) are located within the Warm Temperate North Pacific Province. Thus, there are not active rookeries within this province. Within the portion of the CTNP Province area in which Steller sea lions are currently recognized as belonging to the eastern DPS, Spaulding et al. (2007: Figure 3) (see Figure 7, panel b) delineated five ecoregions: #58, Northern California; #57: Oregon, Washington, Vancouver Coast and Shelf; #56, Puget Trough/Georgia Basin, and #55, North American Pacific Fjordland (from the Northern tip of Vancouver Island north through, and including, Southeast Alaska), and #54, the Gulf of Alaska which includes areas north of Southeast Alaska in the GOA to the boundary between the eastern and western DPS at 144^{O} longitude but does not currently include areas with eastern DPS rookeries.

In Wilkinson et al.'s (2009) ecoregion classification (Figure 8), #19 is the Southern Californian Pacific ecoregion, which includes the Channel Islands but no current Steller sea lion rookeries; #20 is the Montereyan Pacific Transition, described as being from the central California coast from Point Conception to Cape Mendocino; Ecoregion #21, the Columbian Pacific ecoregion, they describe "...stretches along the Pacific coast from Cape Mendocino... to the Strait of Juan de Fuca, the Strait of Georgia, Puget Sound, and north on the seaward side of Vancouver Island to Cape Cook; and lastly, #22, the Alaskan/Fjordland Pacific which Wilkinson et al. (2009:125) defined as straddling "...Vancouver Island, starting at Cape Cook on the west side and the Strait of Georgia on the east. It continues north through the Gulf of Alaska and extends to the end of the Aleutian Archipelago Region, running south and west of that region."

Thus, the best available information indicates that within the eastern DPS, different rookery and haulout sites are located within areas recognized as belonging to different ecosystems, ecological realms, ecological provinces, ecoregions and/or different LMEs in various biodiversity classification schemes. These ecosystems and ecoregions differ in underlying biological and physical processes (e.g., see Figure 6). Different ecoregions have been identified within the California- Oregon-Washington area; this area is not homogenous. Different ecoregions have been identified within the waters off some political entities, such as off different parts of California and off of British Columbia. A large portion of the range of this DPS is in a transition zone between large ecosystems.

Figure 4. Large Marine Ecosystems of the United States and Linked Watersheds. Source: NOAA's Large Marine Ecosystems of the World Website. LME Maps Download Page: http://www.lme.noaa.gov/index.php?option=com_content&view=article&id=171&Itemid=74

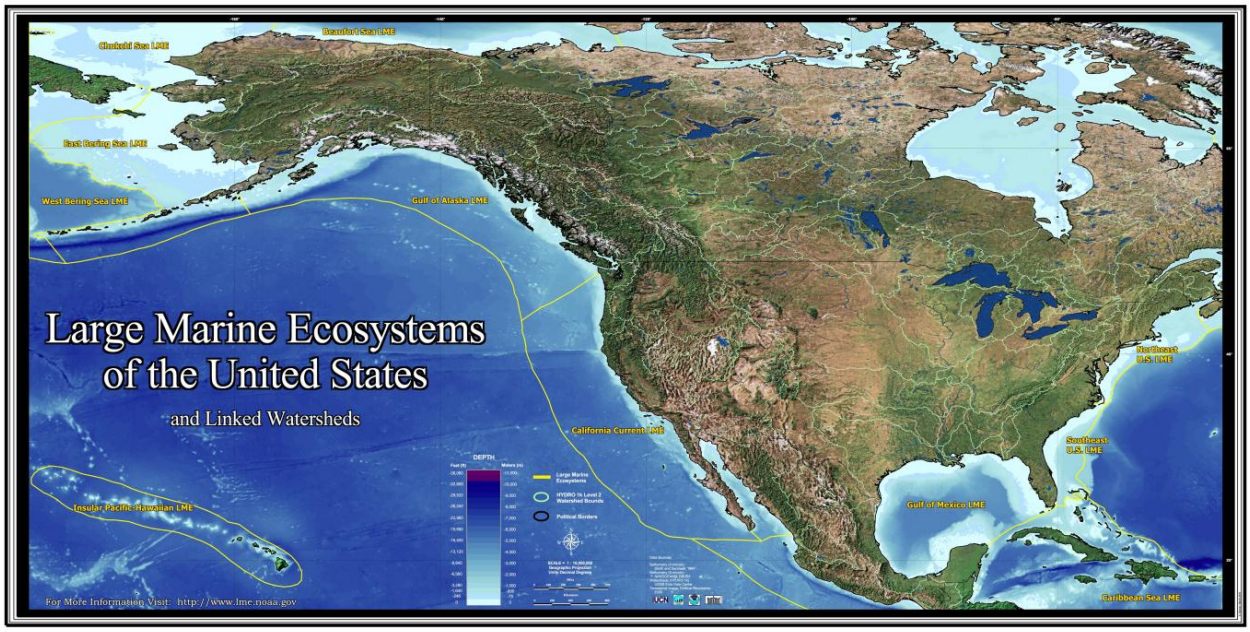


Figure 5. Generalized representation of circulation in the North Pacific. Reproduced from King et al. (2011: Figure 1, pg. 2); these authors note that the figure is originally from Agostini (2005).

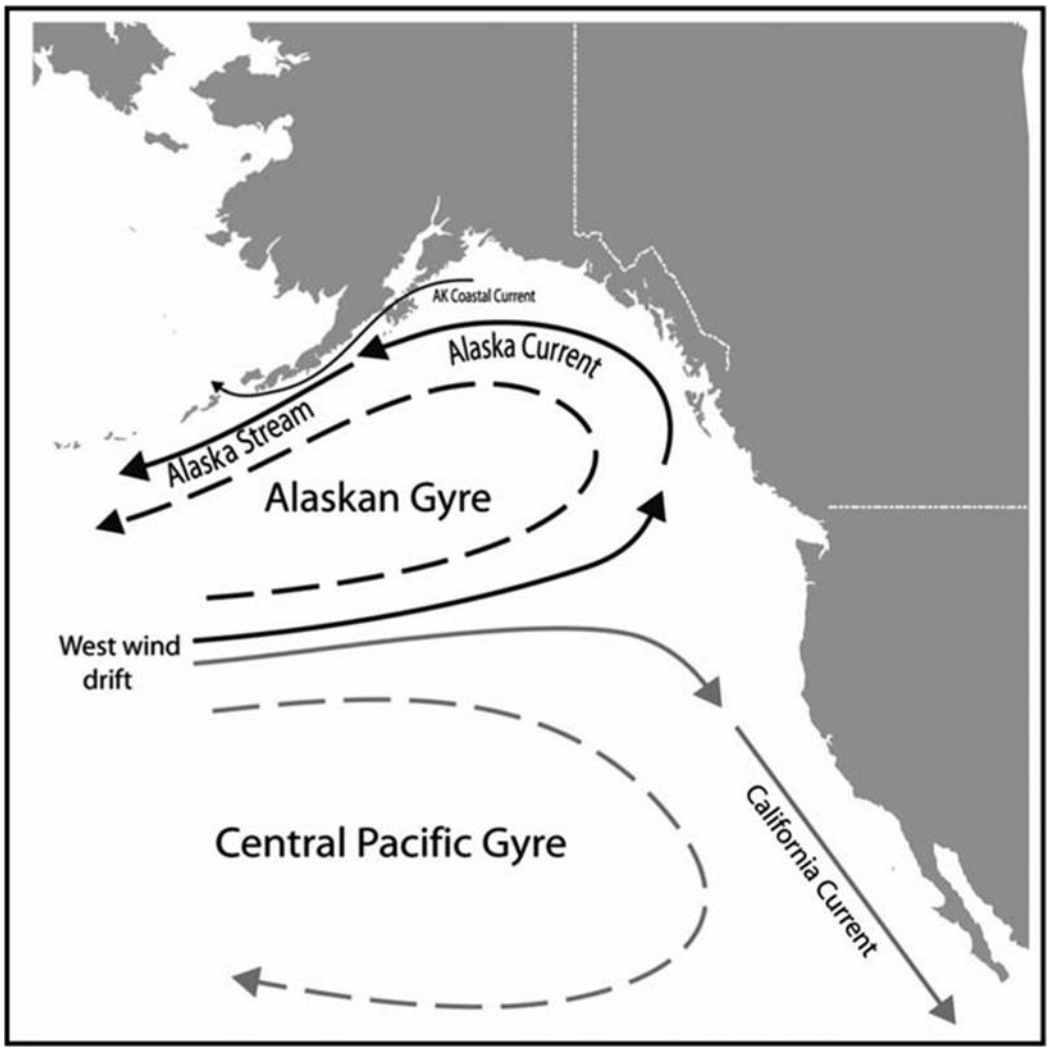


Figure 6. A generalized depiction of regional variation in biological and physical processes within the California Current System. Figure reproduced from King et al. (2011: Figure 3, pg. 4; these authors indicate that the figure is from Agostini (2005)).

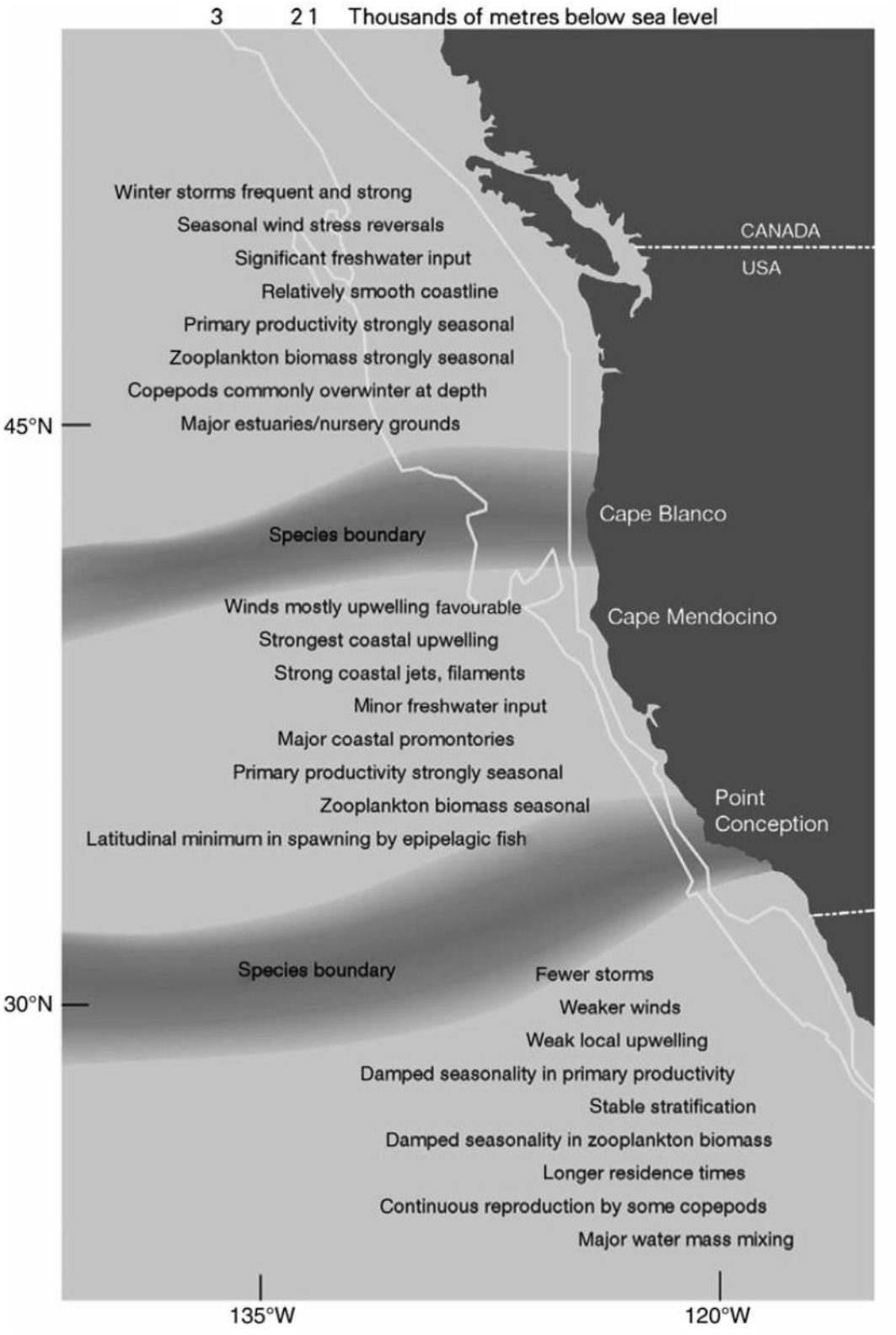
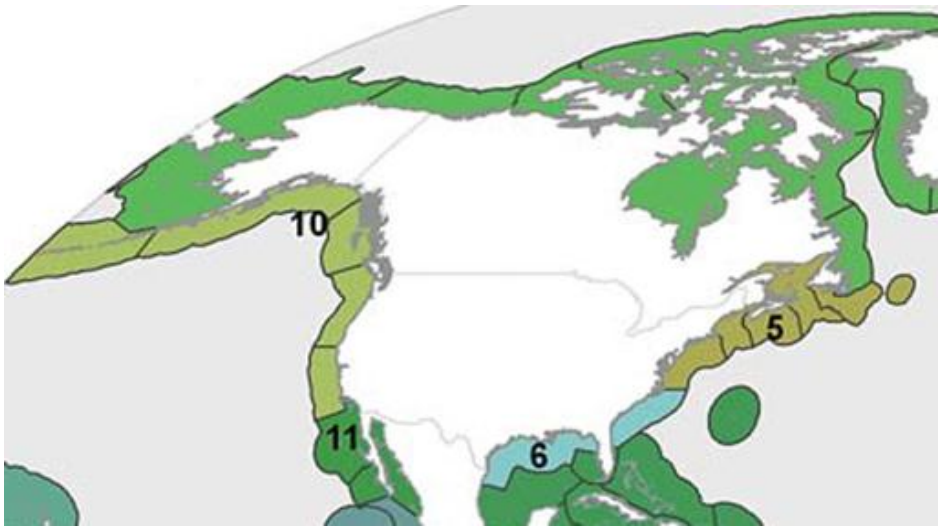


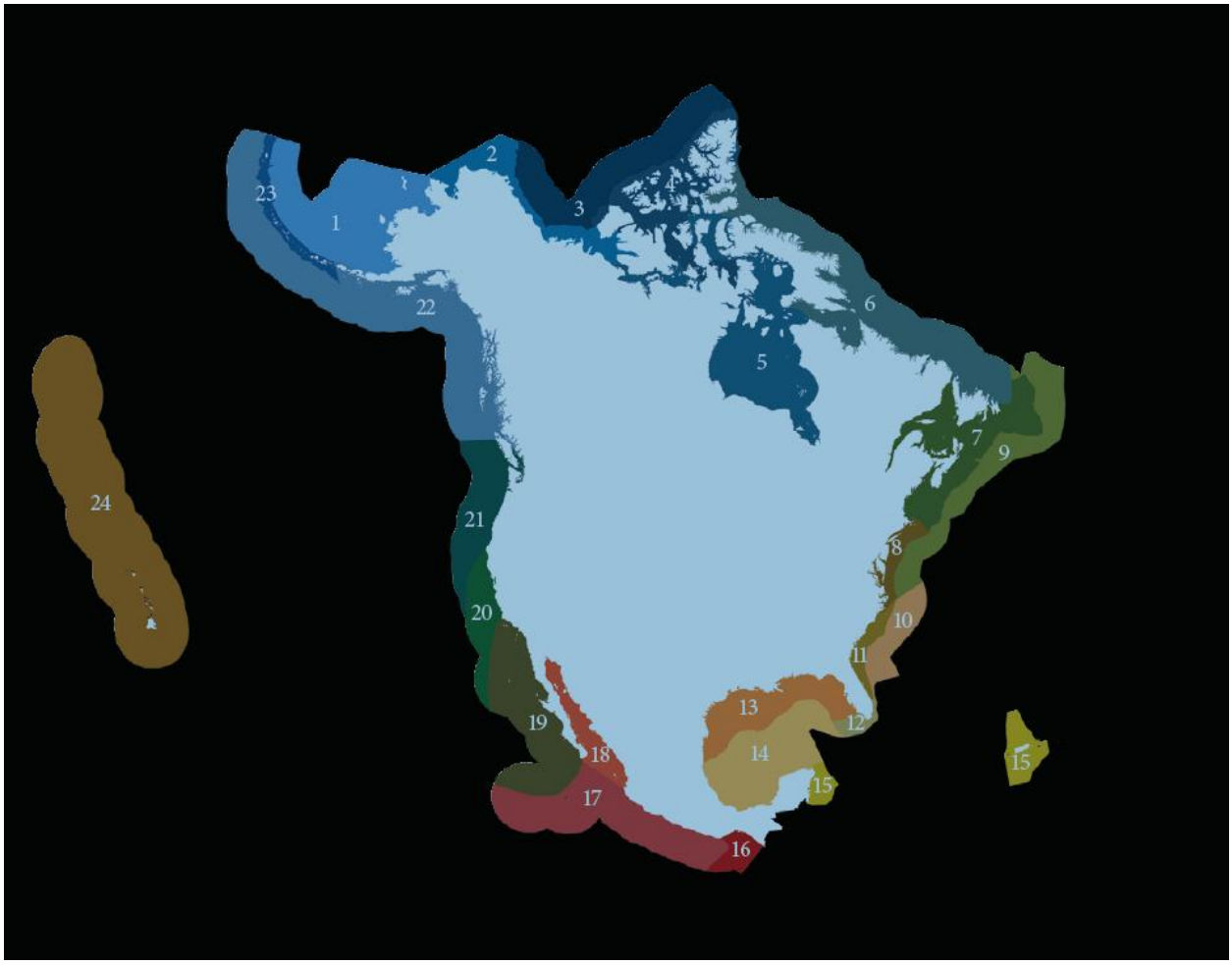
Figure 7. Depiction of a portion of Spalding et al.'s (2007) final biogeographic framework showing: a) a subset of provinces with ecoregions outlined and b) a subset of numbered ecoregions. Reproduced and cropped from Figures 2 and 3 of Spalding et al. (2007:577 and 580). As given in Box 1 of Spalding et al. (2007:578), all ecoregions within the current and historic breeding range of the eastern DPS of Steller sea lion fall within the Temperate North Pacific Realm. Within the Cold Temperate Northeast Pacific Province (#10 on panel a), relevant ecoregions (shown in panel b) are: #54. Gulf of Alaska; #55. North American Pacific Fjordland; #56. Puget Trough/Georgia Basin; #57. Oregon, Washington, Vancouver Coast and Shelf; and #58. Northern California. Within the Warm Temperate Northeast Pacific Realm (#11 on panel a) relevant ecoregions include #59, the Southern California Bight (no breeding currently occurs there).

a. Subset of numbered provinces from Spalding et al. (2007) with ecoregions outlined.



b. Subset of numbered ecoregions provided in Spalding et al. (2007). See text above.

Figure 8. Wilkinson et al.'s (2009) Marine Ecoregions of North America. Reproduced from Wilkinson et al. (2009: unnumbered figure on page xii). Ecoregion #19 is the Southern Californian Pacific; #20 is the Montereyan Pacific Transition; #21 is the Columbian Pacific; and #22 is the Alaskan/Fjordland Pacific.



Ecological or Behavioral Factors- Sea Lion Movement.--As described elsewhere (Mate 1973; Bigg 1985; Raum-Suryan et al. 2002, 2004; Section 3.2.2 of this document; NMFS 2008 and 2010c), Steller sea lions may disperse from breeding locations after the breeding season. These movements may be associated with seasonal aggregations of prey (e.g., see Womble et al. 2005). COSEWIC (2003:13) summarized that "...there are well-defined seasonal movements in certain parts of their range. Following the breeding season,...Steller...male sea lions have been observed to migrate north along the Oregon coast (Mate 1975), coinciding with a sharp increase in the number of animals wintering off southern Vancouver Island (Bigg 1985)." Citing Bartholomew and Boolootian (1960) and Mate (1975), Bigg (1985) summarized that adult males are uncommon off of California and Oregon in the winter and are believed to travel to British Columbia and Alaska.

Resighting data of individuals branded at the St. George Reef (SGR) (in Northern California) and Rogue Reef (ROR) (in southern Oregon), summarized by Scordino (2006), also indicate that a portion of sea lions that breed at these locations do not stay within the confines of these two states but rather, at least in some years, disperse from breeding locations following the breeding season, with sizable proportions traveling into northern Washington and southern British Columbia. As discussed in section 3.2.2, Scordino (2006) described a "marked pattern" of seasonality to female abundance in Oregon and northern California. Scordino (2006:29) noted that while "[B]randed pups were not seen beyond 500 km of their natal rookery in a study...in Alaska (Raum-Suryan et al. 2002). We did not observe the same pattern. Between 2003 and 2005, 9 - 22% of observed branded pups were seen in northern Washington and southern British Columbia (600 - 700 km north of SGR and ROR) by 9 months of age." Scordino (2006:29) reasoned that females with a dependent pup at breeding rookeries in Oregon and northern California may need to travel farther than females in Alaska to find "ideal feeding and haulout conditions" due to the north - south distribution of terrestrial habitats. Scordino (2006) also noted that the 22% result coincided with the first year of concentrated fall resight effort in British Columbia. He pointed out that delayed upwelling and decreased primary production in 2005 may have caused increased post-breeding season dispersal ranges of adult females accompanied by dependent pups in 2005. Lack of fall resight data from British Columbia during the fall in 2001 to 2004 precluded his evaluation of the effect of ocean conditions on dispersal trends. However, these data indicate that southern British Columbia is part of the foraging range of adult females with dependent pups who breed in northern California and southern Oregon (Scordino 2006). Pups branded in Oregon have been resighted within northern California, Washington, British Columbia, Southeast Alaska, and even within the range of the western DPS (Calkins and Pitcher 1982; Calkins 1986; Loughlin 1997; Scordino 2006). Juveniles branded at Forrester Island in SEAK were observed in Washington State. Based on the best available information, we would expect that animals that are born on rookeries in British Columbia north of Vancouver Island (e.g., in the area classified by Wilkinson et al. (2009) to be within the Alaskan/Fjordland), could also utilize prey and haulouts within the Pacific Columbian Pacific ecoregion just to the south.

In summary, Steller sea lions born within one ecoregion, and even within one LME, may spend a portion of their lives within other ecoregions or even within other LMEs. Data indicate that they likely travel to these locations away from where they were born to utilize specific resources, such as seasonally abundant prey.

Patterns of Genetic Variability.--The AFSC (2011) summarized relevant studies on the patterns of genetic variability within the entire range of the Steller sea lion, with focus on the disjunction between the eastern and the western DPSs. Herein, we focus on findings, especially new findings, that are most relevant to determining whether genetic data support the contention that Steller sea lions from rookeries within ecoregions dominated by the California Current System are discrete from those on rookeries in

northern British Columbia and Southeast Alaska or whether Steller sea lions in California are discrete from those farther north within the eastern DPS.

Bickham (2010b) recently reported on the results of genetic studies within the eastern DPS, including new samples from Año Nuevo. While these data are unpublished, a few examples are illustrative with regards to the discreteness of different parts of the range within the eastern DPS. Bickham (2010b) obtained mtDNA control region sequences for a total of 64 animals from California (including 13 from Año Nuevo and the rest from St. George Reef). He observed 10 control region haplotypes, all of which were either widespread or characteristic of the eastern DPS as a whole. One haplotype observed at Año Nuevo had previously been reported only from SEAK and British Columbia rookeries. Three control region haplotypes observed at Año Nuevo had previously only been seen in SEAK. Three cytochrome b haplotypes were observed among the 10 new specimens from Año Nuevo, two were known from northern California and one had previously only been observed in British Columbia. One relatively rare Y-chromosome haplotype was observed only in the eastern DPS but at rookeries in British Columbia, Oregon, and Año Nuevo. UPGMA analysis using Fst estimates based on control region/cytochrome b sequences, clustered Año Nuevo with a rookery in British Columbia, whereas St. George Reef (northern California), Rogue Reef (southern Oregon), and Hazy Island (in SEAK) cluster together and show greater genetic similarity (at those loci) than Año Nuevo and St. George Reef, both of which are in California (J. Bickham, unpublished data). Other details from this analysis and previous genetic studies are provided in AFSC (2011 in Appendix 1). In summary, based on the most complete and updated genetic data set for the eastern DPS (Bickham 2010 a,b and unpublished data), genetic data do not document marked discontinuity between Steller sea lions sampled from rookeries within the California Current and those sampled at rookeries in British Columbia or Southeast Alaska. Instead, genetic data support the continued recognition of the eastern DPS of Steller sea lion as currently recognized. Genetic data also do not indicate there is marked discontinuity between Steller sea lions at rookeries in California and the rest of the DPS (Bickham 2010 a,b; AFSC 2011).

International boundaries.--We also examined whether there are international governmental boundaries delimiting the population segments within the California Current LME and the Gulf of Alaska LME, that delimit California, or other ecological subunits identified under other biodiversity classification schemes discussed above.

There are two international boundaries, both between the United States and Canada: one at the Strait of Juan de Fuca at the southern border of British Columbia, Canada and the northern boundary of Washington State, in the U.S; and one at the southern boundary of Alaska and just north of Prince Rupert, British Columbia. As described by AFSC (2011), the current management plan for the Steller sea lion in Canada provides protections similar to those in the United States under the MMPA. While there are relatively minor differences (e.g., see Section 4.3.5.9 for a discussion of protections in Canada), NMFS has concluded that they are not significant in light of Section 4(a)(1)(D) of the ESA.

However, even if such international boundaries did result in significant differences in species protection or management, they do not delineate the same subunits as those that could be delineated by ecoregion identification. For example, many, but not all (e.g., Brand et al. 2007) of the ecological biodiversity classifications (CCLME (Levin and Schwing 2011), Spalding et al.'s (2007) hierarchical classification, and Wilkinson et al. 2009) clumped parts of British Columbia north of Vancouver Island with Southeast Alaska (i.e., the northern tip of the CCLME as being the northern tip of Vancouver Island (Levin Schwing 2011:3)). This is true both at the LME or ecosystem level, and at smaller levels such as the sub-ecosystem level (e.g., Parrish et al. 1981; Levin and Schwing 2011) and Spalding et al.'s (2007) ecoregion level. However,

delineation of subunits based on international boundaries would subdivide these areas just north of Prince Rupert. Under Wilkinson's classification scheme, Ecoregion # 21, the Columbian Pacific ecoregion, "...stretches along the Pacific coast from Cape Mendocino... to the Strait of Juan de Fuca, the Strait of Georgia, Puget Sound, and north on the seaward side of Vancouver Island to Cape Cook". Based on international boundaries, this ecoregion would be bifurcated by the boundary at the Strait of Juan de Fuca between the U.S. and Canada.

Other Information.--Phillips et al. (2009a) assigned Steller sea lions from all locations within the eastern DPS to a single subspecies, *Eumetopias jubatus monteriensis,* distinct from the subspecies *E. j. jubatus,* which encompasses Steller sea lions from the western DPS.

Conclusion.--In conclusion, we do not find compelling evidence of consistent or marked discontinuity among different segments within the eastern DPS of Steller sea lion. The best available evidence indicates that Steller sea lions which breed in northern California, southern Oregon, and Washington State are not markedly separated from Steller sea lions in British Columbia and Southeast Alaska as a consequence of physical, physiological, ecological, or behavioral factors. The best available evidence about genetic patterns, morphology, ecological characteristics of habitat, movement patterns, etc. also does not indicate that Steller sea lions in California are discrete from those in the rest of the eastern DPS.

2.3.2 Significance of Population Segments

If a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance is then to be considered in light of Congressional guidance that the authority to list DPSs be used sparingly while encouraging the conservation of genetic diversity (FWS and NMFS 1996, 61 FR 47222). As NMFS concludes that there are no population segments within the currently recognized eastern DPS of Steller sea lion that are discrete, we did not consider the biological and ecological significance of any subunits, relative to a determination of DPS status.

2.4 Conclusion of All DPS Evaluations

NMFS concludes that the eastern DPS of Steller sea lions, as currently identified, is a valid DPS for consideration under the ESA. Multiple lines of evidence indicate that it is discrete from the western DPS of Steller sea lion. NMFS also considered whether either the portion of the population breeding in California, or the portion of the population within the California Current System met the definition of a DPS. NMFS determined that they did not. After consideration of both the information available to us at the time of the release of the Draft Status Review and that provided to NMFS during public comment, NMFS does not find it appropriate to further sub-divide this DPS. Thus, we focused our review on evaluating the status of this currently listed entity, the eastern DPS.

3 SPECIES BACKGROUND

In this section of the status review, NMFS summarizes natural history, biological, ecological and other information about the eastern DPS that is valuable for describing the status of the taxon under review, and how it may be affected by factors that could potentially threaten its long term existence. Considerable detail is provided in the Recovery Plan (NMFS 2008), COSEWIC (2003), DFOC (2011), NMFS (2010) and other documents. Readers are referred to Loughlin et al. (1987) and Hoover (1988) for more

detail regarding physical descriptions, behavior, and basic biology. Information about classifications of ecological systems within the range is given in Section 2.

3.1 Species Description and Taxonomy

Taxonomically, Steller sea lions are classified within the Order Carnivora, Suborder Pinnipedia, Family Otariidae, and Subfamily Otariinae. The Steller sea lion is the only extant representative of its genus, *Eumetopias (*NMFS 2008; Rice 1998).

The eastern DPS of Steller sea lion is one of two distinct population segments, as defined under the ESA, that comprise the biological species known as the Steller sea lion (*Eumetopias jubatus*). The species is also sometimes called the "Northern sea lion" or Steller's sea lion. Recent analyses have concluded the eastern DPS comprises a separate subspecies, *E. j. monteriensis* (Gray, 1859) Loughlin's northern sea lion (Phillips et al 2009a; Committee on Taxonomy 2011).

3.2 Current and Historical Distribution

The current worldwide breeding range of the Steller sea lion extends around the North Pacific Ocean rim from northern Japan, the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Figure 1) (Kenyon and Rice 1961; Loughlin et al. 1984, 1992; Burkanov and Loughlin 2005; NMFS 2008; DFOC 2011). The most northern rookery is Seal Rocks (60°09'N), located at the entrance to Prince William Sound, Alaska (58 FR 45269). Currently, Año Nuevo Island off central California is the southernmost rookery (37°06'N) (58 FR 45269). However, until 1981, Steller sea lions bred farther south on the Channel Islands at San Miguel Island (34°05'N) (Bartholomew and Boolootian 1960; DeLong and Melin 2000) and may have briefly held a rookery at the west end of Santa Cruz Island in 1930 (Bonnot 1931). Thus, the overall range of the eastern DPS of Steller sea lion is large, occupying a span of coastline of about 2400 km (Pitcher et al. 2007).

The eastern DPS includes sea lions born on rookeries from California north through Southeast Alaska (Figures 9, 10, and 11). With the reclassification into a western and eastern DPS (62 FR 24345, May 5, 1997), NMFS recognized the division between the eastern and western DPSs to be at Cape Suckling (144º west longitude) in the northeast Gulf of Alaska (see Figure 1).

3.2.1 Habitat Types and Locations

As described in the Final Rule designating critical habitat (58 FR 45269) and as summarized in Section 1.4, Steller sea lion critical habitat throughout their range includes terrestrial, aquatic, and the area above (in air) that support reproduction, rest, foraging, and refuge. Terrestrial sites used by Steller sea lions as rookeries and haulouts are widespread throughout the range and the locations used year-to-year vary little (58 FR 45269). More specific discussion about the nature of important features of Steller sea lion habitat can be found in Call and Loughlin (2005) and Ban and Trites (2007).

In this status review, our use of the term rookery follows NMFS (58 FR 45269):

> those sites where males defend a territory and where pupping and mating occurs on a consistent basis.

We follow the convention adopted in the Recovery Plan (NMFS 2008 and Pitcher et al. 2007), limiting the use of the term “rookery” to a site where a count of animals on a site generally reports greater than 50 pups are being born per year.

Within the eastern DPS, breeding currently occurs at 15 major rookeries (sites with >50 pups) (Pitcher et al. 2007; Olesiuk 2008; NMFS 2008). Pitcher et al. (2007:112) summarized that during the breeding season, there are about 59 major haulout sites used by nonbreeding animals, plus seasonal and numerous smaller haulouts. NMFS (2008a:25) summarized that “about 85 major haulout sites currently exist from Cape Fairweather (58.8°N, 137.9°W) to Año Nuevo Island (37.1°N, 122.3°W)”. This number includes rookery sites used as haulouts during the non-breeding season. Figures 9, 10, and 11 depict the locations of the rookeries and haulouts. Additionally, Glacier Bay National Park and Preserve (2012) reported that there are several recently established haulout sites in southeast Alaska, including haulouts that have been previously identified and documented in publications (Womble et al. 2005; Womble et al. 2009; Mathews et al. 2011). These haulout sites and locations (decimal degrees, WGS 84 datum) are:

Tarr Inlet in Glacier Bay National Park (58.94105N, -136.91237W)
Gloomy Knob in Glacier Bay National Park (58.82609N, -136.464W)
Black Rock in Icy Strait (58.324929, -135.613181 W),
Middle Pass Rock in Cross Sound (58.25111N, -136.38777W)
Gaff Rock in Cross Sound (58.19276N, -136.41853W)
Dry Bay near Alsek River (59.130157N, -138.624474 W)
Little Island in Lynn Canal (58.52672N, -135.03746W)
Berners Bay in Lynn Canal (58.75733N, -135.01733W)

As noted by a peer reviewer, between Cape St. Elias and Cross Sound, there are few areas with rocky shorelines and no offshore islands which are preferred habitats for SSL hauling out and pupping/breeding. Between Orford Reef in Oregon and the northern end of Vancouver Island, a stretch of coastline more than 600 miles long, there are currently no breeding rookeries. In Washington State, Jeffries et al. (2000:ix) reported that Steller sea lions use "...haulout sites primarily along the outer coast from the Columbia River to Cape Flattery, as well as along the Vancouver Island side of the Strait of Juan de Fuca." The WDFW (ODFW and WDFW 2010:2) has observed “…increasing numbers of newborn pups at several locations…” along the Washington coast. Hence, while there are no established rookeries in Washington State, there is a small amount of Steller sea lion reproductive behavior occurring.

Pitcher et al. (2007:111) summarized that “…there is a general consensus that the breeding range” of the eastern DPS “has shifted” north. This shift began at the southern end of the range in the 1930s with the decline of the southern California rookery on San Miguel Island and continued in the 1960s and 1970s when the number of Steller sea lions at central California sites declined (Pitcher et al. 2007). At the northern end of the range, Steller sea lions established rookeries in southeast Alaska on Forrester Island in the 1950s, Hazy Island in the 1980s, and on White Sisters, Biali Rock and Graves Rock in the 1990s. In the 1920s, the center of the breeding population was at approximately 46°N (Washington-Oregon border), but by 2002, it had moved northward over 400 miles to the central British Columbia coast. However, the northward shift in the center of the eastern DPS breeding population is not entirely due to movement of eastern DPS animals. Based on genetic analyses of samples collected from new born pups in 2002 (Gelatt et al. 2007), western DPS females gave birth to about half of the pups born on White Sisters and about 70% of those on Graves Rock. Over the last 13 years (1996-2009), the regional distribution of pup production within the eastern DPS has changed only slightly: in 1996, 79% of all eastern DPS pups were born on northern rookeries in southeast Alaska and British Columbia, while the

remaining 21% were born on southern rookeries in Oregon and California; in 2009, northern rookeries produced 83% and the southern rookeries 17%. Consequently, it appears that most of the northern shift in the distribution of pup production within the eastern DPS occurred during the period from the 1930s through the early 1990s. Since the mid-1990s, pup production in both the northern and southern portions of the eastern DPS has increased significantly.

Steller sea lions use aquatic portions of their habitat for foraging, resting, and traveling. As summarized recently (NMFS 2010c: xxxii):

> Prey resources are the most essential feature of marine critical habitat for Steller sea lions. The status of critical habitat is best described as the status and availability of the important prey resources contained within [marine waters adjacent to major haulouts and rookeries]…Dominant prey items vary with region and season.

Studies conducted by Gregr and Trites (2008) and Lander et al. (2009) provide thorough reviews and quantitative based discussions concerning important features of Steller sea lion aquatic habitat.

Figure 9. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts in Alaska.

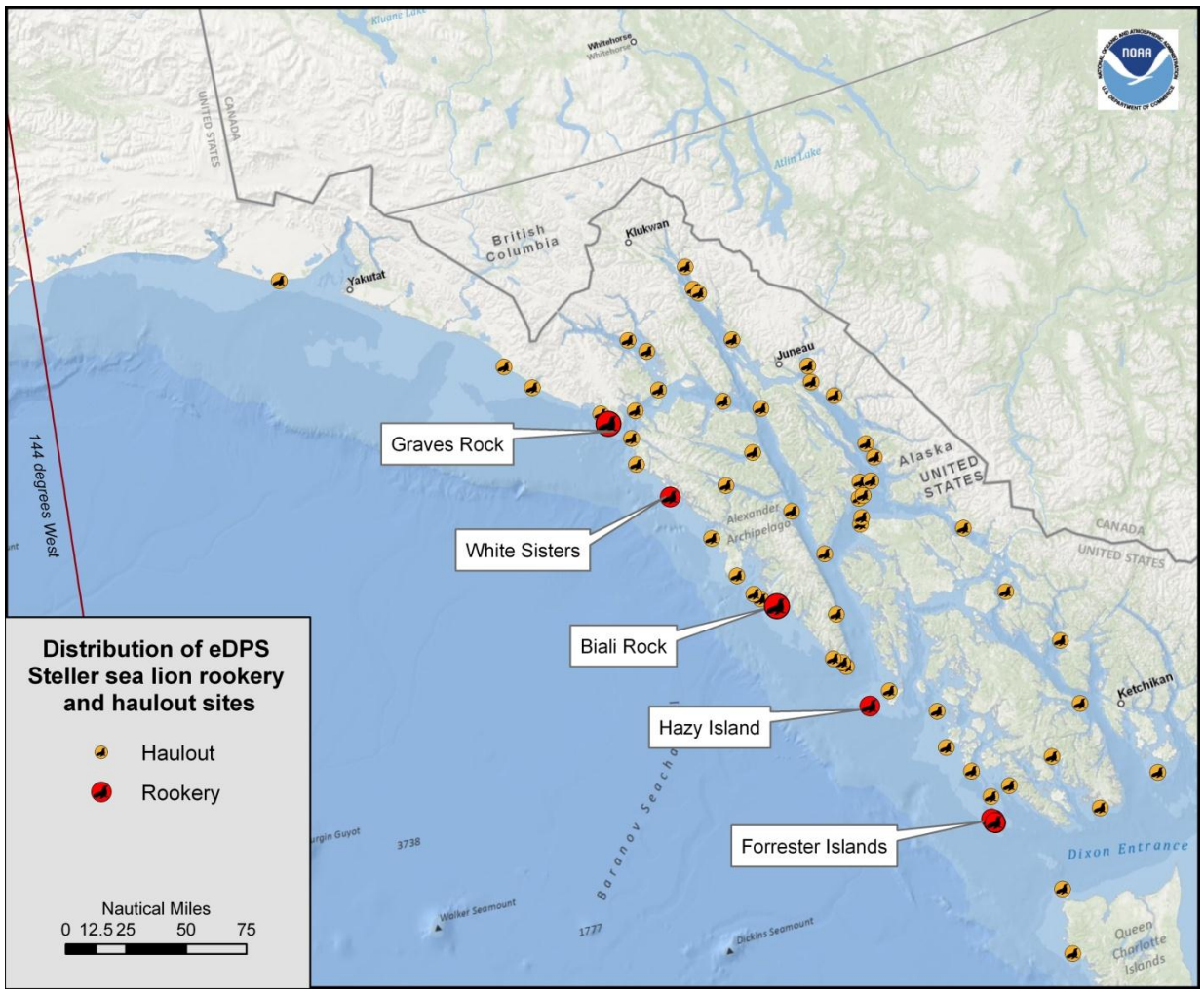


Figure 10. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts used in British Columbia, Canada.

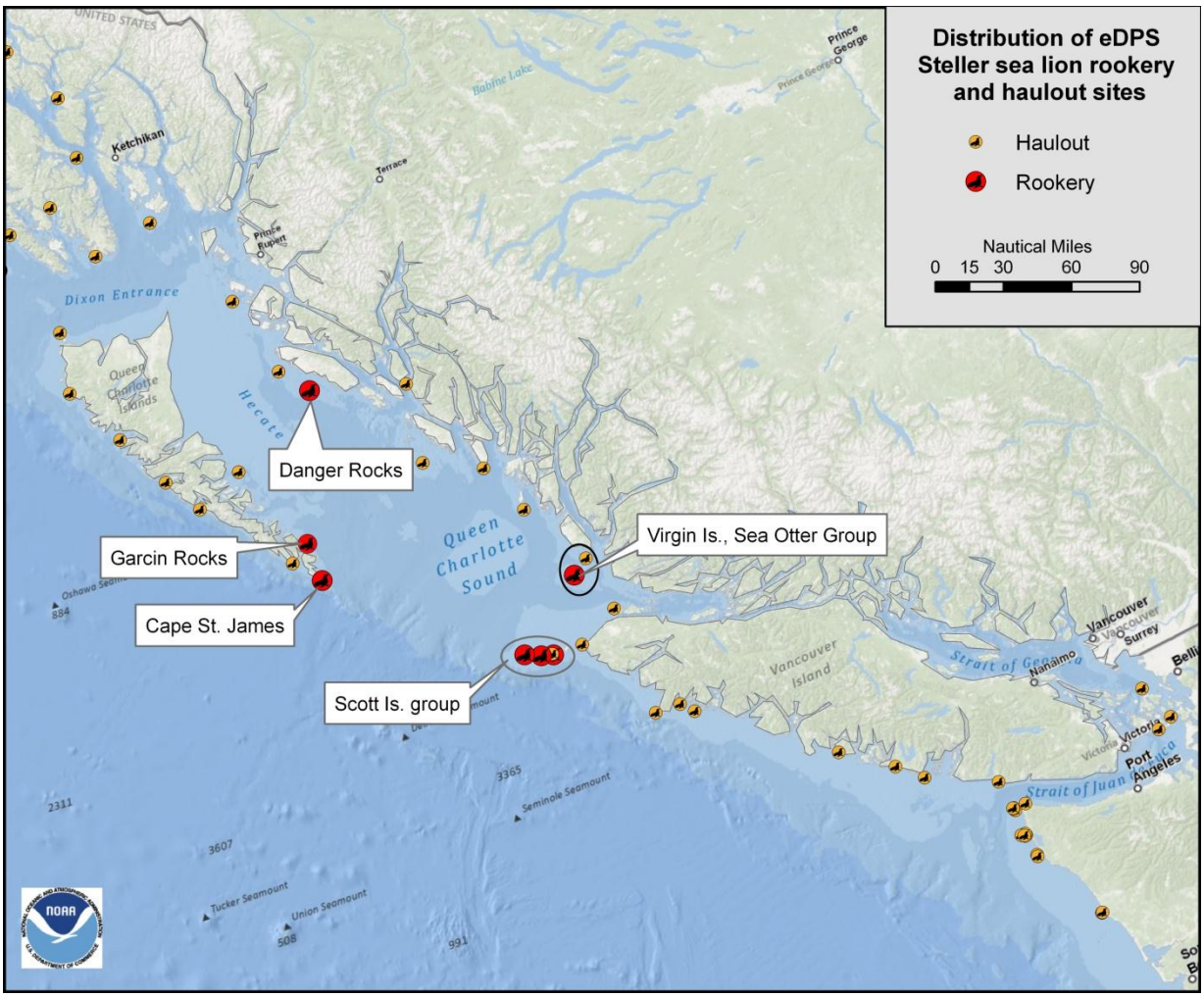
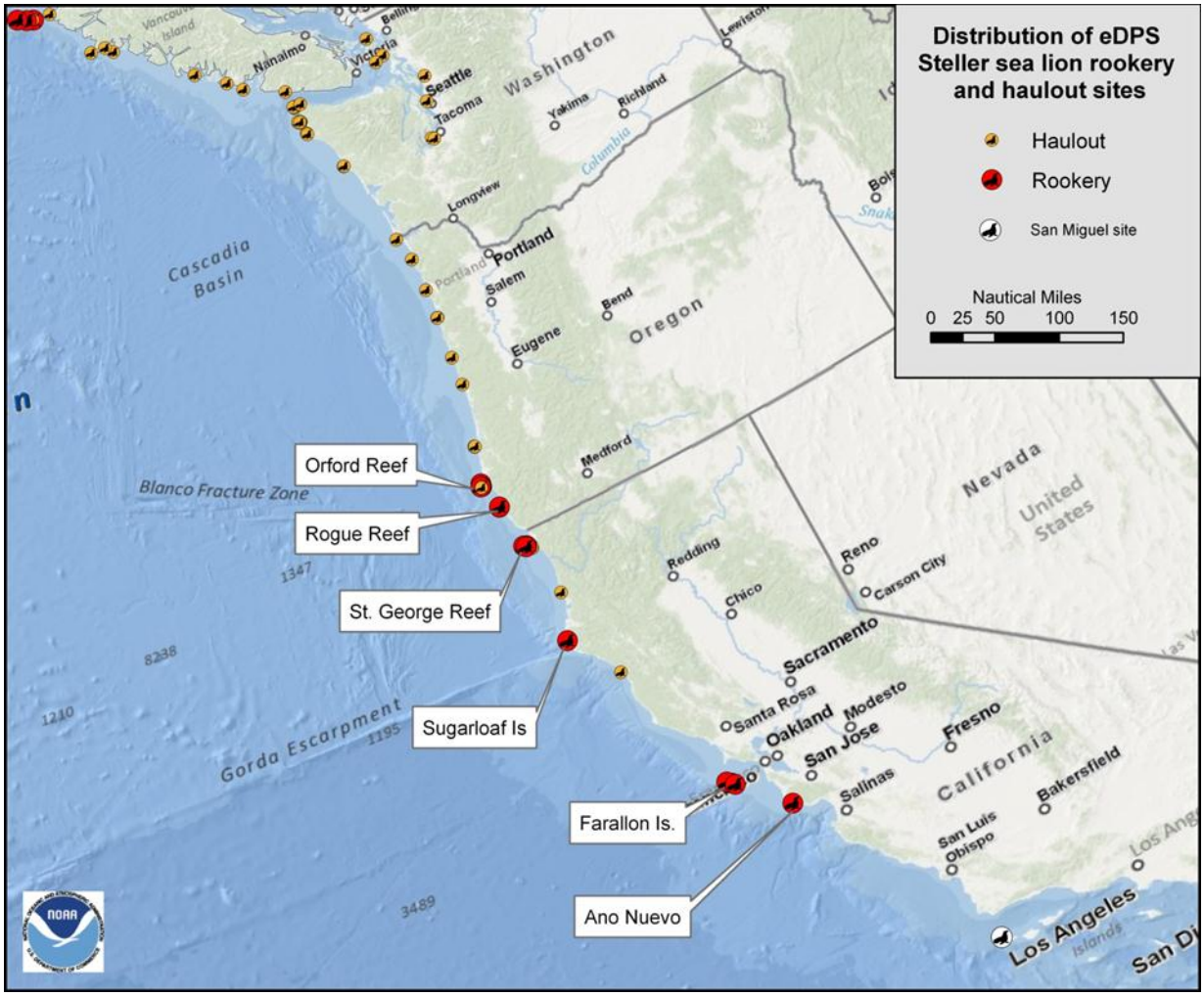


Figure 11. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts from Washington to California.



3.2.2 Movements

Information about movement patterns is important for understanding the nature and extent that local and range-wide threats may have on eastern DPS animals, for evaluating data on distribution and abundance, and for evaluating population structure. Such information comes from mark-resight studies of animals branded as pups (e.g., Raum-Suryan *et al*. 2002; Scordino 2006; L. Jemison unpublished data) and from animals instrumented with a variety of electronic tags (e.g., Merrick and Loughlin 1997; Baba et al. 2000; Loughlin et al. 2003; Raum-Suryan et al. 2004; NMML unpublished data).

During the pupping and breeding season, which varies somewhat with latitude but extends from late May to early July (Pitcher and Calkins 1981; Gisiner 1985; Pitcher et al. 2001), most adult Steller sea lions occupy rookeries typically on islands or offshore reefs. While some juveniles and non-breeding adults occur at or near the rookeries during the breeding season, most are on haulouts or are at sea foraging. After the breeding season, animals may disperse from the rookery at which they breed.

While it is often summarized that Steller sea lions are not known to make regular migrations, as noted above, there are well-defined seasonal movements in parts of the range of the eastern DPS. After the breeding season, males migrate north along the Oregon coast (Mate 1975) and this movement coincides with a "sharp increase in the number of animals wintering off southern Vancouver Island (Bigg 1985)" COSEWIC (2003:13). Additionally, as summarized above, Scordino (2006) documented seasonal movements of females that breed in Oregon and Northern California. However, while some individuals are able to move large distances, others may occupy relatively restricted regions depending on age, sex, and season (Mate 1973; Baba *et al.* 2000; Raum-Suryan et al. 2002, 2004; Scordino 2006). Womble et al. (2005) described a seasonal dispersion of Steller sea lions from offshore breeding areas of Southeast Alaska to the inner waterways of the region. These movements were associated with seasonal aggregations of high energy prey such as herring and eulachon. For example, adult males have been seen over 1000 km from where they held a territory earlier in the same year (also their natal rookery) (Mate 1973; Scordino 2006). In contrast, Raum-Suryan et al. (2004) noted "…nearshore areas adjacent to haulouts are critical to the developing juvenile" as 90% of round trips were $\leq$ 15 km from haul-outs and 84% were < 20 hours in length. Thus, when young animals were using a particular haulout, they did not travel far or stay at sea very long (Raum-Suryan et al. 2004:823). These data indicate that potential threats near haulouts (e.g., human disturbance, predation, intensive prey removals) are of particular relevance to developing juveniles.

The picture is further complicated because females with their pups are known to disperse from rookeries from August-October (Calkins and Pitcher 1982; Merrick et al. 1988; Raum-Suryan et al. 2002; Scordino 2006). In Oregon and northern California, Scordino (2006:21) reported a "marked pattern in seasonal abundance and distribution" of females with a decline in the abundance of females and pups in both Oregon and northern California through the fall "…as many individuals traveled north beyond the Oregon border." Hence, potential threats to Steller sea lions occurring in regions far to the north of Oregon in the winter may affect individuals that breed in northern California and Oregon in the spring and summer.

Both pups and juvenile Steller sea lions can be impacted by threats far from where they are born. Based on analysis of resights of 8,596 pups branded on their natal rookeries in Alaska from 1975-1995, Raum-Suryan *et al*. (2002) found that by five months of age, pups can move over 400 km from natal rookeries. Based on resights of pups branded between 2003-2005, Scordino (2006) found that most pups from Northern California and Southern Oregon remained close to their natal rookery but 9-22% dispersed farther than 500 km. One-year olds moved further than pups and by three years of age, males dispersed

greater distances than females. Pups branded on their natal rookeries in British Columbia (Fisher 1981) have been seen at Cape Saint Elias, Alaska (within the range of the western DPS); pups branded in the Gulf of Alaska have been sighted in Southeast Alaska and British Columbia; and some marked in Oregon have been seen in northern California, Washington, British Columbia, Southeast Alaska, and the Gulf of Alaska (Chiswell Island) within the range of the western DPS (Calkins and Pitcher 1982; Calkins 1986; Loughlin 1997; Scordino 2006).

Juvenile Steller sea lions often disperse widely, including documented movements up to 1,785 km from their natal rookeries (Raum-Suryan et al. 2002). Typically all long distance movements (those greater than 500 km) of juveniles were by males (Raum-Suryan et al. 2004).

Movement across the eastern DPS/western DPS boundary by animals (particularly juveniles) from both populations occurs (Raum-Suryan *et al.* 2002, 2004; Gelatt et al. 2007; Scordino 2006; Pitcher et al. 2007). AFSC (2011) summarized unpublished Alaska Department of Fish and Game (ADFG) mark-resight data for 2,000 pups marked on eastern DPS rookeries from 2001-2005. Of the 107 individual sea lions that traveled to the western DPS from the eastern DPS, only two were females: one returned to her natal rookery, the other traveled west at one year of age, but has not been resighted since. These data imply that eastern DPS males are more likely to be exposed than eastern DPS females to threats within the breeding range of the western DPS.

3.3 Foraging Ecology

Knowledge of the general foraging ecology of Steller sea lions and the particular foraging habits and ecology of the eastern DPS (to the extent that this is known) helps evaluate potential threats to that population. Some threats may indirectly affect sea lions by adversely affecting the physical characteristics of feeding habitat (e.g., changes in temperature or acidity that affect prey species distribution, survival, or reproduction) and/or through more direct impacts on the composition, abundance or seasonal and temporal distribution of prey species (e.g., due to pollution and fishery-related removals). The following summary is relevant to understanding how threats (e.g., human disturbance, climate change, fisheries) on Steller sea lion prey might influence future population growth and long-term viability of the eastern DPS. For additional details on this subject and a broad review of the nutritional stress concept relevant to Steller sea lions are provided in NMFS (1992, 1998, 2000, 2001, 2008, and 2010c).

Steller sea lion diet is a function both of spatial and temporal patterns of prey, prey abundance, and the ability of the individual (e.g., due to age and/or constraints due to pup rearing) to access prey. Available data indicate that Steller sea lions forage on a wide variety of demersal, semi-demersal, and pelagic prey, including many species of fish and cephalopods with regional differences (e.g., Gentry and Johnson 1981; Pitcher and Fay 1982; Calkins 1988; Calkins and Goodwin 1988; Daniel and Schneeweis 1992; Merrick and Calkins, 1996; Sinclair and Zeppelin 2002; Womble and Sigler 2006; Gende and Sigler 2006; Waite and Burkanov 2006; Trites et al. 2007) and occasionally eat other marine mammals and birds. NMFS (e.g., 2000, 2008, 2010c) and Trites et al. (2007) provide lists of prey known to be consumed. This generalist foraging capability buffers, but does not eliminate, the sensitivity of Steller sea lions to reductions or changes in distribution in a single species of prey in a given area. Such sensitivity is likely affected by availability of other prey at a given location and in a particular season, the cost of acquiring such alternate prey, and the nutritional benefits they derive from consuming it.

Nutritional requirements vary with age as does the ability to access prey. Diving ability develops over time in young animals and limits foraging ability until animals are proficient divers (e.g., Merrick and Loughlin 1997; Swain and Calkins 1997). For example, pups grow rapidly and mothers must supply them with a large amount of energy (e.g., Higgins et al. 1988; Winship et al. 2001; 2002). Estimates indicate that lactating females may need to consume about 70% more food in order to provide all of her pup's nutrition over its first year (Winship et al. 2002). Food consumption increases with age and varies with sex (males eating more than females) (Kastelein et al. 1990).

The foraging strategies of Steller sea lions vary by sub-region, and certainly also vary by gender of the animal, season of year, and age (NMFS 2010c). There are seasonal changes in foraging distances, probably related to prey availability (e.g., Merrick 1995; Womble et al. 2009) and prey movements (e.g., Loughlin 1993; Sigler et al. 2009). This variability in foraging strategies, distances, etc., is likely related to the fact that the abundance, distribution, quality, and in some cases the nutritional value, of prey available to Steller sea lions also varies geographically, seasonally, among years, and may vary relative to the life stage and sex (e.g., pup, juvenile, non-reproducing adult, pregnant or nursing female, etc.) of the individual animal (see Rosen 2009).

The relative importance of different species in the diet differs throughout the range (e.g., Trites et al. 2007). In the Gulf of Alaska (a location where some eastern DPS animals travel to feed), Merrick and Loughlin (1997) characterized sea lion diet as approximately 66.5% gadoids (pollock, Pacific cod, Pacific hake, and unidentified gadoids); 20.3% Pacific salmon; 6.1 % small schooling fish; 3.9 % flatfish; 2.9 % squid or octopus; and 0.3 % Atka mackerel. The diet of Steller sea lions in Southeast Alaska in the 1990s included more than 61 species of prey and was more diverse than in any other part of Alaska (Trites et al. 2007) and more diverse in summer than fall. Steller sea lion prey in southeast Alaska included: walleye pollock (*Theragra chalcogramma*), Pacific herring (*Clupea pallasii*), Pacific sand lance (*Ammodytes hexapterus*), Pacific salmon (Salmonidae), arrowtooth flounder (*Atheresthes stomias),* rockfish (*Sebastes* spp.), skates (Rajidae), and cephalopods (squid and octopus). Pollock has been more frequently observed in the diet of sea lions from the inside waters of southeast Alaska than anywhere else in Alaska (Sigler et al. 2009). Summer diet in British Columbia includes forage fish such as herring, sandlance and sardines, as well as mid-sized schooling fish such as salmon, hake, and rockfish (DFOC 2011).

Many Steller sea lion prey species seasonally form large aggregations after migrating from pelagic to nearshore waters to spawn. Salmon, herring, Pacific cod, capelin, eulachon, and other species, tend to have localized and highly seasonal patterns of abundance. Other species, such as cephalopods, pollock, sand lance, arrowtooth flounder, and rock sole, may be available year round in many locations (e.g., see Calkins and Goodwin 1988; Sinclair and Zeppelin 2002; Trites et al 2007; Womble and Sigler 2006) but their nutritional value may vary seasonally.

3.4 Reproductive Biology

Steller sea lions typically breed and pup at remote sites (rookeries) at which sexually and physically mature males compete for territories and access to females. They have a polygynous mating system.

Male Steller sea lions become sexually mature between three and seven years of age. Males may become territorial at 10 and 11 years of age (Calkins and Pitcher 1982). Breeding males set up territories in May (Pitcher and Calkins 1981) and females, most of who return to breed at their natal rookery, begin to arrive shortly thereafter (e.g., Gentry 1970; Merrick 1987). Most males do not defend a territory for more than 3 years, although they may return for up to 7 years (Gisiner 1985). The breeding sex ratio of females

to males is often summarized to be about 10-15:1 (Gisiner 1985; Merrick 1987), although this may vary by site.

Female Steller sea lion become sexually mature between three and six years of age; they may still reproduce into their early 20s (Mathisen et al. 1962; Pitcher and Calkins 1981). Pitcher and Calkins (1981) concluded that adult females normally ovulate once each year and that most breed annually. However, Steller sea lion females may experience reproductive failures so breeding and pregnancy may not always result in a surviving pup, especially during periods of nutritional stress (Pitcher et al 1981).

Pregnant females typically give birth to one pup within a few days of arriving on the rookery. About 90% of pups within a given rookery are born within a 25-day period (Pitcher et al 2001). Because pupping is so highly synchronous, there are temporal periods of high vulnerability to stressors, such as disturbance or fluctuations in prey availability. Pupping occurs from late May to early July and peaks in June (Pike and Maxwell 1958; Mathisen et al. 1962; Gentry 1970; Pitcher and Calkins 1981; Bigg 1985; Pitcher et al. 2001). The mean date of pupping varies throughout the range of the eastern DPS, but not in a linear fashion with latitude. Pitcher et al. (2001) reported that the earliest mean pupping date occurred at Forrester Island in southeast Alaska and that the mean date becomes progressively later both south and north of this location, with the latest mean date at Año Nuevo in California. They hypothesized that female nutritional status likely explains the differences in pupping times at individual rookeries, but that the mean timing of births at rookeries was determined by the availability of prey near rookeries and weather conditions favorable for pup survival.

For roughly the first week following birth, mothers stay with and nurse their pups on the rookery. After this time, they go on regular foraging trips, the length of which can also be highly variable, depending on geographic location (Higgins et al. 198;, Hood and Ono 1997; Brandon 2000). Females typically breed about 11 days after they pup. Implantation of the blastocyst is delayed until about 3.5 months after breeding.

Pups first enter the water at about 2–4 weeks of age (Sandegren 1970) and can swim in the open ocean at about 4 weeks of age. Pups begin to disperse (with their mothers) from rookeries to haulouts between 2-3 months of age (Raum-Suryan et al. 2002; Scordino 2006). Most pups are weaned in their first or second year, but some may nurse into their third year (Pitcher and Calkins 1981; Porter 1997; Loughlin 1998; Trites and Porter 2002; Trites et al. 2006; summarized in NMFS 2008). Trites et al. (2006) reported that the proportion of time that Steller sea lion pups nursed declined through the spring to early summer suggesting that sea lion pups began supplementing their milk diet with solid food in the spring. They concluded that weaning appears to typically occur at the start of the breeding season when pups are one or two years old. No sea lions were observed to be weaned during the winter. Observations made in Southeast Alaska found that offspring sex may affect the length of lactation - most male sea lions were weaned at two years of age whereas about 50% of females weaned at 1 year and the remainder at 2 years of age (Trites et al. 2006).

It is unclear how pup dependency may be affected by the body condition of the mother and/or the pup, pup birth weight or growth rates, or related to the availability of prey resources. Merrick et al. (1995) found that pup sizes were not related to local trends in abundance. Rather, pups grew faster (Brandon et al. 2005) and 2-4 week old pups weighed more at (western DPS) declining rookeries in the Gulf of Alaska and Aleutian Islands than at stable or increasing rookeries in Southeast Alaska (eastern DPS), and, in the case of pup weight, in Oregon. However, Fadely and Loughlin (2001) found that in the late 1990s the

relationship between pup condition and growth rate was weak and not consistent, throughout the range (of the western DPS).

3.5 Historic and Current Abundance and Productivity

This section provides abundance estimates, non-pup trend data, and data available about trends in pup production for the eastern DPS of Steller sea lion. These data provide insight into whether recovery in abundance has been achieved and is likely to continue for the foreseeable future, given assumptions about current and possible future threats.

In the Recovery Plan, NMFS (2008) reviewed available historical records of Steller sea lion abundance within the eastern DPS "...in an attempt to relate current population size with levels prior to the initiation of standardized surveys." NMFS (2008) noted that this task is difficult because historic counts are not directly comparable to current counts, having been collected using a variety of methods and at varying times of the year (Pitcher et al. 2007). Hence, NMFS (2008) did not subject counts in U.S. waters prior to the 1970s to quantitative analyses. NMFS's (2008) analyses and conclusions for the eastern DPS relied heavily on the comprehensive evaluation of abundance and trend (between the late 1970s and 2004) presented in Pitcher et al. (2007). Updated information is provided below, as available.

Two types of counts are used to study trend in Steller sea lion populations: counts of pups of up to 1 month of age and counts of non-pups (1+ year olds) (Pitcher et al. 2007; Olesiuk et al 2008; DeMaster 2009; Fritz and Gelatt 2011; NMFS 2010c). NMFS currently monitors Steller sea lion status in Alaska by counting animals during the breeding season at trend sites in conjunction with State and other partners. Trend sites are a set of terrestrial rookeries and haulouts where surveys have been consistently undertaken for many years (NMFS 2008, 2010). These counts are accomplished at varying intervals throughout the range. Throughout the range, there are two groups of trend sites: those that have been consistently monitored since the mid 1970s (called 70s trend sites) and those monitored since 1991 (90s trend sites; NMFS 2010c).

The techniques used for Steller sea lion counts have changed over time. Thus, data collected during different periods using different techniques (e.g. on-site counts, oblique photo counts, or vertical high resolution photos) are not directly comparable (Fritz and Stinchcomb 2005; Pitcher et al. 2007; Kaplan et al. 2008; DeMaster 2009; NMFS 2008, 2010c).

The estimated ratio of pups to non-pups in Steller sea lion populations can be used to estimate population size. This method was described by Calkins and Pitcher (1981) who estimated that the total population size was 4.5 times the number of pups born. This derivation is based on estimates of sex and age structure, and birth rates, in a stable population for the Gulf of Alaska.

Population trend is calculated by plotting non-pup counts over time. NMFS (2010: page 80) stated that using the currently established and consistently applied survey methodology (in which non-pup counts are completed by vertical high resolution photography every 2 years), there is a greater than 90% chance of detecting a 1% per year change in population abundance over 8 years (over which time, 4 surveys would have been undertaken).

3.5.1 Eastern DPS Overall

The best available information indicates that the overall abundance of Steller sea lions in the eastern DPS increased for a sustained period of at least three decades. Similarly, the best available information indicates that pup production increased significantly, especially since the mid-1990s.

Estimated ratios of pups to non-pups in Steller sea lion populations are used to estimate population size. Using an estimation methodology based on estimates of sex, age structure, and birth rates in a stable population in the GOA, Calkins and Pitcher (1981) estimated that population size was 4.5 times the number of pups born. However, to the extent that the actual demographic characteristics of the population deviate from the assumptions underlying the model, biases can be introduced into the estimate. Based on population simulations, Berkson and De Master (1985) evaluated the accuracy of using pup counts to estimate discrete rates of population change. They found that " ... pup counts can be reliable indicators of population growth" but that they can also give a biased estimate, with the direction and magnitude of that bias depending of the maximum rate of population change and depending on which demographic parameters are density dependent. Berkson and DeMaster (1985:873) concluded that" ... caution should be used in interpreting the results unless density feedback mechanisms have been identified."

Based on the comprehensive eastern DPS range-wide survey conducted in 2002, Pitcher et al. (2007) estimated that about 11,000 pups were produced in the eastern DPS in 2002. They provided a "general" estimate of total abundance for this DPS of about 46,000-58,000, noting that several factors can affect the accuracy both of the counts and of correction factors applied during estimation. In their estimate of pup production, upon which the population estimate is based, and citing Trites and Larkin (1996), Pitcher et al. (2007:112) added 10% to the pup counts, an adjustment they noted was "subjective and arbitrary". Pitcher et al. (2007) estimated that, for the 25-year period between 1977 and 2002, overall abundance of the eastern DPS of Steller sea lion had increased at an average rate of 3.1% per year.

There are new pup and non-pup count data available since Pitcher et al.'s (2007) analyses from all portions of the range including Southeast Alaska (DeMaster 2009), British Columbia (Olesiuk 2008; P. Olesiuk, DFOC pers. comm. to T. Gelatt, NMML), Washington State (S. Jeffries, WDFW unpublished data provided to AKR and NMML), Oregon (R. Wright and R. Brown, pers. comm.), and California (NMFS unpublished data).

When these new data are added to Pitcher et al.'s (2007) time series of surveys, the interval over which we can assess population trend is lengthened, and thus, the confidence that the positive trend is real and sustained is also increased.

Johnson and Gelatt (2012) provided an analysis of growth trends of the entire eastern DPS from 1979-2010[1] based on models of the growth of subareas (e.g., Oregon, Southeast Alaska, etc.). In their subarea models, Bayesian posterior distributions of counts of both pups and non-pups for years in which counts are missing were obtained using a nonparametic approach. The authors indicate that a benefit of this method is that it accounts for possible serial correlation in the data if it is present (Johnson and Gelatt 2012, provided in Appendix 4). Johnson and Gelatt (2012) multiplied pup counts by 4.5 to estimate the total number of animals in each subpopulation (Calkins and Pitcher 1982). This analysis indicates that the eastern DPS has increased from an estimated[2] 18,313 animals in 1979 (90% CI: 16247-20436) to an

[1] In 1979, only Southeast AK was surveyed.

[2] In 1979, only Southeast AK was surveyed.

estimated 70,174 animals (90% CI = 61,146 – 78,886) in 2010. The best available information estimated annual growth rate (posterior mode) of the eastern DPS of Steller sea lions from 1979-2010 was 4.18% with a 90% confidence interval of 3.71% - 4.62%. The probability that the growth rate exceeded 3% was 0.9999 (Johnson and Gelatt 2012). From this analysis, Figure 12 illustrates the estimated abundance in each region, based on the pup counts, as well as the total abundance for the eastern DPS, and the fitted growth rate curve.

Most of the overall increase in population abundance was due to increases in the northern portion of the range in southeast Alaska and British Columbia, but pup counts in Oregon and California also increased significantly (e.g., Fritz et al. 2008; Olesiuk 2008, pers. comm.; DeMaster 2009; NMML 2012; B. Wright and R. Brown pers. comm.).

Based on non-pup data, which include count data from Washington State through 2011, and non-pup count data through 2008 from Oregon, the estimated non-pup annual growth rate for the eastern DPS as a whole is 2.99% (90% CI = 2.62% - 3.31%) (see Figure 13).

Thus, the population growth rate estimate based on non-pup counts and that based on estimates of population size derived from pup production both indicate that the population has increased for an extended period of time. Thus, despite uncertainty about actual numbers of Steller sea lions in the eastern DPS at any given period of time, we have confidence about the overall trend over time.

As it has recovered, the eastern DPS has become more important to the long-term viability of the biological species (on a worldwide basis) as a whole. The rookeries producing the most Steller sea lion pups are now in Southeast Alaska and British Columbia (Figure 15). In 2002, researchers counted nearly 2,500 pups at the Scott Islands rookery in British Columbia (Olesiuk 2008; NMFS 2008) and during a 2010 survey counted 3,936 pups there (P. Olesiuk, pers. comm. to D. Seagars, NMFS Alaska Region, March 6, 2012). Based on 2009 data (DeMaster 2009), the Forrester Island complex produced 4,036 pups and Hazy Islands 1,976 pups (both in Southeast Alaska). By contrast, in 2009 the largest rookery for the western DPS was at Ugamak Island complex (with 909 pups) in the eastern Aleutian Islands (DeMaster 2009).

[3] This fishery is included here on the basis of analogy with the federally managed Gulf of Alaska Sablefish longline fishery, which has had reported serious injury/mortalities of eastern DPS Steller sea lions. Although no such interactions have been reported in the State-managed fishery in State of Alaska waters, the two fisheries operate in similar means (e.g., time, space, and gear), and the State fishery occurs well within the range of seasonal concentrations of foraging eastern DPS sea lions, thus it is reasonable to consider that such interactions may occur.

Figure 12. Estimated abundance, 1979-2010, for the eastern DPS of Steller sea lion based on pup counts. Figure reproduced from Figure 1 of Johnson and Gelatt (2012). Points represent observed pup counts × 4.5 (Calkins and Pitcher 1982). Colored solid lines are estimates of abundance for each sub-region (and the eastern DPS total abundance) for years in which no survey took place and colored envelopes are 90% intervals for the estimated abundance in any particular year. The thick black line is the fitted linear trend of the eastern DPS total abundance from 1979-2010.

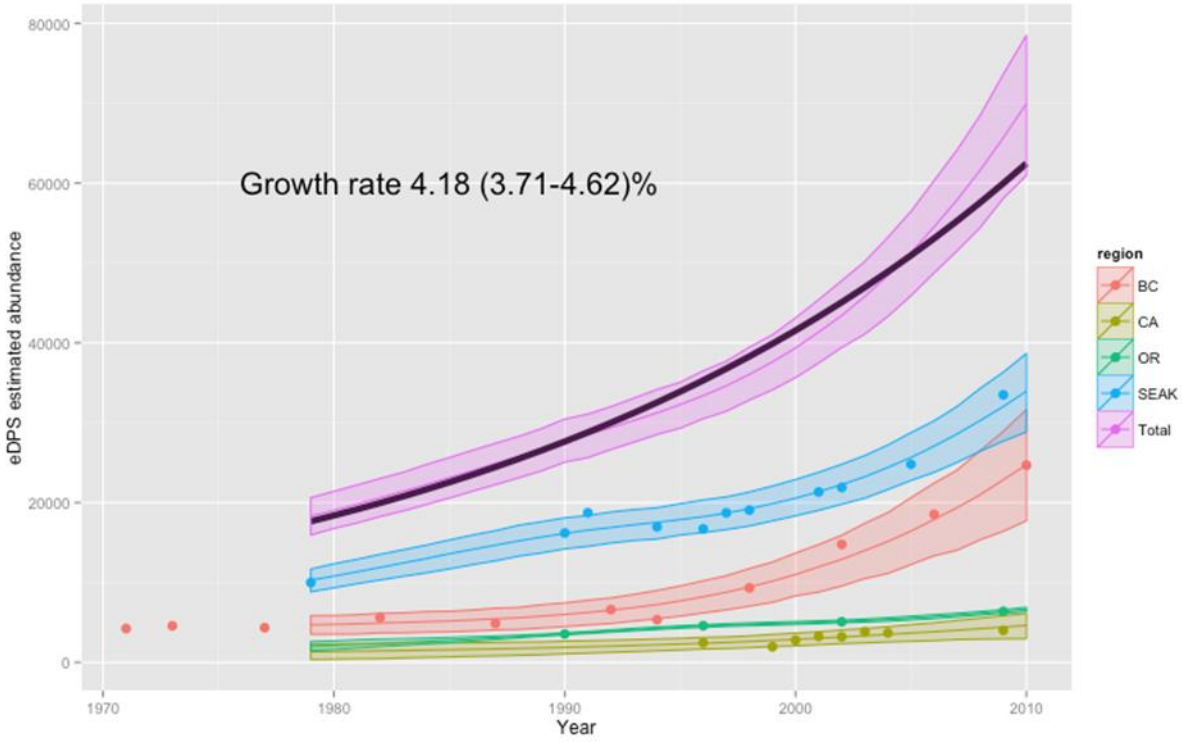
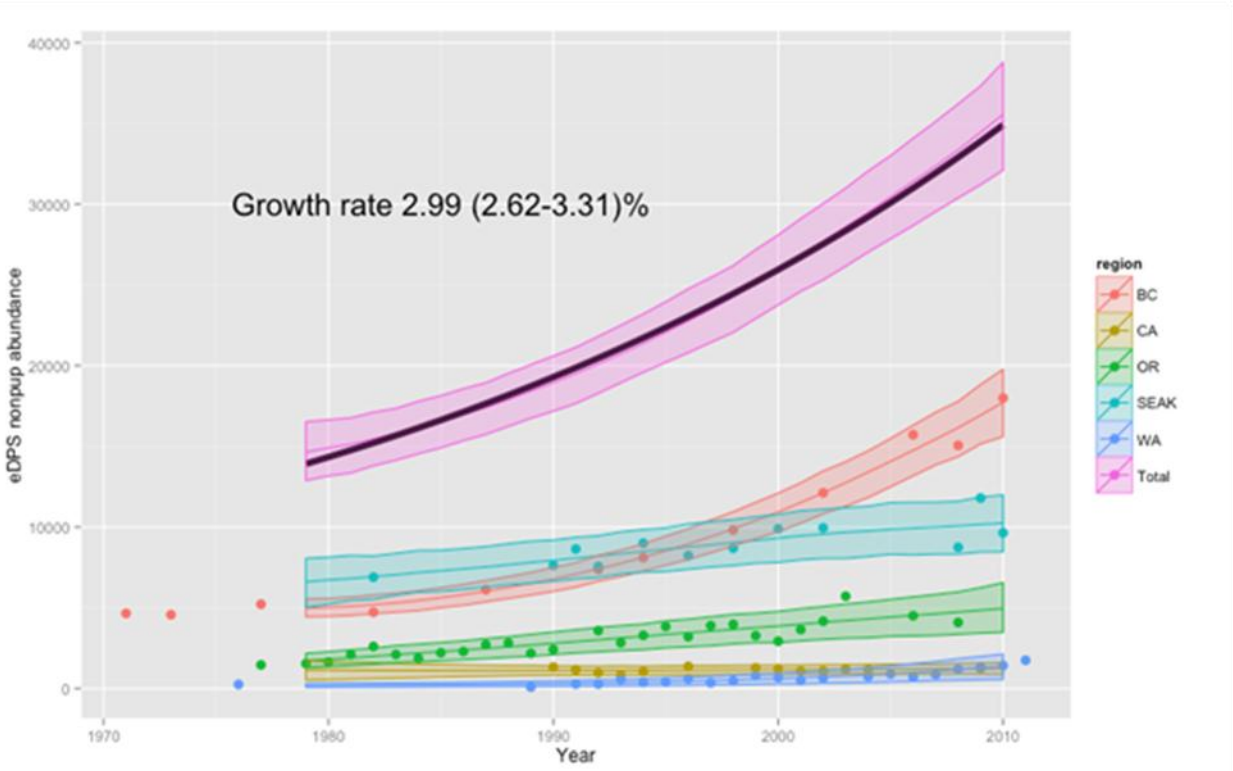


Figure 13. Estimated trends for eastern DPS Steller sea lions non-pup data, 1979-2010. Figure reproduced from Figure 2 of Johnson and Gelatt (2012). Points represent observed nonpup counts. Colored solid lines are estimates of abundance for each sub-region (and the eastern DPS total abundance) for years in which no survey took place and colored envelopes are 90% intervals for the estimated abundance in any particular year. The thick black line is the fitted linear trend of the eastern DPS total abundance from 1979-2010.



3.5.2 Southeast Alaska

Pitcher et al. (2007) noted that sea lion abundance in Southeast Alaska was probably quite low in south-eastern Alaska during the first half of the 20th century (e.g., only one rookery at the Forrester Island complex containing 50-100 animals in the 1920s and 350 in 1945). While survey information is limited up to the early 1970s, it appears the population in the region began to grow rapidly during the 1950s and 1960s (Trites and Larkin 1996). The increase occurred in terms of numbers of pups produced and also in terms of the geographic range over which pups were produced within Southeast Alaska. In the 1970s, the Forrester Complex (Figure 9) was the only functional rookery in southeast Alaska. Pitcher et al. (2007) noted that the Hazy Islands group was a substantial haulout in the 1950s, pups were first observed on this site in 1979, and pup production grew rapidly at the rookery in the 1980s (638 pups were counted in 1990; NMFS 2008). New rookeries began to be established as abundance increased in the eastern DPS. Between 1979-2005, pup production within Southeastern Alaska increased at a statistically significant rate of 3.1% (see Figure 3 in Pitcher et al. 2007) and three new rookeries (White Sisters, Graves Rock and Biali Rock) were established in the northern half of southeast Alaska between 1990 and 2005 (Pitcher et al. 2007; NMFS 2008).

Since the review by Pitcher et al. (2007), additional surveys have been undertaken in Southeast Alaska (Fritz et al. 2008; DeMaster 2009, and Fritz and Gelatt 2011). The abundance of non-pups has increased over the long term, almost doubling between 1982 (N=6,898) and 2009 (N=11,798) (Fritz and Gelatt 2011; Table 1). Non-pup counts were stable between 1991 and 1996, and increased through 2002. The 2008 data utilized in DeMaster (2009) were compromised due to the June survey date, which was considerably earlier than in previous years (NMFS 2010). Counts of non-pups in Southeast Alaska (Table 1; Figure 14) have been more variable than those in other regions, particularly in recent years. In 2009, the count was anomalously high. Additional surveys were flown in 2010 to investigate the hypothesis that the high variability in non-pup counts from Southeast Alaska and eastern Gulf of Alaska (part of the western DPS) may be related to survey timing and the movement of sea lions taking advantage of seasonally available prey resources (e.g., salmon, spawning herring). The results, shown in Table 1 (DeMaster 2009; NMML 2012), tend to support this hypothesis. As a consequence, time series of non-pup counts in these areas may be less reliable indicators of recent (since 2000) population trends than pup counts.

Pup production increased in Southeast Alaska between 1979 (N=2,219) and 2009 (N=7,443 at the 5 rookeries; total = 7,462) at a statistically significant rate of +3.6% per year, if one assumes that the increase is spread evenly over the years (DeMaster 2009; NMML 2012). DeMaster (2009:1) summarized that "Between 2001/02 and 2009, rookery pup production increased 50% (from 4969 to 7443) in SE Alaska." NMFS (2010) noted the levels of pup production and the density of animals on shore are likely near historical highs at Forrester Complex and Hazy Island, the two oldest and largest Southeast Alaska rookeries in southeast Alaska.

Gelatt et al. (2007, in AFSC 2010) reported on mitochondrial and microsatellite variation in samples collected from pups on Graves Rock and White Sisters, the two most recently established rookeries in Southeast Alaska. This analysis found that these rookeries were established in part by females born in the western DPS. Based on genetic analyses, in 2002 about half of the pups born on White Sisters and about 70% of those on Graves Rock were from western DPS females (Gelatt et al. 2007). To put the contribution of western DPS sourced pups at these sites into context, NMFS estimates that in 2002 there were about 270 pups born to western DPS females on these two sites, while there were an estimated 9,997 pups born to eastern DPS females throughout the eastern DPS range. Thus, the contribution of

pups born to western DPS females on eastern DPS sites was just 3% of the total pup production of the eastern DPS Steller sea lion. This status review is based on the abundance trends and information presented for Steller sea lions found within the identified range of the eastern DPS regardless of their genetic makeup.

New data indicate that the trend in population growth in new sites across the Southeast Alaskan geographic region as reported by Pitcher et al. (2007) continues. Mathews et al. (2011) estimated trends in abundance of Steller sea lions in the Glacier Bay area through Icy strait to Lituya Bay from the 1970s to 2009. They concluded that sea lions increased very rapidly (8.2%/yr. (95% CI = 6.4% – 10.0%)) in this region. They documented the transition of a haulout to a rookery (at Graves Rock) and the colonization of several new haulouts with sea lions from both the western and the eastern DPS colonizing the Graves Rock rookery. These authors suggested that the availability of new habitat following deglaciation, immigration, redistribution, decreases in mortality and ecosystem-level changes were likely factors contributing to the exceptional growth in this area. These increases in breeding range provide a measure of protection against localized stressors that may adversely affect a population.

Local knowledge and localized studies also indicate that Steller sea lions have increased in Southeast Alaska. For example, the United Southeast Alaska Gillnetters (2011) reported that they have seen "…a large increase in …populations on new rookeries and in greater numbers…in Southeast Alaska in particular. Each year the populations get larger hauling out to molt in the spring and each year the size and numbers of sea lion pups traveling in waters in the fall have also increased…". Comments from the Glacier Bay National Park and Preserve (2012) stated that, in the period from the 1970's to 2009, Steller sea lions in the Glacier Bay region (from Cape Fairweather through Icy Strait) increased at a rate of 8.2%/year (95% CI = 6.4% -10.0%). They noted that the most rapid growth (16.6%/year (95% CI = 12.2%-21.2%)), occurred from 1991-2009 at South Marble Island in Glacier Bay National Park, a haulout site that was colonized by Steller sea lions in the 1980's.

In summary, based on pup counts, Steller sea lion abundance has increased in southeast Alaska at rates exceeding 3% per year since the 1970s. Steller sea lions have expanded their use of terrestrial habitats (Pitcher et al. 2007; NMML 2012, unpublished data). The trend in non-pup counts also increased, albeit at a slower annual rate of average annual increase (1.4%). Pup production increased significantly at a rate of 3.6%/y between 1970 and 2009 (Table 4) and four new rookery sites have been established. By 2009, pup production at these four new rookeries totaled 3,407 where 30 years previously only 32 pups were counted, an increase of over 100-fold. At the Forrester Complex, pup production also increased, but by less than 2-fold during this same time period (N=4,036 in 2009), suggesting that density dependent factors may be limiting growth at this site. The rookery is likely to continue to contribute to the expanding colonization at other sites within Southeast Alaska or northern British Columbia.

Table 1. Counts of adult and juvenile (non-pup) eastern DPS Steller sea lions observed at individual rookery sites combined in southeast Alaska during June-July aerial surveys from 1979 to 2010. Data updated from Allen and Angliss (2011; Total Counts) and Table I-6 in NMFS (2008:I-47) in which data from Sease *et al.* 2001, ADF&G and NMFS unpublished data was presented. As per Fritz and Gelatt (2011), 2010E (early) refers to the non-pup survey conducted 7 June-3 July 2010; 2010L (late) refers to the movement survey conducted 10-13 July 2010.

Year	Forrester Island	Hazy Island	White Sisters	Graves Rocks	Biali Rocks	Total Count SE AK	Total Counts at Trend Sites in SEAK
1979	3,121	893	761	-	810		
1982	3,777	1,268	934	-	722		6,898
1989	4,648	1,462	734	475	794		
1990	3,324	1,187	980	937	596		7,629
1991	3,970	1,496	975	470	494		8,621
1992	3,508	1,576	860	366	398		7,555
1994	4,010	1,615	868	733	410		9,001
1996	3,551	1,759	894	475	342		8,231
1998	3,788	1,962	858	445	476		8,693
2000	3,674	1,824	1,398	558	690		9,892
2002	3,699	2,050	1,156	1,001	626*	15,284	9,949
2005	5,557	2,293	1,078		598		
2008	2,894	1,686	1,132	1,305	408	14,344	8,748
2009	4,752	2,457	1,435	1,442	616	16,986	11,797
2010E	3,385	1,642	1,557	1,057	488	15,776	9,644
2010L	3,152	1,570	W	W	509	10,803	6,155

* New data updated or added from Table 4 of Fritz and Gelatt (2011:21).
"W" refers to a site missed because of bad weather.

3.5.3 British Columbia

In British Columbia (BC), the first Steller sea lion counts were conducted at rookeries in 1913 (DFOC 2008). Based on these counts, an estimated 14,000 Steller sea lions of all ages, including pups, were present on rookeries in 1913-19, a period before any large scale killing occurred (Bigg 1984, 1985; DFOC 2008; DFOC 2011). As a result of culling, estimated abundance fell to approximate 12,000 animals by 1938 and rookeries on the Sea Otter Islands group were eradicated. Harvest and predator control programs resumed in the decade spanning 1956-1966 with large scale killing on rookeries throughout BC reducing abundance from 8,900-9,400 in 1956 (DFOC 2008) to about 4,550 by 1961 (DFOC 2011), and an estimated (DFOC 2008) total in 1970 of about 3,400 animals. DFOC (2011:27) concluded the rookeries in British Columbia had been severely depleted, to about one-quarter of their historic size by the time protection was afforded, first in 1970 by the Fisheries Act in Canada, and then in 1972, by the U.S. Marine Mammal Protection Act. The major factor causing this depletion was intentional killing.

There are now four Steller sea lion rookeries in British Columbia: the Scott Island complex (including Triangle, Beresford-Maggot, and Sartine Islands), Cape St. James, North Danger rocks (Pitcher et al. 2007) and one recently re-established in the Sea Otter group (Olesiuk 2008) (Fig 3.2). Olesiuk (2008) summarized that at present these four known breeding areas account for more than 99% of the pup production in British Columbia. Despite being subjected to similar commercial harvests, disturbances, and predator control programs that had eliminated the Sea Otter group rookery, the first three sites were able to persist into the 1970s, each producing less than 350 pups/yr. Pitcher et al. (2007) concluded that the numbers at the Scott Islands had fully recovered by 2002 but that abundance at the other rookeries was still below historic levels. Based on data in Table 3 of Olesiuk (2008:19), between 1971 and 2006, pup production at Triangle Island rookery increased over 13-fold (from 181 in 1971 to 2,674 in 2006). However, pup production increased by a factor of 1.8 (from 760 to 1,366 pups) at all of the other four rookeries combined. DFOC (2011) reported that pupping has resumed at a breeding site in the Sea Otter group (on Virgin Rocks) in 2006 and a new rookery has been established on Garcin Rocks with pup counts of 104 and 217 in 2008 and 2010, respectively (P. Olesiuk, pers. comm. to T. Gelatt, NMML, Feb. 28, 2012).

Olesiuk (2008) reported there are 23 year-round haulouts in British Columbia and the number of year-round sites occupied by Steller sea lions has increased from twelve to twenty-three sites over that past three decades. (Pitcher et al. 2007 reported 24 main haulouts are used during the breeding season). These haulouts are typically located along the exposed outer coastline. Pitcher et al. (2007) calculated that the number of Steller sea lions counted at these sites increased at a rate of 4% annually from the early 1970s to 2002, when 6,681 non-pups were counted on haulout sites in British Columbia.

Since the species was protected under the Fisheries Act in 1970, province-wide aerial surveys have been conducted every 4-5 years (DFOC 2011). DFOC (2008) reported that adult and juvenile (non-pup) abundance in British Columbia was stable until the early 1980s and then increased at a rate of 5%/year (see Figure 4 of DFOC 2008:6). Based on these data, Olesiuk (2008) reported that counts of adult and juvenile sea lions more than tripled between 1971 (N=4,653) and 2006 (N=15,700) in British Columbia. P. Olesiuk of DFOC (pers. comm. to T. Gelatt, Feb. 28, 2012) has recently provided updated and new (for 2008 and 2010) information on counts of non-pups (and pups, see below) in British Columbia. These data are provided in Table 2. Based on the most recent, but as yet unpublished survey, P. Olesiuk (pers. comm. to T. Gelatt, NMML, Feb. 28, 2012) reported that 17,996 nonpup Steller sea lions were counted in British Columbia in 2010 (Table 2).

In British Columbia, pup production increased from a count of 941 in 1971 to 4,118 in 2006, an increase that would be about 3.9% per year if the increase had been steady (Table 2). However, DFOC (2008:5) clarified that, like non-pup numbers, pup production was stable until the mid-1980s "but subsequently increased at 7.9% per annum." After applying correction factors to account for pups obscured in photographs and for pups not included in censuses (following Trites and Larkin 1996 and Pitcher et al. 2007), Olesiuk (2008) estimated total pup production in British Columbia in 2006 to be about 4,800 and that the total abundance could range from 4.0 to 5.8 times the number of pups born. Olesiuk (2008) concluded that "…at least 20,000 and perhaps as many as 28,000 Steller sea lions currently inhabit coastal waters of B.C." As noted above, P. Olesiuk, DFOC (pers. comm. to T. Gelatt, NMML, February 28, 2012) recently updated pup count data presented previously (in Olesiuk 2008), and also provided new pup count data for British Columbia. Pup production in B.C. has continued to increase, with the most recent pup count of 5,485 in 2010. These updates and the new information indicate that Steller sea lion pup production in British Columbia has been increasing at 7.3% per year since the mid-1990s and has increased significantly at 4.5% since the early 1970s. Non-pups have increased significantly at 3.6% per year since the early 1970s.

In summary, in British Columbia, the eastern population has expanded their use of terrestrial habitats northward since the 1970s (Pitcher et al. 2007; Olesiuk 2008; NMFS 2008; DFOC 2011; NMML, unpublished, cited in AFSC 2011) and with the recent reestablishment of the Sea Otter Group rookery (55 pups counted in 2006), Steller sea lions are now breeding on all documented historic rookeries in Canadian waters (Olesiuk 2008). The population has shown a strong growth and recovery in British Columbia for 30 years or longer (Table 2; Figures 12, 13, 14, and 15).

Table 2. Counts of eastern DPS Steller sea lions on rookeries and haulouts in British Columbia, 1971-2010. Data provided by P. Olesiuk, Dept. Fish. Oceans, Canada, pers. comm. to T. Gelatt, NMFS, NMML, February 28, 2012; some data previously presented in other references (e.g., NMFS 2008), and Olesiuk 2008).

Year	Non-pups	Pups	Total
1971	4,653	941	5,594
1973	4,570	1,015	5,585
1977	5,219	963	6,182
1982	4,726	1,245	5,971
1987	6,122	1,084	7,206
1992	7,378	1,468	8,846
1994	8,104	1,186	9,290
1998	9,818	2,073	11,891
2002	12,122	3,281	15,403
2006	15,721	4,118	19,839
2008	15,061	4,067	19,128
2010	17,996	5,485	23,481

3.5.4 Washington

Kenyon and Scheffer (1959) reported 2000-3000 Steller sea lions on Jagged Island in August and September of 1914, 1915 and 1916. The number of animals at this location was subsequently reduced - primarily due to intentional killing related to a bounty offered by the State of Washington.

Pitcher et al. (2007) reported that Steller sea lions, presumably immature animals and non-breeding adults, regularly used four haulouts, of which two were "major" haulouts (with > 50 animals) during the breeding. From 1989-2002, surveys were conducted almost annually. Pitcher et al. (2007) reported a maximum statewide breeding season count of 847 between 1978-2001, and a count of 651 non-pups at the two major haulouts in 2002. They also reported that the numbers of sea lions counted between 1989 and 2002 on Washington haulouts increased significantly, at an average annual rate of 9.2%.

In the petition to delist the eastern DPS of Steller sea lion submitted by the ODFW and the WDFW, the petitioners, citing unpublished WDFW data, reported that sea lion surveys conducted by the WDFW along the Washington coast show "…both increasing Steller sea lion numbers at haul out areas as well as increasing number of newborn pups at several locations over recent years." WDFW provided Steller sea lion count data from 1915-2011 (S. Jeffries email of June 9, 2011 to L. Rotterman, NMFS, AKR: data through 2010; S. Jeffries email of Nov. 2012 to T. Gelatt et al., NMFS, NMML: update to 2011) (see Table 3 and Figure 14). We incorporated these data into the analysis of the overall population trend based on non-pup data for the eastern DPS (Figure 13). While counts are not yet at historic levels, data (Table 3 and Figure 14) indicate that Steller sea lion abundance in Washington State has been increasing since the early 1990s (increasing trend seen in 1993).

WDFW also reported that an increasing number of newborn Steller sea lion have recently been observed along the coast of Washington State (ODFW and WDFW 2010) but there are no active rookeries.

3.5.5 Oregon

There are currently two active rookeries, Rogue Reef and Orford Reef, and seven major haulouts occupied in Oregon during the breeding season (Pitcher et al. 2007). NMFS (2008:I-15) noted that historical data prior to 1968 on Steller sea lion abundance in Oregon are scant (Pitcher et al. 2007) and, thus, "…the relationship of present numbers to levels during the 1800s and early 1900s is not known". However, evidence indicates that the breeding abundance of Steller sea lions in Oregon has increased since 1977. Goodman (2006) noted that the non-pup count data from Oregon, which at the time of his analysis included 24 annual counts from 1977-2002 (missing only 1978 and 1991), was one of two "longest monitoring series available" for the eastern DPS. He evaluated these data in his analysis of the extinction risk of the eastern DPS. Goodman (2006) concluded that this time series of counts (and the pup counts from SEAK) showed "…consistent exponential growth estimates of about the same magnitude, centered around 3 to 3.5%, SE Alaska being the lower, with similar confidence interval widths, and with no indication of large environmental variation (or varying extraneous influences)."

Pitcher et al. (2007:105-106, see Figure 3) reported that the total number of non-pups at rookeries increased at an average annual rate of 2.5% from 1977 (1186) to 2002 (2442). Including the numbers of Steller sea lions at haulouts, NMFS (2008, based on data in Brown et al. 2002) reported an annual rate of increase in the total number of non-pup sea lions counted during the breeding season surveys at all of these sites at a significant rate of 3.7%/y between 1977 (1,461) and 2002 (4,169).

New data are available from Steller sea lion surveys conducted by the Oregon Department of Fish and Wildlife (ODFW) in 2003, 2005, 2006, and 2008. In their petition to delist the eastern DPS of Steller sea lion, ODFW and the WDFW (2010:2), citing these unpublished ODFW data, reported that abundance surveys conducted from Northern California to Washington demonstrate continued population growth at nearly 4% through 2008. ODFW provided these data to NMFS for this status review (B. Wright, email to L. Fritz and L. Rotterman, Dec. 7, 2012) (Table 3). The final count for 2003 was anomalously high at 5,714 non-pups counted and, in that year, increases in non-pup numbers were seen at multiple locations throughout the state. The count for 2005 was incomplete due to poor weather. Counts for 2006 and 2008 indicate the non-pup abundance trajectory generally follows the upward trend line depicted in Pitcher et al. (2007) (B. Wright, ODFW, pers. comm.; see Table 3 and panel D of Figure 14; see also Figure 13).

Pup count data are also available for Oregon for the years 1990, 1996, 2002, and 2009 (B. Wright and R. Brown). These data are included in the estimate of the overall population size and growth rate for the eastern DPS (Figure 12) (Johnson and Gelatt 2012) (see also Figure 15, panel C).

3.5.6 California

Pitcher et al. (2007) summarized that Steller sea lions historically used six rookeries in California: San Miguel Island, Año Nuevo Island, the Farallon Islands, Seal Rocks off of San Francisco, Sugarloaf Island-Cape Mendocino, and Saint George Reef. They noted that additional small rookeries may have existed south of Año Nuevo. San Miguel Island, at the southernmost part of the historic range (Bonnot 1928, 1929), is no longer used, nor is the Seal Rocks site. Since the 1980s, only a few Steller sea lion pups have been born in recent times on the Farallon Islands (Pitcher et al. 2007; PRBO unpublished data).

Historic survey data from California is based on a number of sources and has been collected by a variety of means (Pitcher et al. 2007). This limits our ability to quantitatively assess long-term trends in California. However, it is clear that Steller sea lion numbers and trends in central and southern California have not followed the same trajectory as that of most of the rest of the eastern DPS and likely have been influenced by a complex suite of human activity, population growth of sympatric species, climate fluctuations and/or global warming. An unknown number of Steller sea lions were killed in the Channel Islands by commercial sealers and fishermen in the 1800s and early 1900s (Stewart et al. 1993). Pitcher et al. (2007) reported that the total statewide count of Steller sea lions on the above six rookeries in the "first half of the 20th century" was about 3,900-5,600 animals. Steller sea lion abundance in central California (Año Nuevo and the Farallon Islands) in 2002 was only about 20% of that recorded in the period from the 1920s through the 1960s (Pitcher et al. 2007). The combined 2004 count at the six rookery sites was 1,578 non-pups and 818 pups. Thus, estimates indicate that only about a third as many Steller sea lions were in California in 2004 as in the first half of the century (Pitcher et al. 2007). Pitcher et al. (2007:108) indicated that:

> from 1996 to 2004 there was no discernible statewide trend for non-pups on rookeries.. ; however, pup production increased at an average annual rate of 8%.

Recently, NMML (2012; L. Fritz email to L. Rotterman, Nov. 20, 2012) summarized trends for the three rookeries in California where breeding still occurs (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef). This summary included 2011 pup and non-pup counts (M. Lowry, SWFSC, unpublished data). The 2011 pup (see below) and non-pup (Table 3) counts are lower than many of the recent counts from California. The addition of these counts to the time series of counts increases the variance and

reduces the estimated annual rate of change for both pups and non-pups (Table 4). Non-pup counts at the three trend sites in California have been stable between 1990-2011, while pup production increased at 2.9% per year between 1996 (N=546) and 2011 (N=672) (Table 4) (L. Fritz email to L. Rotterman, Nov. 20, 2012). While the 2011 pup count is lower than in recent years, the upward trend was driven by counts in 3 of the previous 4 years, when CA pup counts were greater than 800: 2003 (855), 2004 (818), and 2009 (891) (L. Fritz email to L. Rotterman, January 16, 2013; M. Lowry, SWFSC, unpublished data).

Population trend and distribution in the southernmost portion of the Steller sea lion range differs from the rest of the eastern DPS. Pitcher et al. (2007) reported that counts of Steller sea lions in the Channel Islands peaked at about 2,000 non-pups in the late 1930s, and declined considerably in the 1940s, probably due to hunting and harassment (Bartholomew and Boolootian 1960; Bartholomew 1967). In a series of papers covering surveys of sea lions from 1927 to 1947, Bonnott (1951) stated "...the breeding range of Steller sea lion is from Santa Rosa Island to Alaska." This statement is not supported by reported observation of pups on Santa Rosa Island. The only report of pups on Channel Islands rookeries was a report of 45 live and 5 dead pups on Flea Island (Castle Rock) at San Miguel Island (Bonnot 1928). Bonnot and Ripley (1948) reported the continued decline of Steller sea lions in the 1940s with 950 animals at San Miguel Island in 1947. The next count was made in June 1958 with 37 animals reported at San Miguel including 3 pups (Bartholomew and Boolootian 1960). In the 1960s, Steller sea lions on the Channel Islands likely faced considerable and growing competition from other pinnipeds, especially California (CA) sea lions. In June of 1964, Odell (1971) estimated there was a minimum of "at least 34,382 CA sea lions, including a count of 4,598 pups." In 2000, nearly 50,000 CA sea lion pups were counted in the region (Lowry and Maravilla-Chavez 2005).

By 1969, there were two territorial adult males, associated females and 13 pups at Northwest Point, San Miguel Island. From 1969 to 1981, Steller sea lion breeding abundance on San Miguel Island declined (DeLong and Melin 2000). The last known birth of a pup on the island is variably reported to have occurred in 1981 (DeLong and Melin 2000; NMFS 2008) or 1982 (Stewart et al. 1993). The last observation of a breeding age animal on the island during the breeding season occurred in 1983 (DeLong and Melin 2000). However, up to four sub-adult and adult males were observed hauled on rocks offshore from Northwest Point, San Miguel Island in the fall, 2010 and winter of 2011 (written account from J. Harris, Research Ecologist, NMML/AFSC to T. Gelatt, Alaska Ecosystem Program Lead, NMML/AFSC, 16 February 2012).

Año Nuevo Island and the Farallon Islands were the most important Steller sea lion rookeries in California in the 1920s, with 625 and 400 pups counted at each site in 1922 (Bonnot 1929). On Año Nuevo Island, numbers remained at high levels until the early 1960s, then declined through the 1980s (Orr and Poulter 1967; Le Boeuf et al. 1991). From 1990 through 2011 pup production has ranged from 312 to 152 annually with the low counts associated with El Niño events. They have averaged 225 per year. The 2009 count was of 214 pups. This number is about one-third what was recorded in 1922.

Citing Bonnet el. (1938) and Bonnot and Ripley (1948), PRBO (Bradley and Cohen 2012) summarized that average counts for the Farallon Islands from 1927-1947 were of 600-790 animals. Counts for the Farallon Islands indicate abundance remained high from 1922 to the early 1960s and then declined sharply during the 1960s or early 1970s (Hastings and Sydeman 2002). From 1977-1996, adult female abundance declined at 5.9% annually at the Farallon Islands (Hastings and Sydeman 2002). PRBO (Bradley and Cohen 2012) provided updated information from this rookery based on weekly, year-round, ground based surveys at the Farallon National Wildlife Refuge since the early 1970's. They noted that, based on maximum count data from breeding season counts, abundance of adult females declined significantly on

average by 2.1% annually (2.1% (see Figure 3 of Bradley and Cohen, PRBO 2012)). In all but 2011, breeding season pup counts have been very low for the past 4 decades (Bradley and Cohen, PRBO 2012) and ranged from 2 to 24 pups from 1990 to 2009 (NMML 2012).

The Steller sea lions rookery at Seal Rocks near the entrance to San Francisco Bay was abandoned by breeding animals early in the first decade of the 1900s as a result of shooting by California institutional officials. It remained a seasonal hauling ground through the 1920s (Rowley 1929; Bonnot 1929) and was subsequently abandoned.

At the three remaining functional rookeries in California (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef) pup production increased at 5.3% annually from 1996 through 2009 (NMML 2012). Pitcher et al. (2007) summarized that sea lion abundance during the 2000s in central California (Año Nuevo and the Farallon Islands) was only about 15-20% of that recorded from the 1920s to 1960s.

The reasons underlying the disappearance of breeding Steller sea lions from the southernmost part of their range (i.e., the extirpation of the San Miguel Island rookery complex) are not entirely known (DeLong and Melin 2000) nor is it entirely clear why this site has not been recolonized when the eastern DPS, overall, has increased for an extended period of time. DeLong and Melin (2000) noted that:

1) The loss of the breeding rookeries at San Miguel Island, the far southern end of the range, occurred when Steller sea lions were declining in abundance (Loughlin et al. 1984) throughout their range;
2) The cause of the decline may have been related to both competition with CA sea lions for breeding habitat as well as shifts in ocean conditions.

The status of the California sea lion population has changed greatly since Steller sea lions were abundant in the southernmost portion of their historic range, including at San Miguel Island. DeLong and Melin (2000) noted that the California sea lion population had "increased exponentially" since the mid-1960s. Thus, competition for breeding and hauling out space with California sea lions may explain, at least in part, why Steller sea lions have not recolonized San Miguel Island for breeding. The rapid and dramatic increase in abundance of California sea lions in southern California waters also may have resulted in competition for prey as there is some overlap in prey between these two species. Other authors (Sydeman and Allen 1999) suggested that contaminants and disease, and synergistic relationships between these factors may have negatively affected Steller sea lions in California, leading to the continuing decline (at the time of their study in the mid to late 1990s) and the lack of increase in that part of the range following protection under the ESA.

There has been a distinct northward expansion in the range of California sea lions in recent years (Mate 1975; Bigg 1985; Maniscalco et al. 2004). This movement appears to be displacing Steller sea lions northward (Mate 1975; Scordino 2006). Furthermore, the decline in Steller sea lions at San Miguel Island occurred during a decadal shift in ocean temperature (Trenberth and Hurrell 1994; McGowan et al. 1998). Thus, in addition to the likely interspecific competition, the range of the eastern DPS of Steller sea lions also may have shifted north in response to warming ocean conditions.

Other factors, such as contaminants, may have impeded population increases and recolonization in parts of the range in California (see discussion in section 4).

To summarize population trends for California, non-pup numbers from 1990-2011 have been stable. The overall statewide population is about one-third of the numbers present in the first half of the century. Pup production has increased at about 2.9%/yr. from 1996-2011. The rookery sites on San Miguel Island in southern California were abandoned in the early 1980s. Stability in the non-pup portion of the overall California population and the lack of recolonization at the southernmost portion of the range (San Miguel Island rookery) is likely a response to a suite of factors including: climate induced northward range shift, competition for space on land (haulouts and rookery sites) and possibly for prey with other more temperately adapted pinniped species that have experienced explosive growth over the past three decades (California sea lions and northern elephant seals) , and possibly human activities or contaminants. The reasons for the poor performance and failure to increase of Steller sea lions at the Farallon Islands over the past four decades is not known and is a cause for concern (U.S. Fish and Wildlife Service Farallon Islands Refuge 2012). The focus of Steller sea lion occurrence in California has shifted from the central to the northern portion of the state. As it has been hypothesized that one likely outcome of climate warming is that the geographic ranges of species may shift toward higher latitudes (e.g., Lodge 1993; Lubchenco et al. 1993; Holbrook et al. 1997), and such shifts have already been observed in some species (NRC 2010), this shift may be an already manifested response to ongoing climate change.

Table 3. Counts of eastern DPS Steller sea lion adults and juveniles (non-pups) at trend sites (those consistently surveyed) in southeast Alaska (SE AK), British Columbia (BC), Oregon (OR) and California (CA), 1971-2009. Number of trend sites follows each region name (e.g. OR-2 is 2 sites in Oregon). Table from Fritz and Gelatt (2011) with: a) updated information for BC from P. Olesiuk pers. comm. to T. Gelatt, NMFS, NMML, February 28, 2012; b) updated information for Oregon from B. Wright email to L. Fritz, NMFS, NMML and L. Rotterman, NMFS, AKR, December 7, 2012; and c) updated information for CA from M. Lowry, pers. comm. to L. Fritz, NMML, November 14, 2012.

Year	SE AK-12	BC-all	OR-2	CA-3	CA-4
1971		4,653			
1973		4,570			
1974					
1977		5,219	1,461		
1979			1,542		
1980			1,632		
1981			2,105		
1982	6,898	4,726	2,604		
1983			2,106		
1984			1,867		
1985			2,210		
1986			2,289		
1987		6,122	2,709		
1988			2,825		
1989			2,183		
1990	7,629		2,414	1,329	
1991	8,641			1,163	
1992	7,555	7,378	3,581	969	
1993			2,838	821	
1994	9,001	8,104	3,293	1,046	
1995			3,837		
1996	8,231		3,205	1,369	1,870
1997			3,897		
1998	8,693	9,818	3,971		
1999			3,275	1,277	1,547
2000	9,892		2,927	1,215	1,704
2001			3,648	1,077	1,817
2002	9,949	12,122	4,169	1,096	1,684
2003			5,714	1,193	1,706
2004				1,163	1,578
2006		15,721	4,506		
2008	8,748	15,061	4,090		
2009	11,798			1,236	1,588
2010	9,644	17,996			

2011	935	1,450

Table 4. Annual rates of change (trends) in counts of non-pups and pups by region based on regressions of ln(count) on year. All are significantly greater than 0 ($p<0.05$) except for non-pups in California. For non-pups, this is different than the method that Johnson and Gelatt (2012), and their results are in Figures 12 and 13. Table provided by L. Fritz, NMML.

A. Non-pups

Region	Period	Annual Rate of Change
SE Alaska	1982-2010	1.4%
British Columbia	1971-2010	3.7%
Oregon	1977-2008	3.65%
California	1990-2011	0.0%
Eastern DPS	1971-2011	2.6%

B. Pups

Region	Period	Annual Rate of Change
SE Alaska	1970-2009	3.6%
British Columbia	1971-2010	4.5%
Oregon	1990-2009	3.0%
California	1996-2011	2.9%
Eastern DPS	1971-2011	3.7%

Figure 14. Breeding season (June-July) counts of eastern DPS Steller sea lion adults and juveniles (non-pups), 1971-2011: (A) at trend sites in southeast Alaska 1982-2010; (B) at all sites in British Columbia 1971-2010; (C) at all sites in Washington 1989-2011 (mean count for years with multiple surveys); (D) at all sites in Oregon 1977-2008; and (E) at trend sites in California 1990-2011(symbols); line is log-linear regression estimate. See Fritz and Gelatt (2011) for data references. Additionally, non-pup data for Oregon were provided by B. Wright and R. Brown, ODFW and non-pup data for the State of Washington were provided by S. Jeffries, WDFW. Figure provided by L. Fritz, NMML.

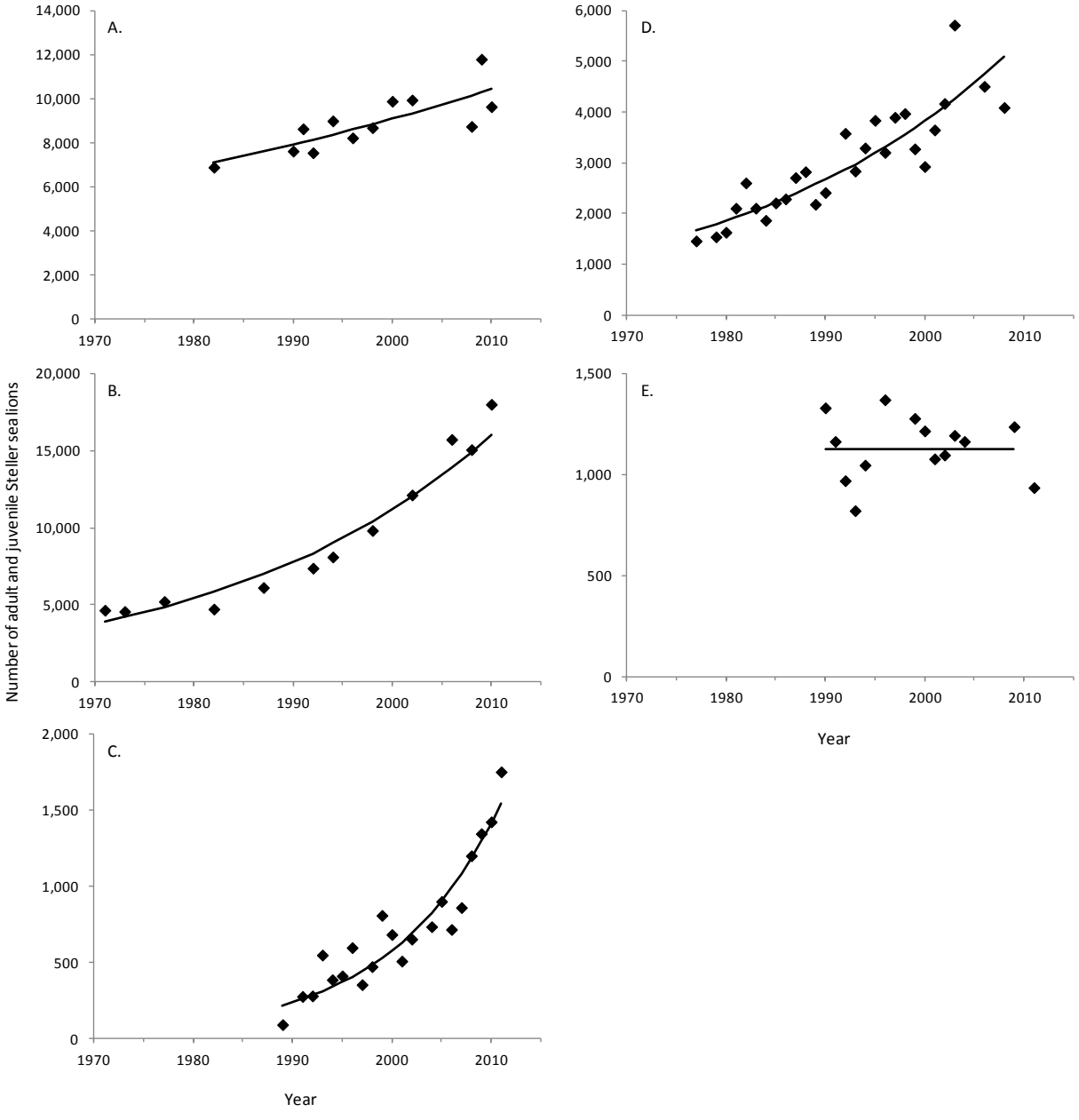
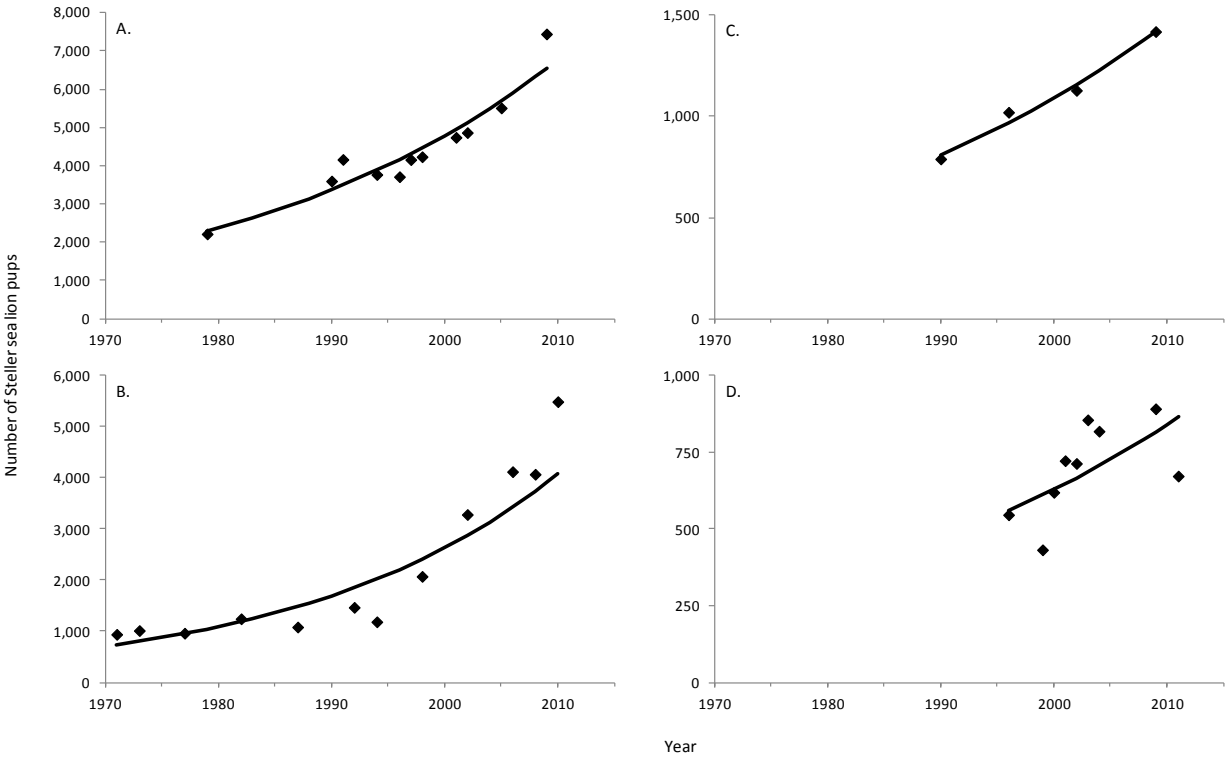


Figure 15. Counts of Steller sea lion pups in the eastern DPS, 1971-2011. A. Southeast Alaska 1979-2009; B. British Columbia 1971-2010; C. Oregon 1990-2009; D. California 1995-2011. Figure provided by L. Fritz, NMML.



4 EVALUATION OF WHETHER RECOVERY CRITERIA HAVE BEEN MET AND EVALUATION OF LISTING FACTORS

4.1 Process for evaluating if the biological and listing factor recovery criteria have been met.

Following regulations implementing the ESA (50 CFR §424.10 and 424.11) and recommendations in NMFS finalized guidance on the content of 5-year reviews under the ESA, this section reviews the best available scientific and commercial information to evaluate whether each recovery criterion listed in the 2008 Recovery Plan has, or has not, been met. The evaluation considers the biological (demographic) recovery criteria, the listing factor criteria set forth in the Recovery Plan, and the five factors included in section 4(a) of the ESA. We evaluate whether the best available information indicates that the eastern DPS currently meets the definition of a threatened species under that Act.

"The ESA requires that recovery plans, to the maximum extent practicable, incorporate objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the List (50 CFR 17.11 and 17.12). The recovery criteria comprise the core standards upon which the decision to delist a species will be based" (NMFS 2008: VII-3).

NMFS (2008: VII-2) incorporated such objective and measurable criteria for the eastern DPS of Steller sea lion into the Recovery Plan:

> To remove the eastern DPS of Steller sea lion from the List, NMFS must determine that the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Any new factors identified since listing must also be addressed in this analysis to ensure that the species no longer requires protection under the ESA.
>
> Recovery criteria must include the elimination of threats to the species as well as measures of demographic health. Both sets of criteria serve as checks on one another – one set of criteria requires evidence that the threats to Steller sea lions have been eliminated or controlled and are not likely to recur (listing factor criteria), and the other set of criteria requires evidence that the population status of Steller sea lions has improved in response to the reduction in threats (biological criteria).

The NMFS (2008) Recovery Plan, written with the assistance of a large Recovery Team comprised of federal, state, and academic scientists, fishing industry representatives, Alaska Natives, and the environmental community, undertook a threats assessment for the eastern and the western DPSs of Steller sea lion and an evaluation of the demographic response of the species following management measures to reduce threat. The Recovery Team also commissioned an assessment of the extinction risk of the eastern DPS (included as an appendix to the Recovery Plan).

The Recovery Plan and its components underwent extensive public comment and independent peer review. The threat assessment within the Recovery Plan represents a thorough review of the threats posed by various factors to Steller sea lions and an analysis of demographic data (including survey data

up to 2002). The following evaluation of the demographic criteria (4.2), the statutory listing factors, and the Recovery Plan's "delisting factor criteria" (4.3) begins with the findings of the 2008 Recovery Plan and considers those in light of new information that has become available since that document was issued.

4.1.1 Time Frame for Evaluation: The Foreseeable Future

The Endangered Species Act and implementing regulations provide the following definitions of an "endangered species" and a "threatened species" (16 USC 1532(6) & (20); 50 CFR 424.02):

> Endangered species means any species that is in danger of extinction throughout all or a significant portion of its range;
>
> Threatened species means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Thus, the objective of this status review is to assess if (NMFS 2008: VII-2):

> the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species *within the foreseeable future* throughout all or a significant portion of its range." (Emphasis added.)

"The foreseeability of a species' future status depends upon the foreseeability of both the threats to the species and its response to those threats. When a species is exposed to a variety of threats, each threat may be foreseeable on a different time frame…" (Cameron et al. 2010:55).

The term "foreseeable future" is used here to refer to the timeframe over which identified threats to the species can be reasonably foreseen, in terms of both type and magnitude, and the species' response to those threats can be assessed. In this review, the term is not interpreted to limit the timeframe under consideration to the length of time into the future for which a species' status can be quantitatively modeled or predicted. The appropriate period of time corresponding to the foreseeable future depends on the particular kinds of threats, the life-history characteristics, and the specific habitat requirements for the species under consideration. A wide range of values has been offered regarding the appropriate time horizon for the foreseeable future when evaluating "threatened" status (e.g., 10-20 years, to 100 years, or various multiples of a species' generation time). Different threats, however, may be foreseeable over different periods of time. Various threats to a species, and the species' response to those threats are not, in general, equally predictable or foreseeable (Cameron et al. 2010:57). In some cases, the ability to foresee a potential threat to the eastern DPS is greater than the ability to foresee the effect of the threat on a species, the population-level response to such effects, or the timeframe of such a response, to that threat.

We rely on the best scientific and commercial data available in assessing any given threat and its foreseeability. In the following analysis, the foreseeability of each threat is considered separately as is the foreseeability of the species' response to each threat.

4.1.2 "Significant Portion of the Range" Evaluation

As noted above, when evaluating the listing status of a species, NMFS must consider whether the species is in danger of extinction throughout all or a significant portion of its range, or is likely to become so within the foreseeable future.

The ESA does not define the term "Significant Portion of the Range"(SPR). USFWS and NMFS published a Draft Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of Endangered Species and Threatened Species (76 FR 76987; December 9, 2011). The Draft Policy has not been finalized as the Services continue to evaluate comments and information received during the public comment period. However, the discussion and conclusions set forth in the draft policy are consistent with NMFS's past practice as well as our understanding of the statutory framework and language (NMFS 2013). While the policy remains in draft form, the Services are to consider the interpretations and principles contained in the Draft Policy as non-binding guidance in making individual listing determinations, while taking into account the unique circumstances of the species under consideration. Thus, following NMFS (2012c), we applied principles from the Draft Policy to this status review.

In accordance with our draft SPR policy, our first step was to ''identify any portions of the range[s] of the [DPSs] that warrant further consideration'' (76 FR 77002; December 9, 2011). We evaluated whether substantial information indicated ''that (i) the portions may be significant [within the meaning of the draft policy] and (ii) the species [occupying those portions] may be in danger of extinction or likely to become so within the foreseeable future'' (76 FR 77002; December 9, 2011). A portion of the range of a species is significant if its contribution to the viability of the species is so important that, without that portion, the species would be in danger of extinction. Under the draft SPR policy, both considerations identified above must apply to warrant listing a species as endangered or threatened throughout its range based upon threats within a portion of the range. Thus, if we determine that a portion of the range is not "significant," we do not need to assess the status of the species specifically within that portion of the range. We evaluate the status of the species (in this case, a DPS) as a whole. Likewise, if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is "significant."

4.1.2.1 Is the California Portion of the Eastern DPS a "SPR"?

In the Recovery Plan, NMFS (2008:VII-3) acknowledged the poor performance of Steller sea lions in parts of the range in California relative to the rest of the range. Detailed data for the California portion of the range are provided in Section 3.5.6.

If the portion of the population in California were to disappear, is it likely that the eastern DPS would be in danger of extinction? The best available evidence indicates that the answer to this question is "no" for two principal reasons:

- First, population trend data for the DPS indicate that, despite the lack of increase in non-pup numbers in California in the past couple of decades, and the poor performance of Steller sea lions in parts of California, the DPS as a whole has increased in number, re-occupied many abandoned sites, and even established new rookeries. While the California portion of the eastern DPS likely had its lowest abundance in the 1980s, recovery throughout the rest of the eastern DPS to the north (in OR, BC and southeast AK) was already underway. Even with the loss of two rookeries in California (San Miguel and Seal Rocks), overall, data indicate that the eastern DPS increased at an estimated average annual growth rate of 4.18% per year from 1979-2010.

Whatever factors have kept non-pup numbers from increasing in parts of California, those factors appear to have local effects: i.e., they did not spread to the rest of the DPS. Instead, with initiation of protections limiting the direct take of Steller sea lions, the eastern DPS rapidly showed signs of gradually recovering throughout most, but not all, of its range. At the time the Recovery Plan was prepared, data from Oregon and southeast Alaska indicated those two portions of the subpopulation area accounted for the bulk of the eastern DPS. In the decade since the data used in the Recovery Plan, we now know that in addition to the significant increase of pups in southeast Alaska and Oregon, there have also been significant increases in pups and non-pups in BC since the early 1970s and increasing numbers of non-pups reported in WA. Both pup production and non-pup trends have remained positive in the rest of the population (see Table 4).

In short, available information indicates that this portion of the population is not "so substantial that [its loss or decline] undermines the viability of the species as it exists today" (76 FR 76987; December 9, 2011) and, thus, that even if the portion of the population in California were to disappear, the species would not be put in danger of extinction. Tens of thousands of sea lions that are reproducing well would remain.

- Second, published studies of both mtDNA (e.g., Baker et al. 2005) and nuclear genes (microsatellite) (Hoffman et al. 2006) provide evidence that sea lions in Northern California were genetically closely related to Steller sea lions in Oregon and fit well within the eastern population. Recently completed unpublished genetic studies indicate that even the portion of the DPS that occurs in the most southern part of the current range in California (at Año Nuevo Island) is representative of the rest of the population (Bickham 2010b). Based on the loci studied, there were no unique genetic variants detected in this most southerly rookery that would be lost if the animals at this rookery were lost from the population. There were rare alleles detected at some loci, and thus, the loss of animals carrying these alleles would increase the rarity of the variants. Unpublished analyses (J. Bickham unpublished data) of mtDNA control region/cytochrome b sequence data indicate that Steller sea lions at specific rookeries within California are genetically similar to those at other locations in the range of the DPS, such as in southern Oregon, Southeast Alaska and British Columbia. In total, evidence does not indicate that the Steller sea lions in California are genetically discrete from other sea lions within the DPS and thus, there is no indication that their loss would put the rest of the population at increased risk due to the loss of genetic variability.

NMFS concludes that the loss of the portion of the population in California would not cause the population to be in danger of extinction nor cause it to be likely to become so in the foreseeable future. Thus, the California portion of range of the eastern DPS should not be considered "a significant portion of the range."

4.1.2.2 Is the California Current Portion of the Eastern DPS a SPR?

NMFS received public comment suggesting that NMFS should determine if the portion of the range in the California Current Ecosystem is a SPR and if so, what the appropriate ESA status of Steller sea lions in this area is. To address this issue, NMFS reviewed information on the distribution of the breeding population, ecoregion classification throughout the range, genetics, migration/dispersal of animals throughout both the Alaska Current and the California Current, recruitment of females among breeding rookeries, and

utilization of diverse foraging habitats by both sexes and all non-pup age classes. Relevant information is provided in Section 3.

With regards to whether the loss of Steller sea lions throughout the entire California Current would render the remainder of the species threatened or endangered range-wide, we found that there are arguments both in favor and against a SPR determination:

- The loss of Steller sea lions from the area ranging from the southernmost part of the current breeding range in central California to the northern tip of Vancouver Island (corresponding with the description of the CCLME) would significantly reduce the diversity of habitat types occupied by the species, thereby increasing its vulnerability to a future threat that affected specific habitat types but not others. The environment within the current range of the eastern DPS of Steller sea lion *is* heterogeneous, and the current residual stressors and potential future stressors that may affect various parts of the range overlap but include some differences. A few of the many differences include: different fisheries; the relative abundance of California sea lions, a probable space competitor; effects of environmental variability on the distribution and abundance of Steller sea lion prey; human population density in coastal areas and the extent of related undisturbed terrestrial and aquatic habitats; pollution (see discussions in Aquarone and Adams (2009a,b); and the likely vulnerability to future ocean acidification and climate change. The loss of the California Current portion of the range would reduce the "spreading of risk" (den Boer 1968:166) that accrues to the eastern DPS by virtue of its currently large and ecologically diverse range. It would likely increase that risk of extinction.

- With respect to spatial distribution, the loss of the California Current portion of the range would greatly reduce the overall geographic occurrence of the species, increasing the vulnerability of the population to stochastic or other events that adversely affect remaining areas.

- The loss of Steller sea lions from the California Current portion of the range would greatly reduce redundancy within the population, increasing the chance of future permanent loss of variability within the population.

- Perhaps most important, if the entire portion of the population that breeds within the California Current System were lost, this would indicate that threats had not been controlled within the DPS. The history of Steller sea lions, especially in the western DPS, recommends caution if large declines of unknown or uncontrollable causes are seen over large areas, as these declines may spread.

- From a strictly demographic point of view (that is, with respect to the effect of the loss of sea lions from the California current portion of the range on abundance and potential productivity of the DPS as a whole over the foreseeable future), the strong upward trend and high abundance of Steller sea lions in the eastern DPS, even without the portion of the population that breeds within the California Current System, would argue against a high extinction risk for the DPS as long as the portion north of the California Current remained highly abundant, and pup production and survival remained high. As detailed in section 3.2.1, a substantial proportion of the eastern DPS's pup production occurs north of the habitats strongly influenced by the California Current. In 2009, rookeries in British Columbia and Alaska produced 83% of the pups and the southern rookeries produced 17%. The center of the Eastern DPS breeding population

has shifted northward from the Oregon/Washington border, prior to the 1930s, to the central British Columbia coast by early this century.

Regardless of whether the California Current portion of the range is a SPR within the eastern DPS, the species is not threatened or endangered within that portion of the range. While the details underlying this fact are presented in Section 3, we summarize a few key points here:

- First, there is range wide genetic diversity (see further discussion in AFSC 2001 and the DPS evaluation above). Analysis of genetic haplotypes reveal that haplotypes found in the northern portion of the range are found in the southern portion of the range and all of the haplotypes found in the California Current portion of the range are represented in the central and Alaska Current portions of the range. Thus, there is not evidence that within the California Current System, Steller sea lions are suffering due to reduced genetic variability or inbreeding depression.

- Second, we did not identify population-level threats within the DPS or within the CCLME portion of the range that supported a conclusion that they would likely cause the species to either be endangered or likely to become endangered in the foreseeable future. While we have concerns about residual threats (e.g., entanglement), and we have concerns about emerging threats (e.g., climate change, disease) we have high uncertainty about the kinds, magnitude, and timeframes of effects from such potential threats on the eastern DPS of Steller sea lions.

- Lastly, newly available data show increasing trends in both non-pup and pups in Oregon (Table 4 and Figure 14 and 15), a strong and sustained (1977-2008) upward trend in non-pup counts (Figure 14) in Washington for the past 20 years, and stability in non-pup counts and increases (2.9%/year from 1996-2011) in pup counts in California. At this time, pup counts on the coast of Washington are at the level found on the Farallon Islands and numbers are increasing.

Thus, neither threats analysis nor demographic data support a conclusion that Steller sea lions within the California Current LME meet the definition of a threatened or endangered species under the ESA. Accordingly, there is no need to determine whether the California Current LME portion of the range is significant.

4.2 Evaluation of the Demographic - Biological Criterions

The Recovery Plan (NMFS 2008:VII-3) specified that:

> The eastern DPS of Steller sea lion will be considered for removal from the List when the likelihood of its becoming endangered in the foreseeable future has been eliminated by achieving the following biological criteria:
>
> • The population has increased at an average annual growth rate of 3% per year for 30 years.

4.2.1 Recovery Plan Evaluation and Recent Population Status and Trend Data

In 1997, NMFS issued a rule reclassifying the ESA status of Steller sea lions into two distinct population segments: the western DPS listed as endangered and the eastern DPS listed as threatened (62 FR: 24345, May 5, 1997). In doing so, NMFS noted the eastern DPS appeared to be stable but called attention to uncertainty about this population trend. This uncertainty existed because of fluctuations in pup

production, declining counts in southern portions of the range, and because too few years had passed for NMFS to have confidence that the population was, in fact, increasing. As a result, the threatened status of the eastern DPS was maintained in the final rule.

In addition to the above biological criteria for growth, the Recovery Plan noted:

> The time period chosen for this criterion reflects three generations such that there would be assurance that survival and reproduction were robust. (NMFS 2008: VII-4).

and:

> For the past 25-30 years, the eastern DPS has been growing steadily at about 3% per year…more than doubled and is now [2006] estimated to be about 46,000 animals. (NMFS 2008:VII-3)

Section 3.5 of this document reviews the best scientific information available concerning population status and trend as presented in, and newly available since, completion of the Recovery Plan (NMFS 2008). The best available information indicates the eastern DPS has increased from an estimated 18,313 animals in 1979 (90% CI: 16247-20436) to an estimated 70,174 animals (90% CI = 61,146 – 78,886) in 2010. The best available information estimated annual growth rate (posterior mode) of the eastern DPS of Steller sea lions from 1979--2010 is 4.18% with a 90% confidence interval of 3.71% - 4.62%. The probability that the growth rate exceeded 3% was 0.9999 (Johnson and Gelatt 2012). Figure 12 illustrates the estimated abundance in each region, based on the pup counts, as well as, the total abundance for the eastern DPS, and the fitted growth rate curve. Most of the overall increase in population abundance was due to increases in the northern portion of the range in southeast Alaska and British Columbia, but counts in Washington and Oregon also increased.

NMFS selected the biological recovery criteria for the eastern DPS to assure that data were collected over a long enough period of time to allow NMFS to "be assured that survival and reproduction were robust." Now, 15+ years since NMFS's 1997 precautionary decision to continue to list the eastern DPS as threatened, the overall pup and non-pup trend data indicate a robust and long-term recovery of this DPS.

4.2.2 Analyses of Extinction Risk of Eastern DPS Based on a Population Viability Analysis Model.

Goodman (2006: Appendix A in NMFS 2008) conducted an analysis of the extinction risk of the eastern DPS of Steller sea lion. At the time of his analysis, Goodman had available two series of data related to population trend: 1) 24 counts, conducted annually except for missing counts in 1978 and 1991, of non-pups from Oregon sites from 1977-2002, and 2) nine counts of pups at southeast Alaska sites between 1979-2002.

Based on analysis of the SE Alaska pup data, Goodman (2006) found that the posterior mean for the growth rate was 3.13%, the posterior standard deviation was 0.413%, and the posterior mode was 3.14%. The 95% posterior confidence interval was from 2.29% to 3.95%. Given these data, the analysis indicated that posterior probabilities of low growth rates were very low: the posterior probability that the growth rate of the eastern DPS is less than 2% was about 0.7% and the probability of growth rate less than 1.5% was about 0.1%.

Since 2002, NMFS have undertaken additional aerial surveys of pups in southeast Alaska, generally on a biennial basis. The most recent pup counts were conducted in 2009 and trends from these data are

summarized above (DeMaster 2009; NMML 2012). These data show that the positive growth rates apparent at the time of Goodman's analysis have continued with a very strong upward trend in pup production in this region since 2002.

Based on the analysis of the Oregon non-pup count data, Goodman (2006) found that the posterior mean for the growth rate was 3.64%, the posterior standard deviation was 0.405%, and the posterior mode was 3.68%. The 95% posterior interval was from 2.42% to 4.44%. Goodman's analysis (2006) of the Oregon non-pup count series indicated that posterior probabilities of low growth rates were again very low, in this case much lower than the already low probability estimated from the southeast Alaska pup count data. Based on the Oregon non-pup count data, Goodman's analysis showed that the posterior probability that the growth rate of the eastern DPS is less than 2% was about 0.01%.

The most recent non-pup count data from Oregon available at the time of Goodman's population viability analysis (PVA) was from 2002. Thus, it is important to determine if the upward trend in non-pup counts in Oregon continued, as this long-term upward trend was important in Goodman's analysis, and his related conclusions about the low foreseeable risk of extinction of this population. Since the aforementioned analyses by Goodman (2006), Pitcher et al. (2007), and NMFS (2008), ODFW has conducted Steller sea lion surveys in 2003, 2005, 2006, and 2008. In their petition to delist the eastern DPS of Steller sea lion, ODFW and WDFW (2010:2), citing these unpublished ODFW data, reported that abundance surveys conducted from Northern California to Washington demonstrate continued population growth at nearly 4% through 2008. ODFW provided these data to NMFS for this status review (B. Wright, email to L. Fritz and L. Rotterman, Dec. 7, 2012) (Table 3). The final count for 2003 was anomalously high at 5,714 non-pups counted and, in that year, increases in non-pup numbers were seen at multiple locations throughout the state. The count for 2005 was incomplete due to poor weather. Counts for 2006 and 2008 indicate the non-pup abundance trajectory generally follows the upward trend line depicted in Pitcher et al. (2007) B. Wright, ODFW, pers. comm.; see Table 3 and Panel D of Figure 14; see also Figure 13).

Based on the aforementioned, the post-2002 demographic data support Goodman's (2006) conclusions regarding the low extinction probability of the eastern DPS of Steller sea lions. There are now longer time series for both of the two main data sets that were available to him and these data sets show continued upward trends and provide evidence of continued recovery.

It should also be noted (Goodman 2006 Appendix A in NMFS 2008) that:

> "A working hypothesis to account for these observations on the eastern DPS is that:
>
> 1. The population is not sensitive to ongoing regime-frequency environmental variation,
> 2. The depressed, but steady and positive, growth rate north of California is owing to a combination of ecosystem modification and possible incidental take that is stable and sustainable,
> 3. The carrying capacity is not less than 46,000 total individuals, and
> 4. The lack (of) recovery of the California portion of the population is owing to range contraction responding to the warming trend of the past several decades.
>
> If all this is true, and continues to be true, the risk of near-or medium-term extinction for this population is very low. While there is no evidence to the contrary, we do not have conclusive information that this hypothesis complex is true, or that it will continue to hold in the future.

> Accordingly we could judge this population to be at low risk provided management maintains the current level of protection, keeps human impact at no more than its present level, and monitors to make sure that evidence contrary to the hypothesis complex will be detected. "

NMFS believes the Goodman (2006) analysis made reasonable inferences about extinction risk and that those inferences likely remain valid - given current trends as indicated by available updated biological/demographic data collected over the past eight years. Therefore, NMFS concludes that the extinction risk for the species in the foreseeable future will remain very low.

4.2.3 Summary of Evaluation of Demographic/Biological Criteria

Based on the best available information for non-pup and pup trend data and related population abundance estimates, NMFS concludes that the biological (demographic) criteria components of the recovery criteria as described by the 2008 Recovery Plan have been met. Furthermore, an evaluation and update of the trend data used in the extinction risk analysis indicates that the risk of extinction is very low for the eastern DPS of Steller sea lions.

4.2.4 What Current Biological Status Tells Us About the Listing Factor Criteria for a Currently Listed Species

Cameron et al. (2010:185) noted that "Threats to a species' long-term persistence…are manifested demographically as risks to its abundance; productivity; spatial structure and connectivity; and genetic and ecological diversity. These demographic risks thus provide the most direct indices or proxies of extinction risk." The current demographic status and recent demographic history for the eastern DPS indicate that, under the current protections, which prominently include the ESA, as well as protections under the MMPA that are parallel in certain important respects, any threats have been controlled to the extent that recovery has been able to proceed for an extended period of time.

However, future threats are not necessarily manifest in current demographic status. Therefore, the next section reviews the Listing Factor Criteria specified in the Recovery Plan, determines if these have been met, and considers if new information indicates if there are residual threats, or threats that are likely to emerge in the foreseeable future, especially within the context of delisting.

4.3 Evaluation of the ESA Listing Factors and Associated Criteria

The second delisting criterion identified in the 2008 Recovery Plan for the eastern DPS of Steller sea lion is:

> 2. The ESA listing factor criteria are met (NMFS 2008: xiv).

By this delisting criterion, NMFS (2008) acknowledged that, prior to delisting, the agency needs to determine if the species still needs protection under the ESA. "To delist…a species, we follow a process similar to" that "when we consider a species for listing" (USFWS, Delisting a Species: http://www.fws.gov/idaho/species/delisting%20copy.pdf). Thus, to make our determination, we have explicitly considered whether there are threats to the population under the five factors specified in section 4(a) of the ESA, and determined whether the best available scientific information indicates that such threats render the species to be in danger of extinction throughout all or a significant portion of its

range, or likely to become so in the foreseeable future. "Threats" are human or natural events/actions that are responsible for, contributing to, or could contribute to, the key limiting factors. Residual threats are those that "…collectively, are sufficiently reduced and contained that the species no longer meets the definition of threatened or endangered" (USFWS and NMFS 2008:2-2). Future threats are activities that are likely to happen but are not currently occurring, or that may currently exist and are likely to continue and/or result in a mounting risk to the species. The focus of this evaluation is on those threats which may be reasonably thought to be of sufficient magnitude that they could render the species "likely to become in danger of extinction throughout all or a significant portion of its range."

4.3.1 Recovery Plan Summaries of Threats to the Eastern DPS

Based on the long-term positive population growth of the eastern DPS, no threats to recovery were identified in the Recovery Plan. However the Recovery Team recognized that certain factors are affecting or have the potential to affect the dynamics of the population (NMFS 2008).

The Recovery Plan evaluated threat factors that may impact the eastern DPS such as: predation; harvests; killing and other human impacts; entanglement in debris; parasitism and disease; global climate change; reduced prey biomass and quality; and disturbance (NMFS 2008). The Recovery Team did not identify threats potentially limiting the population's recovery. The Recovery Plan also assessed the cumulative aspect of threats to the eastern DPS and concluded that given that Steller sea lion numbers are increasing in the range of the eastern DPS, any individual or combined effects currently occurring in the region are apparently not significant enough to prevent the population's growth in those areas (NMFS 2008:VI-8).

> Similar to the western DPS, there is also uncertainty as to the level of current and historical impact of various threats and whether there have been changes in the magnitude of those threats to the eastern DPS. It is thought the prior threats, primarily in the form of directed human take (shooting), have been adequately addressed. As the breeding range and center of the eastern DPS has moved northward, prior threats associated with the previous southern range extent such as competition with other increasing pinniped populations and activities associated with a high human population density may have been largely alleviated (NMFS 2008:vi-8).

The Recovery Plan (NMFS 2008) addresses each of the 4(a)(1) factors and draws an overall conclusion that these factors are not impeding the recovery of the population. Below, we consider this information and new information regarding threats to the eastern DPS and with specific attention to the ESA 4(a)(1) "listing" (or delisting) factors.

4.3.2 *Factor A: The Present or Threatened Destruction, Modification, or Curtailment of a Species' Habitat or Range*

4.3.2.1 Summary of Recovery Plan Discussion

The Recovery Plan (NMFS 2008) emphasized that the main historical threat to the species was direct mortality, and that even after the passage of the ESA and MMPA intentional killing continued as "…a generally accepted behavior until recent years. " While the Recovery Plan's discussion of factors potentially influencing the eastern population (pp. VI-1 – VI-8) did not specifically mention habitat destruction, it did address the potential for competition between eastern DPS Steller sea lions and

commercial fishing for their prey. In the Recovery Plan, NMFS (2008) found no evidence of nutritional stress in the eastern DPS. However, NMFS (2008) did note there are commercial fisheries that target key Steller sea lion prey, including Pacific cod, walleye pollock, Pacific hake, salmon, and herring. It was recognized that in some regions fishery management measures appear to have reduced this potential competition (e.g., no trawl zones and gear restrictions on various fisheries in southeast Alaska) and in others the very broad distribution of prey and seasonal fisheries that differs from that of sea lions may minimize competition as well (e.g., hake along the west U.S. coast).

The Recovery Plan (NMFS 2008) concluded:

> Prey resources currently appear to be adequate to support recovery. Future fisheries management and other marine resource management should specifically consider sea lion needs in their planning.

4.3.2.2 Global Climate Warming and Ocean Acidification

In the Recovery Plan, NMFS (2008) did not identify a significant threat to the eastern DPS of Steller sea lions from climate change, nor was ocean acidification identified as a threat. NMFS (2008) did identify concerns regarding global climate change and its potential to adversely affect the southern part of the range (i.e., California). The Recovery Plan recommended that future monitoring target this southern portion of the range.

Evidence indicates that global warming (also referred to as climate change) and ocean acidification are both tied to increased carbon dioxide levels in the atmosphere for the foreseeable future. As summarized by Fabry et al. (2008:414) (see also NRC 2010; Doney et al. 2012), there is a growing and persuasive body of scientific evidence that:

> "Rising atmospheric carbon dioxide (CO2) concentration is causing global warming and ocean acidification (Caldeira and Wickett, 2003, 2005; Feely et al. 2004; Orr et al. 2005), which increasingly are recognized as important drivers of change in biological systems (Lovejoy and Hannah, 2005).

Since the writing of the Recovery Plan, additional information has resulted in increased concern about the potential ecological impacts of these factors on marine ecosystems (e.g., McCarty 2001; ACIA 2004; IPCC 2007; Fabry et al. 2008; NMFS 2010c; NRC 2010; Doney et al. 2012; NOAA at http://www.oceanacidification.noaa.gov/), including, specifically, the California Current System and other areas within the range of the eastern DPS. Recently, Doney et al. (2012:11) summarized that:

> "In marine ecosystems, rising atmospheric CO2 and climate change are associated with concurrent shifts in temperature, circulation, stratification, nutrient input, oxygen content, and ocean acidification, with potentially wide-ranging biological effects. Population-level shifts are occurring because of physiological intolerance to new environments, altered dispersal patterns, and changes in species interactions. Together with local climate-driven invasion and extinction, these processes result in altered community structure and diversity, including possible emergence of novel ecosystems…Midlatitude upwelling systems, like the California Current, exhibit strong linkages between climate and species distributions, phenology, and demography. Aggregated effects may modify energy and material flows as well as biogeochemical cycles, eventually impacting the overall ecosystem functioning…".

Other potential effects of climate change that could impact Steller sea lions include: changes in timing of key oceanographic phenomena and in the timing of primary productivity; zooplankton concentrations; prey recruitment (e.g., see information in NRC 2010; King et al. 2011); changes in complex inter-species dynamics; shifts in ecological communities; invasions of new species, including pathogens that are new to this species and/or the North Pacific (discussed in the disease section); increase in size and duration of anomalous and extreme environmental and biological conditions (Walther et al. 2002); shifts in the ranges and abundance of algae, plankton, and fish in high-latitude oceans; and changes in the migrations of fish in rivers (IPCC 2007b: 8-9). Climate- related changes in oceanic and atmospheric conditions may be related to recurrent annual zones of hypoxia (low oxygen) close to shore along the Oregon coast (e.g., see http://mytilus.science,oregonstate.edu/lmcclme.html).

Within the range of the eastern DPS, Iles et al. (2012) examined trends in the duration, frequency, and strength of continuous upwelling events for the Oregon and California regions of the California Current System. They found changes to upwelling events that are consistent with climate change predictions: they are becoming stronger, are longer in duration, and are less frequent. They concluded that such changes in coastal upwelling are "…altering the tempo and the mode of environmental forcing in near-shore ecosystems, with potentially severe and discontinuous ramifications for ecosystem structure and functioning" (Iles et al. 2012:783). The California Current System may be particularly sensitive to climate change, "…climate change is expected to have several far-reaching consequences" in this system (Doney et al. 2012:25), and "…substantial change is evident already and susceptibility to further change is likely" (Doney et al. 2012:14) in it.

The NRC (2008) summarized that there are two well-studied and documented ecological impacts of climate change: climate induced shifts in range and effects on phenology (or seasonal shifts in biological activities) (see also Walther et al. 2002). "These types of changes have been observed in many species, in many regions, and over long periods of time" (NRC 2008:17). As noted in our description of the shifted range of the DPS, the general northward shift in distribution within the breeding range and the decline of eastern DPS Steller sea lions in the southernmost part of the range may reflect an already-manifested, or an ongoing, response to climate change.

As Steller sea lions are opportunistic and mobile predators, they are likely to be less sensitive to geographical shifts in prey than marine organisms which are limited in their prey options and/or that are relatively stationary. However, at least during portions of their lives, their flexibility is limited by the terrestrial nature of some of their important habitat, such as rookery sites. The foraging efficiency of especially nursing females and pups may be affected by factors that change the timing, distribution, and abundance of key prey in the proximity of rookeries. In general, past patterns of resilience to environmental variability may not predict the future ability of the eastern DPS to respond to environmental change caused by either climate change and/or ocean acidification if the magnitude or nature of such change is outside of the range of variability to which Steller sea lions have adapted.

Ocean acidification poses threats to marine ecosystems (e.g., Orr et al. 2005; IPCC 2007; the Interacademy Panel on International Issues (IAP) 2009; Royal Society 2005; the National Research Council (NRC 2010; NMFS 2010c; and the Interagency Working Group on Ocean Acidification (IAWG-OA) 2011). When the oceans uptake CO_2, decreases to water pH can result (IPCC 2007), leading to other chemical changes which have been termed "ocean acidification". With respect to current conditions of the potential threat, changes to ocean surface water acidity have been documented, from pH 8.2 to 8.1 since the beginning of the industrial revolution (e.g., European Science Foundation (ESF) 2009)). Modeling

efforts indicate that “even under optimistic scenarios” (NRC 2010) about further changes over the foreseeable future, pH will drop 0.2-0.3 more by the end of this century (Caldeira and Wickett 2005; NRC 2010) or 0.3-0.4 units more (Orr et al. 2011). Thus, an increase in ocean acidification by the turn of the century (or sooner, see below) is considered foreseeable for the purposes of this status review. The chemical effects are “well understood” (NRC 2010). For the California Current System, Gruber et al. (2012) concluded that the development of summer-long undersaturation in the top 60 meters is predicable within the next 30 years.

The NRC (2010) stated that the relative abundance of different species, changes in growth rates, invasive species, and water and nutrient cycling are impacts that are affecting many ecosystems. However, the potential biological effects of ocean acidification will vary (NRC 2010). The specific timeframes for effects of ocean acidification on North Pacific ecosystems are uncertain, and "the long-term consequences of ocean acidification are not known but are likely to include serious impacts on ecosystems" (NRC 2010). The IAP (2009) summarized the direction of the likely impacts of ocean acidification, including in parts of the eastern North Pacific within the range of the eastern DPS of Steller sea lions and/or some of their prey:

> “The high CO2 waters in polar and upwelling regions such as the eastern Pacific and Bering Sea for example, will experience low pH more rapidly than other regions…The ocean chemistry changes projected will exceed the range of natural variability, which is likely to be too rapid for many species to adapt to. Many coastal animals and groups of phytoplankton and zooplankton may be directly affected with implications for fish, marine mammals and the other groups that depend on them for food…The impacts of these changes on oceanic ecosystems…cannot yet be estimated accurately but they are potentially large…Although some species may benefit, most are adapted to current conditions and the impacts on ocean biological diversity and ecosystem functioning will likely be severe.”

"Virtually every major biological function" including rates of growth, reproduction, recruitment, photosynthesis, respiration, and calcification has been shown to respond to ocean acidification related chemical changes in seawater pH, or changes in the concentrations of dissolved CO2, bicarbonate ion, or carbonate ion (Interagency Working Group on Ocean Acidification (IWG-AO) 2011). Ocean acidification "has the potential... to alter marine food webs in fundamental ways" (IWG-AO 2011:4).

All of the aforementioned findings and conclusions are relevant to the eastern DPS of Steller sea lion as they may affect the distribution, abundance, and predictability of their prey, which may impact the population.

Foreseeability of Threat and Effects on Population Viability.--The existence of a potential threat to the eastern DPS of Steller sea lion from both ocean acidification and climate change is considered foreseeable, given assumptions about carbon emissions and atmospheric carbon levels, with the window of foreseeability (how far out we can predict the threat) being to about 2100. This timeframe is associated with current model predictions about both climate change and ocean acidification (e.g., see the IPCC 2007). This threat is considered to be present currently at some level but, more importantly, is expected to increase over time (see discussion above and below). Gruber et al. (2012) concluded that they were “…able to project with some confidence the chemical changes associated with the future evolution of ocean acidification in the California” Current System and that the results of their simulations indicate that this system “…is moving rapidly towards conditions that are well outside of the natural

range..” with resultant conditions that “will be challenging” to both calcifying and other organisms and related fisheries.

In summary, the general kinds of effects that climate change and ocean acidification may have within the range of the eastern DPS are becoming more clear, and we can begin to hypothesize about potential pathways through which this DPS may be impacted by such effects (e.g.: shifts in species ranges due to climate change; potential effects of ocean acidification on pteropods, with related effects on pink salmon and hake; effects on food webs of which Steller sea lions are a part from both threats, etc.). The specific responses of most marine species to ocean acidification in particular are not yet known (NMFS 2010e:1) and with regards to ocean acidification and the California Current specifically, Gruber et al. (2012: 223) stated that “… the impacts of these chemical changes on organisms, ecosystems, and biogeochemistry remain highly uncertain.” However, our ability to make predictions about the magnitude, pathways, or timing of long-term effects on populations from these two factors varies considerably among different species, based on their specific ecology.

We are concerned about the effects of these factors on marine ecosystems. However, because of the specific ecology of Steller sea lions and the characteristics of the ecosystems of which the eastern DPS is a part, based on current information, we have high uncertainty about the magnitude and timing of any population level effects on the eastern DPS of Steller sea lion from either global climate warming or ocean acidification, and we do not have sufficient information to conclude that these potential threats are likely to cause it to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.2.3 Indirect Fisheries Interactions

There are numerous federal, state, and/or provincial commercial fisheries, recreational fisheries and subsistence fisheries within the range of the eastern DPS of Steller sea lion. We discuss effects of direct taking in these fisheries under Factor B, below. Mechanisms by which fisheries can have indirect effects on Steller sea lions have been reviewed extensively in the scientific literature. A particularly thorough review of relationships between commercial fisheries and possible nutritional stress in the western DPS of Steller sea lions is found in NMFS (2010c). Fisheries present within the range of the eastern DPS of Steller sea lion could cause such effects, which include:

- Acting as a competitor for prey
- Causing changes in the local or regional absolute and relative (with respect to other species) abundance of some fish species with the potential for:
    - impacts on ecosystem structure, function, and the resiliency of populations within some food webs
    - changes to the age and size structure of fish populations
    - reductions in Steller sea lion foraging success
- Causing changes to fish distributions with resultant effects on Steller sea lion sea foraging efficiency
- Causing changes in the average size and age of fish in a population, thereby potentially affecting Steller sea lion foraging efficiency and affecting the dynamics of the fish populations
- Causing damage to habitat (e.g., due to bottom trawling) of Steller sea lion prey
- Disturbance of rookeries or haulouts resulting in abandonment of the site on a short-term and/or long-term basis

Within Southeast Alaska, commercial fisheries that harvest Steller sea lion prey include fisheries for salmon, herring, demersal shelf rockfish, ling cod, and black and blue rockfish. Commercial fishermen harvest salmon in Southeast Alaska using purse seines and gillnets, set gillnets in Yakutat, and hand and power troll gear in both areas. Herring are harvested in sac roe, spawn-on-kelp, bait pound, and winter bait fisheries. In the breeding range of the eastern DPS, ADF&G also manages state groundfish fisheries (Region 1) from U.S.-Canada border to the Yakutat area. These groundfish fisheries include directed fisheries for Pacific cod (longline), demersal shelf rockfish (DSR; longline), sablefish (longline/pot), lingcod (dinglebar/jig), and black rockfish (primarily mechanical jig) (http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.groundfish). All of the directed groundfish fisheries other than the directed sablefish fisheries (which are limited entry and limited to Chatham and Clarence strait) are open access. Alaska State fisheries, which are not managed under parallel (to the federal management of the species under the FMP) management include lingcod, blue, and black rockfish, sablefish and Pacific cod.

Since the early 1990s, fishing with trawls has been prohibited in all portions of the EEZ off Southeast Alaska. This prohibition effectively precludes a pollock fishery in the range of the eastern DPS, though a small trawl pollock fishery continues off British Columbia. Other fisheries in SE Alaska for Pacific cod, salmon, and herring commonly use fixed gear (e.g., hook and line, pots) or mobile, non-trawl gear such as seines and trolling. These gear types reduce the rate at which fish can be caught (for most species and gears), and may reduce the likelihood of fishery-induced local depletions of commercially important prey species as well as effects on the habitat and populations of other Steller sea lion prey species.

There is no indication that fisheries in Southeast Alaska are currently competing with Steller sea lions to the point where the harvest level constitutes a threat to the survival or recovery of the eastern DPS in this region. Rather, concurrent with the ongoing prosecution of these fisheries, our analysis indicates that there has been a sustained increase in abundance and pup production of Steller sea lions in Southeast Alaska. Additionally, there are not direct physical data (e.g. emaciated pups or yearlings) or indirect evidence (e.g. reduced or declining survival, declines in pup to non-pup ratios) available to us that indicate there is nutritional stress in Southeast Alaska.

DFOC (2011) reported that commercial fisheries that target important Steller sea lion summer prey species in British Columbia include fisheries for herring, hake, sardines, salmon, and groundfish. They summarize that it is not known whether limitations in a given prey species may limit population growth (DFOC 2011). However, they concluded that due to the "unrestrained, exponential growth" of the Steller sea lion population in British Columbia, in the presence of ongoing fisheries, there is no evidence that fisheries have had a negative effect on this population. They expressed some concern for potential population-level effects in the future due to the increase in population abundance of the sea lions.

Limited entry commercial fisheries for salmon and herring exist in Washington State. Salmon fisheries include troll, gillnet (Willapa Bay-Columbia River, Grays Harbor-Columbia River, and Puget Sound gillnet fisheries), reefnet, and purse seine. Licenses are also given for commercial charter and angler fish operations. Herring licenses are also limited by moratorium and include the following fisheries within Puget Sound: Dip bag net, drag seine, gillnet, lampara, and purse seine. There is a limited entry fishery for Pacific whiting within Puget Sound.

Groundfish fisheries along the US west coast in the US EEZ of the northeast Pacific Ocean are managed by NMFS under the regime established in the Pacific Coast Groundfish Fishery Plan (PFMC 2008) via the

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Fish stocks managed under this regime are given in Table 3-1 of PFMC 2008:14-15). The Recovery Plan (NMFS 2008) recognized the importance of a key prey species for Steller sea lions along the Pacific west coast managed under this Plan: the Pacific hake (whiting). The Plan noted that even during the 1987-2001 period of declining hake catch and a reduction in the stock (age 3+ fish) there was not a concurrent change in Steller sea lion population trajectory in the region. Furthermore:

> Fishery regulations and the typical distribution of the fishery north of 44 N. lat. may minimize the potential for competition between foraging Steller sea lions and the hake fishery during the summer months when the Steller sea lion population is concentrated on rookeries in southern Oregon and northern California. (NMFS 2008)

Given the sustained significant increases in non-pup abundance and increases in pup production of Steller sea lions in Southeast Alaska, British Columbia, Oregon, increasing abundance in Washington, current and anticipated continued fisheries management procedures and regulatory mechanisms, there is no indication that fisheries are directly or indirectly competing with eastern DPS Steller sea lions to the point where the level of fisheries related competition constitutes a threat to the survival or recovery of the eastern DPS of Steller sea lions.

The presence of the fisheries referred to above is considered foreseeable, i.e., they are likely to continue to occur in the locations, seasons, and at the approximate level of magnitude (in terms of effort and harvest) as they do currently. Evidence does not indicate that there is a current threat from a given fishery, or from the cumulative impact of the existing fisheries, sufficient to threaten the viability of the eastern DPS of Steller sea lion. While there is currently not evidence of nutritional stress, the impacts of competition, both from fisheries, other species, and from conspecifics may increase in the future due to increasing numbers of Steller sea lions in some locations, and increasing numbers of California sea lions in others. That is, as the number of animals competing for the same prey increases, the effects of competition with fisheries may increase. Future indirect effects of fisheries, including competition with fisheries for prey, should be considered as a potential, but uncertain, future threat. We conclude indirect effects of these fisheries are not likely to cause the eastern DPS to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range.

4.3.2.4 Coastal Development and Disturbance

Coastal development, in the form of tourism, settlement, industry, shipping, and human population growth may lead to more noise, human presence and other outcomes that increase disturbance of Steller sea lions on terrestrial sites or in the water, or to their prey. Disturbance to sea lions can emanate from the air, water, or from land and from many sources including, but not limited to: tourism (e.g., tour boats, private boats, hikers); scientific research on Steller sea lions or other marine mammals, birds, habitat, fish, archaeological sites; defense-related activities; aeronautical research and commercial activities; oil and gas activities; air transportation; recreational and commercial fishing; development; hunting; and recreation. The type of disturbance that may affect Steller sea lions is likely to vary throughout the range of this DPS because of the expansive geographic distribution and varied density of human settlements and sea lions, as well as the seasonality of both sea lion and human activities. In addition to disturbance, coastal development can lead to habitat loss or degradation.

The Recovery Plan (NMFS 2008) acknowledged the vulnerability of Steller sea lions to human disturbance, noting the findings of Kucey (2005), who concluded that Steller sea lions on a haulout in

Southeast Alaska were sensitive to various types of disturbance and responded with temporary movements from the area. The Plan also reviewed actions taken by the agency under the Section 7 consultation process, including analysis of the effects of two large-scale development projects proposed in or near Steller sea lion habitat in Southeast Alaska – the Kensington Gold Mine Project (a formal biological opinion) and the Juneau Access road (handled as an informal consultation). NMFS noted that the potential existed for some disturbance to sea lions on coastal haulouts and in regions frequented by foraging animals. NMFS (2005) concluded the Kensington project was not likely to jeopardize the existence of Steller sea lions or to destroy or adversely modify their critical habitat. Review of the Access road project concluded the action was not likely to adversely affect Steller sea lions or their critical habitat. In the Recovery Plan, NMFS (2008) concluded its review of disturbance by noting "the continued pressure of developments in otherwise wilderness areas may ultimately result in the abandonment of haulouts" (NMFS 2008: VI-8).

Currently designated critical habitat provides a measure of protection from disturbance associated with federal agency actions that may destroy or adversely modify such habitat. In the final rule designating critical habitat (58 FR 45269), NMFS identified "the extent and type of human activities and disturbance in the region" as one of the factors that "influence the suitability of a particular area" as a rookery or haulout. If NMFS revises the designation of Steller sea lion critical habitat in the future, fewer or different areas may be subject to the ESA Section 7 requirements for federal agencies to consult on actions that may affect such habitat.

NMFS acknowledges the potential threat of human disturbance, which may diminish the value of terrestrial habitat as sites for resting, reproduction, nursing and platforms from which to feed. However, NMFS notes the existence of protections against such disturbance under a variety of State and federal statutes. The prohibitions and penalties related to "take" in the MMPA (16 USC 1371; Section 101(a)) provide a strong measure of protection for both animals and any occupied habitat. In particular, the MMPA, through its prohibition on harassment (defined at 16 USC 1362: Section 3(18)(A)) provides clear direction that human activity and development must take into account essential habitat needs. The MMPA prohibits unauthorized harassment of marine mammals including acts that might cause "disruption of natural behavioral patterns…", such as "…migration, surfacing, nursing, breeding, feeding or sheltering" that are required to maintain healthy populations of sea lions and other marine mammals.

Related aspects of the MMPA provide procedures for implementing specific protections to marine mammals by limiting the degree and circumstances of potential take due to human activities. For example, Congress amended the MMPA in 1981, 1986, and 1994 to provide various mechanisms for the authorization of "incidental take" (including harassment) of marine mammals due to various activities, provided that NMFS finds that the takings would be of small numbers and would have no more than a "negligible impact" on affected marine mammal species, and not having an "unmitigable adverse impact" on subsistence harvests of these species (see http://www.nmfs.noaa.gov/pr/permits/incidental.htm). NMFS regulations define a "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival" (50 CFR 216.103). Before authorizing the incidental take of marine mammals, NMFS must provide an opportunity for public comment on its proposal to do so and must specify the: 1) Permissible methods and the specified geographical region in which take will be authorized; 2) Means of effecting the least practicable adverse impact on the species or stock and its habitat and on the availability of the species or stock for "subsistence" uses; and, 3) Requirements for monitoring and reporting, including requirements for the independent peer-review of proposed monitoring plans

where the proposed activity may affect the availability of a species or stock for taking for subsistence uses. Such authorizations may be obtained for taking endangered or threatened marine mammals, again provided NMFS finds the taking (lethal, injurious, or harassment) will be small in number and will have no more than a negligible impact on the affected stock(s) of marine mammals. These limits will continue to apply to NMFS's ability to authorize incidental take of eastern DPS Steller sea lions even if the species is removed from the list of threatened species.

Under section 404 of the Clean Water Act, permits must be issued by the US Army Corps of Engineers for development projects affecting wetlands or other aquatic resources. NMFS routinely reviews these permit applications and provides comments and recommendations designed to reduce or otherwise mitigate any potential adverse impacts to trust resources such as wetlands, fish, and marine mammals and their habitats.

In the event the eastern DPS is delisted under the ESA, there are significant regulatory mechanisms available (e.g., MMPA prohibitions) that provide a means to minimize possible adverse effects of disturbance associated with human activity. These mechanisms provide protections against human disturbance for Steller sea lions on coastal haulouts and rookeries, and in other habitat. Based on the present population performance, and assuming that MMPA protections will be implemented effectively if ESA protections are removed, NMFS concludes that the eastern DPS of Steller sea lion is not likely to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range due to coastal development and disturbance.

4.3.2.5 Toxic Substances

In the Recovery Plan, NMFS (2008) summarized that "Existing studies on Steller sea lions have shown relatively low levels of … heavy metals, and these levels are not believed to have caused high mortality or reproductive failure (Lee et al. 1996) and are not considered impediments to Steller sea lion recovery." NMFS (2008:VI-8) noted that although threats, including contaminants:

> "… are present and could certainly act upon the eastern DPS in similar negative ways, there is no evidence to support that any either individually or collectively are current threats to recovery. In addition to the threats and mechanisms in the western DPS table being present to some degree, the most vulnerable cohorts within the eastern DPS would also likely be the same….".
>
> "…contaminant risks are largely unknown in Steller sea lions and are little understood in pinnipeds in general (Barron *et al.* 2003)…Field studies with pinnipeds have been confounded with other factors and cannot be unambiguously linked to contaminant caused impacts. The sensitivity of pinnipeds to contaminants relative to the sensitivity of other species is largely unknown. Thus, adverse effect levels of contaminants in Steller sea lions must be inferred from studies in other species (Barron *et al.* 2003). As a result, the primary data gap is an understanding of what levels of contaminants affect sea lion health, and subsequently also affect vital rates, especially reproduction. "

Available information indicates that some toxic substances have the potential to affect both the health of individuals and populations. Depending on the contaminant and dose, animals can suffer acute effects, such as rapid death due to effects on digestive, respiratory, neurological or other vital systems, or populations may be affected due to effects on reproduction and/or survival due to chronic, but sublethal (or slowly acting lethal) effects on health, body condition, the immune system, the endocrine system, or

other systems (see NMFS 2008). Cases of contamination leading to the rapid death of large numbers of marine mammals are much more likely to be documented than more subtle effects, but the latter presumably are more prevalent.

Our concern related to the potential for contaminants to pose a threat to the eastern DPS of Steller sea lions, now or in the foreseeable future, is highest in the industrialized southern part of the historic range where contaminant levels of some compounds appear to still be high in other resident pinnipeds and where historic evidence suggests that contaminants may have played a role in the failure of Steller sea lions to become re-established and/or to increase significantly in numbers at some locations during the period of time that robust increases were occurring elsewhere in the range.

Organochlorines have been found in the tissues of Steller sea lions and other pinnipeds in the North Pacific and in some of their prey. Organochlorines are a diverse group of lipophillic compounds that: are derived from a variety of sources including, but not limited to pesticides, lubricants, and other industrial uses; are known to be transported in the ocean and atmosphere from sources in lower latitudes to higher latitudes (e.g. Iwata et al. 1993); can persist in the environment; can accumulate in the lipids of animals; and biomagnify, with high concentrations often found in top predators (deWit et al. 2004; Myers t al. 2011). Blasius and Goodmanlowe (2008) reported that large amounts of organic toxic substances were discharged into the Pacific Ocean near the coast adjacent to the southern California Bight (SCB) from 1949 to the 1970s. Citing Lee et al. (2002), Blasius and Goodmanlowe (2008) summarized that over 11 tons of PCBs and 110 tons of DDT remained in the SCB by 1993.

Organochlorine levels may have posed a threat to reproduction and immune function of Steller sea lions in the southern part of the range in the past and may still be contributing to the lack of increase in numbers of the species in parts of their historic range off of California. Huber et al. (1984) investigated the high incidence of premature pupping of Steller sea lion pups on the Farallon Islands in 1983 by evaluating levels of pollutants and disease pathogens in the tissues of premature pups. Huber (1987:10) concluded that: "…premature pupping is more extensive on the Farallones than in other areas, that disease and concentrations of PCB's or some combination of the two may be contributing to premature pupping…". Sydeman and Allen (1999) hypothesized that contaminants and disease, and synergistic relationships between these factors may have been factors that were influencing Steller sea lions in California, leading to the continuing decline (at the time of their study in the mid to late 1990s) and the lack of increase in that part of the range following protection under the ESA. At the time of their study, trace metal and organochlorine contaminant levels were elevated, but had declined over the past decade (Jarman et al. 1996). Both San Miguel Sea lion virus and Leptospira interrogans had been found in debilitated animals. They noted that, at between 1973 and 1983 at the South Farallon Islands about 20-65% of the pup mortality was due to premature births (some stillborn). Hastings and Sydeman (2001) studied annual and seasonal variation in the numbers of Steller sea lions at the south Farallon island from weekly counts undertaken from 1974-1996. These authors found both lower reproductive rates (11% of presumed females present during the breeding season produced pups) than at rookeries at Año Nuevo California, British Columbia and Ugamak Island and high pup mortality rates (average of 0.49 of pups born from Feb.-August) with high variability among years (0.33-0.90). These authors also suggested that disease or exposure to pollutants may be the cause of the high pup mortality, but also suggested, citing Pitcher et al. (1998) that it may result from a prevalence of young, inexperienced, or malnourished females. The Center for Biological Diversity (2011) summarized that "…organochlorine (PCB and DDT) and trace metal contaminants levels were found to be elevated in central California's Steller sea lions (Jarman et al., 1996, Sydeman and Jarman 1998). These compounds are known to adversely affect health in marine mammals (Burek et al., 2008) and have documented effects on their reproductive and

endocrine function increased contaminant loads may suppress the immune system and make animals more vulnerable to diseases and other pathogens. This can adversely impact health…".

Studies on the California sea lion, a closely related species, and one that shares much of the range of the eastern DPS, indicates that contaminants in some parts of the range were having effects on the reproduction of at least this species. High organochlorine levels were associated with premature birth in California sea lions in the past (DeLong et al. 1973). Based on tissues collected on San Miguel Island in 1970, DeLong et al. (1973) reported that organochlorine pesticides and PCB residue levels were two to eight times higher in the tissues of California sea lion pups and premature parturient females than in similar tissues from full-term females and pups. These authors noted that "Premature pupping in California sea lions has been noted on the breeding islands since 1968" (DeLong et al. 1973:1168). Huber (1987) reported that researchers on San Miguel Island noted that 20% of the California sea lions of San Miguel Island were being born prematurely in the 1970s. They determined that multiple factors were associated with this factor: San Miguel sea lion virus (SMSV), *Leptospira interrogans* serovar Pomona, and increased levels of PCB and DDE, both organochlorines, in their tissues (Gilmartin et al. 1976). Leptospirar Pomona was isolated from both newborn and dead premature pups, always associated with perinatal hemorrhagic syndrome (Huber 1987). While Le Boeuf et al. (2002:1) reported that total DDT levels in California sea lion blubber decreased by more than an order to magnitude from 1970 to 2000, and that this decrease was in general agreement within patterns seen in other marine mammals, he also reported that current levels of tDDT and PCBs in this species are "……exceed those reported to cause immunotoxicity or endocrine disruption." While the average current levels of these toxic substances has declined in CA sea lion and Pacific harbor seals, since the 1970s, Blasius and Goodmanlowe (2006) reported that some individuals had levels as high as those discerned in the 1970s. More than half of the California sea lion had levels of these contaminants known, at least in other species, to adversely affect immune function.

Based on studies in the Southern California Bight, an area in which Steller sea lions used to breed, Blasius and Goodmanlowe (2008) reported that the mean concentrations of organochlorines in California sea lions, northern elephant seals, and Pacific harbor seals were much higher than previously reported from southern California. The mean concentration of tDDT and tPCB were 9.8 fold and 4.8 fold for California sea lions in their study versus that of Kannanet al (2004) further south in the range. Blasius and Goodmanlowe (2008:1978) concluded that:

> "…the high levels of tDDT found in the present study reflect the extremely high levels that still remain in top-level carnivores in the SCB."

Higher levels of HCH were detected in northern elephant seals than in the CA sea lion and the Pacific harbor seal, a situation they raise as an example of exposure to a contaminant far from the contaminant hotspot. The high levels of tDDPT and tPCB in pinnipeds in the SCB contrast sharply with levels in Steller sea lions collected in Alaska in the mid-late 1970s (Lee et al. 1996).

While many the aforementioned studies were on other pinnipeds from waters off California, these pinnipeds share portions of their range with Steller sea lions and they forage on some of the same prey items. Thus, these studies provide insight into levels of contaminants that are circulating and bioavailable in parts of the range of the eastern DPS.

Recent studies (Wang et al. 2011) in Prince William Sound (PWS), an area within the breeding range of the western DPS but an area in which eastern DPS animals are known to feed, detected PCBs in all tissues

sampled (blubber, liver, and kidney) of 5 male sea lions harvested from Tatitlek in 2000 and 2001. Wang et al. (2011) reported that the median total PCB concentrations in the PWS samples collected were in the same order of magnitude as those collected from the Pribilofs, about one order of magnitude below those that Varanasi et al. (1992) reported for marine mammals and fish in US coastal waters, and were also lower than the averages reported for blubber (5-17 ug/g lw) but comparable to those reported in liver (409) of Alaskan sea lions and the western Bering Sea by Lee et al. (1996). Median total concentrations of PCBs in Steller sea lions from SE AK were 6.6. ug/g lw) (Krahn 1997). Wang et al. (2011) summarized that the "mean toxic equivalents for samples from the 9 males sampled (total) from both PWS (an area where animals from the eastern DPS are known to feed) and the Pribilofs were 2.6, 4.7, and 7.4 pg/g lw in kidney, liver, and blubber samples, respectively. The total concentration of PCBs (2.6-7.9 ug/g lw) in the livers of some of these males was within a range known to cause physiological effects."

Surveys have shown that captive and western stock Steller sea lions have relatively high levels of organic pollutants in their systems, specifically organochlorines (OC), such as PCBs and DDTs (Meyers and Atkinson 2012; Wang et al 2011). It is noteworthy that PCB levels at the highest concentrations recorded for samples taken from Steller sea lions in southeast Alaska (NMFS unpublished; in NMFS 2008) have been shown to reduce juvenile survival in sea otters (AMAP 2002) (cited in NMFS 2008).

Increases in other potentially toxic pollutants have recently been documented in pinnipeds in California (e.g., Meng et al. 2009; Stapleton et al. 2006). Recent data showed that levels of polybrominated dephenyl ethers (PBDE) in pinnipeds (harbor seal, California sea lion) that stranded along the southern California coast between 1994 and 2006 were the highest to date in marine mammals (Meng et al. 2009). Meng et al. (2009) summarized that some congeners of PBDEs are believed to be endocrine disrupters with specific interaction with thyroid hormones documented in some young (first year of life) marine mammals. However, there are not published or widely acknowledged thresholds on which to predict potential effects.

Elevated levels of copper, mercury, and selenium were detected in the tissues collected from eight dead pups at Año Nuevo Island and Southeast Farallon Island (Sydeman and Jarman 1998). Castellini (1999) reported that copper, zinc, and metallothionein (a chelating compound that is assessed as a measure of exposure to heavy metal contamination) levels were comparable between eastern and western DPS Steller sea lion pups. These authors also reported elevated levels of circulating metallothionein and zinc for southeast Alaska sea lion pups during the early 1990s, but levels declined and were similar to those in pups sampled in the Aleutian Islands by 1997. Relatively low, but detectable levels of mercury were found in the hair of pups and juveniles from both populations (Beckmen et al. 2002). Recently, Holmes et al. (2008) evaluated concentrations of 7 metals: total mercury, arsenic, lead, cadmium, silver, aluminum, and vanadium in tissues of Steller sea lion pups from both the eastern DPS (19 pups) and the western DPS (8 pups). Within the eastern DPS, all samples were collected in Southeast Alaska. Holmes et al. (2008) found statistically significantly higher levels of mercury in liver and kidney in samples from pups in the western DPS than in the eastern DPS. These authors also found statistically significantly higher levels of lead in the livers of pups from the western DPS. There were no instances where, overall, tissue burdens were e significantly higher for pups from the eastern DPS, although there were some significant differences in both directions (higher in both the east and the west for given tissues and metals) when only pups of the same sex were compared among populations (see Tables 3 and 4 of Holmes et al. 2008). However, sample sizes for the western DPS are quite small (n=0-4) in some of these latter comparisons. Holmes et al. (2008:1416) summarized that metals are "…known to significantly disrupt all of the major organ systems in humans and terrestrial mammals" and are prevalent in the marine environment (Barron

et al. 2003). Mercury is believed to be toxic to the liver in pinnipeds (Holmes et al. 2008, citing Ross and Troisi 2001) and was found to target gray seal testes due to altered steroid production. Holmes et al. (2008) summarized that mercury may be of particular concern for Steller sea lions. The upper limit of the levels found in western DPS pup livers was 9.38 ug/g, more than 9 times the action level (at the time of their paper) of 1 ppm or 1 ug/g for mercury levels in fish intended for eating by humans.

We conclude that much remains to be learned about the levels of a suite of contaminants, related physiological mechanisms, and the reproductive, health and survival consequences of such substances in eastern DPS Steller sea lions (Atkinson et al. 2008; Meyers et al. 2008; Barron et al. 2003). We note that there are relatively few data in the center of the range and more data in both the southern and northern ends. However, in the past two decades there has been an emerging understanding that contaminants, especially those that bioaccumulate and are persistent, can pose a risk to reproductive success and health (e.g., Ross et al. 1995; Beckmen et al. 2003; Hammond et al. 2005). Studies conducted in southern and central California (Sydeman and Jarman 1998; DeLong et al. 1973; Ylitalo et al. 2005 and others see Heintz and Barron 2001 for review), have recognized there is potential for adverse consequences of high levels of contaminants in pinnipeds in this more industrialized portion of their range. However, this potential is in contrast to the robust populations of many pinnipeds, such as California sea lions (but not Steller sea lions), in these areas. A body of literature on Steller sea lion and other pinnipeds suggests that toxic substances may have been a factor in the lack of recovery of Steller sea lions in some parts of California. However, this is uncertain. More importantly, in most of the range of this DPS, if toxic compounds have affected reproduction or survival, the effects have not been sufficient to impede sustained recovery. At present, while we have unanswered questions about the potential for toxic substances to be affecting reproduction, survival, and population increase in the southern part of the range of this species, evidence does not indicate that toxic substances are likely to cause this population to become endangered within the foreseeable future throughout all or a significant portion of its range.

4.3.2.6 Oil and Gas Activity

NMFS (2008a) did not identify potential pollution or disturbance from oil and gas development as a threat to the eastern DPS of Steller sea lions. However, oil and gas activities such as exploration, development, and/or transport could adversely affect Steller sea lions within the range of the eastern DPS and are foreseeable, for at least 30-50 years. Given the history of spills in the region over the long term, it is reasonable to expect that another large spill may occur within the range of this species given the current levels of activity.

California.-Oil and gas leasing, exploration and development has occurred directly in the historic or current range of the eastern DPS in waters off California. New leasing is not currently occurring or planned offshore of California, but there are multiple active leases and platforms on which drilling is occurring and oil is produced in that state. Maps of these leases are available at: http://www.boemre.gov/omm/pacific/lease/lease.htm. They include multiple platforms at the southern end of the historic range, shoreward of the Channel Islands, off Point Arguello, and off Huntington and Seal Beaches. In July of 2010, BOEMRE Pacific region indicated that there are currently 241,023 acres in active leases and 43 of the 49 active leases are producing in California. The Pacific region of BOEM reported that since the 1969 Santa Barbara oil spill, approximately 883 barrels of oil have been spilled as a result of OCS natural gas and oil operations offshore California (http://boem.gov/BOEM-Newsroom/Offshore-Stats-and-Facts/Pacific-Facts-and-Figures.aspx). While the historic range of Steller

sea lions in California was overlapping with the area in which active leasing and development occurred, currently the nearest breeding site is over 150 miles north of where active leases occur. However, breeding areas exist in areas that could be affected by oil spills.

Washington, Oregon and Alaska.--While there is a history of oil and gas exploration on the Olympic Peninsula and adjacent offshore areas of Washington State, there has not been recent activity. There are no active offshore leases in Washington, Oregon, or Southeast Alaska. Based on BOEM's (formerly MMS) Notice of Intent to Prepare and Scope an EIS (75 FR 16828), BOEM is currently evaluating a proposed OCS Oil and Gas Program for 2012–2017 that includes oil and gas leasing in Cook Inlet and Shelikof Strait. This region includes areas in which animals, especially males, from the eastern DPS may seasonally occur for feeding. No future oil and gas sales are currently planned within the breeding range of the eastern DPS in the United States. However, tankering is expected to continue to occur from Valdez for transport to refineries in Washington, California and Hawaii (http://alaska.conocophillips.com/EN/about/publications/Documents/ArcticEnergy.pdf). Those tankers travelling between AK and the lower states use offshore routes, while those servicing the refinery at Cherry Point, WA, travel through the Strait of Juan de Fuca.

British Columbia.--Within the range of the eastern DPS, available information indicates that new oil and gas leasing and exploration in the foreseeable future is most likely to occur in British Columbia. While drilling occurred historically off Barkley Sound, Vancouver Island, in 1972, Canada suspended all work obligations under existing permits and decided to not approve any new exploration permits or programs in the west coast offshore. British Columbia imposed a 5-year provincial moratorium on offshore drilling in 1989. In 2007, British Columbia issued a new BC Energy Plan that re-affirmed its commitment to offshore oil and gas exploration and development, requested that Canada lift the federal moratorium and stated that the provincial moratorium will be lifted at that time (British Columbia Ministry of energy and Mines and responsible for Housing 2011: http://www.em.gov.bc.ca/OG/offshoreoilandgas/OffshoreOilandGasinBC/Pages/AChronologyofActivity.aspx). Since that time, Canada and British Columbia have taken steps to undertake research and to outline policy (e.g., in 2008, the release of seismic survey mitigation policy) related to initiating exploration and development of offshore oil and gas.

In recent years there has been an increase in tankering of oil out of the Kinder-Morgan TransMountain pipeline that terminates in Burrard Inlet http://www.kindermorgan.com/business/canada/transmountain.cfm). A new project, Enbridge's proposed Northern Gateway pipeline, would build and operate a port facility at Kitimat, B.C. and two pipelines, one of which would transport crude oil via tanker to Asia-Pacific markets from an inland terminal in Alberta to the marine terminal, and one of which would transport condensate from the marine terminal to Bruderheim. One terminus of the pipelines would be in Kitimat. This project would result in a significant increase in tanker traffic in inshore waters on the central-northern British Columbia coast (see http://www.northerngateway.ca/). An Environmental Assessment is currently underway, and Steller sea lion haulout and rookeries have been identified as vulnerable habitats. In April 2012, Natural Resources Canada (http://www.nrcan.gc.ca/media-room), the Natural Energy Board approved an application for a 20 year license to export liquefied natural gas, paving the way for the construction and operation of a natural gas liquification facility in Kitimak . The first module of the facility is intended to be completed in late 2012 or early 2014 and the 2nd module complete in 2016-18. The export license authorizes BC LNG to export up to 1.8 million tonnes per year of LNG from Kitimat. An EA is being

prepared on the LNG facility and the LNG proposal will be subject to a Technical Review Process of Marine Terminal Systems and Transhipment sites (TERMPOL). This activity will raise the level of shipping related noise and disturbance, as well as spill risk, within the range of the species in British Columbia. Citing COSEWIC (2003) and Olesiuk (2008)., Alava et al. (2012) noted that although Steller sea lions are increasing in British Columbia, they are listed as a species of ''Special Concern'' under the terms of the Species at Risk Act (SARA), due to human disturbance, risk of oil spills and environmental contaminants.

Potential Effects of Oil Spills.--Oil exploration, development, production, and transportation can pose a risk to eastern DPS of Steller sea lions throughout their range, principally due to accidental spills.

Throughout the 20th century, sea lions within many areas of the eastern DPS may have been exposed to spilled petroleum products. Small diesel and fuel spills routinely occur from boats throughout the range of the eastern DPS. Large and very large spills (as defined by BOEM in the 2003 Cook Inlet Oil and Gas lease Sale EIS 2003) have occurred in waters off of California (e.g., a blowout at the Union well offshore of Santa Barbara and related releases directly from the sea floor in 1969), the coast of Washington (e.g., the Nestucca spill in 1988, which spilled about 231,000 gallons of heavy fuel oil (the Nestucca spill also oiled portions of British Columbia); the spilling of about 2.3 million gallons of heavy fuel in 1972 caused by the grounding of the U.S.S. General M.C. Meiggs; the spill of approximately 354,800 gallons of intermediate fuel oil and 97,800 gallons of diesel due to the sinking of the Tenyo Maru in 1991 which spilled about 100,000 gallons of heavy fuel, oil, and diesel; Prince William Sound (the *T/V Exxon Valdez* oil spill (EVOS) in 1989); and other smaller spills at locations in the breeding and/or feeding range of this species. A complete review of this topic is beyond the scope of this document.

Sea lions may be exposed to spilled oil while in the water, on rookeries or haulouts (wave action can drive the oil into high intertidal zones), and through contaminated prey. Oiled females can contaminate their pups. Oiled individuals can spread oil on terrestrial sites and transfer oil directly to non-oiled animals during socializing. In nearly all cases in which there have been some studies of the effects of spilled oil on marine mammals, neither the baseline data nor the study depth are sufficient to detect many types of effects, other than large scale mortality. As summarized by BOEM (2006:90):

> "There are few post spill studies with sufficient details to reach firm conclusions about the effects, especially the long-term effects, of an oil spill on free-ranging populations of marine mammals."

The effects of exposure to spilled oil will depend on many factors including, but not limited to, the type of oil, the location and extent of contamination, the animal's behavior after exposure, the freshness of the oil (i.e., freshly spilled oil versus weathered), the age of the animal at the time of exposure, and the route of exposure. Sea lions exposed to oil spills may become contaminated through inhalation, skin contact and absorption, direct ingestion, or by ingestion of contaminated prey (e.g., see Engelhardt et al. 1977; Geraci 1990; Geraci and Williams 1990; St. Aubin 1990a).

Sea lions would be particularly vulnerable if large amounts of crude oil coated rookeries when young pups were on the rookeries or oil contaminated concentrations of prey. The extent to which sea lions avoid areas that have been oiled is not known. Groups and individual sea lions observed in Prince William Sound and the Gulf of Alaska after the Exxon Valdez oil spill did not appear to avoid oiled areas (Calkins and Becker 1990). Sea lions were sighted swimming in or near oil slicks, oil was seen near numerous haulout sites, and oil fouled the rookeries at Seal Rocks and Sugarloaf Island (Calkins et al. 1994). All of the sea lions collected in Prince William Sound in October 1989 had high enough levels of

metabolites of aromatic hydrocarbons in the bile to confirm exposure and active metabolism at the tissue level. Histological examinations found no lesions that could be attributed to hydrocarbon contamination and, hence, no evidence of damage due to oil toxicity (Calkins et al. 1994). However, studies after EVOS on sea lions were hampered by a lack of baseline on key health, condition and population parameters to enable the type of detailed study needed to discern chronic effects. Studies of long-term effects were not undertaken.

FOC (2011:24) noted that:

> "…a spill affecting a rookery during the breeding season could result in a significant population-level impact. Considering that over 70% of pup production in B.C. occurs on the Scott Islands, an oil spill in that area during the breeding season could have a significant impact on breeding animals."
>
> "As a population-wide impact has been illustrated to be unlikely, concern for catastrophic spills affecting the population has been rated low…However, given that a spill near a rookery (e.g. Scott Islands) during breeding season might impact a large proportion of animals at once, an additional moderate concern is applied for impacts to rookeries during breeding season…".

FOC (2011) noted that it is difficult to predict the location and timing of spills because they are accidental. They rated the "…potential for mitigation of this threat…low to medium due to the inherent difficulty in, and low success of, post-spill clean-up measures (Graham 2004), particularly in isolated, remote areas."

NMFS has previously completed Biological Opinions on oil and gas lease sales within the range of the Steller sea lion. In a 2003 opinion, NMFS (2003:33) wrote that:

> "It is difficult to predict the potential impact of an oil spill on Steller sea lions. A large oil spill could harm or even kill adults, juveniles, or pups that inhale high concentrations of vapors from fresh oil, especially if they are already in a weakened physiological state. Skin irritation and eye damage could result from prolonged surface contact with oil. Such conditions can increase an individual's physiological stress and increase the likelihood of death of individuals that are highly contaminated or already weakened. Because they rely on their hair for thermal protection, sea lion pups are more vulnerable than are adults to oiling and could die if significantly oiled. Thus, a spill during peak pupping season could cause pup mortality if pups were oiled through contact with the beach or from their mothers. However, available data do not indicate such effects have typically occurred after previous spills, or if they have, that large numbers of individuals were affected."

However, as noted, there have not been sufficient data after most (or any large) spills to be able to detect most kinds of effects, especially chronic effects.

Disturbance.-- Sea lions can also be affected by oil and gas exploration, development and production activities due to airborne noise from aircraft and vessels, effects of noise in the water (due to seismic surveys, vessels, sonar devices, emplacement, operation, and abandonment of production facilities, etc.), and pollution due to discharges and fuel spills. Such disturbance could potentially affect the use of rookeries and haulouts, foraging areas, and other important habitats.

Conclusion.--NMFS recognizes that exploration and development of oil and gas reserves, and transportation of product within the eastern DPS Steller sea lion range has the potential to adversely

affect portions of this DPS in the event of large spills or accidents. The most significant effects could result if repeated disturbances or a large spill were to occur near large rookeries. Based on current information, we conclude that oil and gas exploration, development, and production activities do not place the species in danger of extinction now or within the foreseeable future throughout all or a significant portion of its range.

4.3.2.7 Conclusion for Factor A

Based on information and analysis in the Recovery Plan (NMFS 2008) as updated here, NMFS finds:

- The available information suggests that global warming and ocean acidification have not affected the overall viability of this population to date. However, based on the best available science, we conclude that climate change-related and ocean acidification-related changes to marine ecosystems are likely to occur within the foreseeable future that may affect the eastern DPS of Steller sea lion. Based on current information, and because of the specific ecology of the eastern DPS of Steller sea lion (e.g., it is a generalist forager, it has a large and ecologically diverse range, it is not ice dependent or ice associated, etc.) we have high uncertainty about the specific pathways by which Steller sea lions are likely to be affected by these two phenomena and about the magnitude or timing of any future population-level adverse effects on them. We do not have information to support a conclusion that these two factors are likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future. NOAA has active research aimed at better understanding the impacts of climate change and ocean acidification on marine ecosystems, including the ecosystems of which eastern DPS Steller sea lions are a part, and our uncertainty about potential impacts should decrease over time.

- There is no indication that fisheries are competing with eastern DPS Steller sea lions to the point where the level of fisheries related competition is likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

- NMFS finds no current evidence indicating that human disturbance of Steller sea lions on or near coastal habitats is likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future. In the event the eastern DPS is delisted from the ESA, there are significant regulatory mechanisms available under the MMPA and other laws that provide a means to reduce or minimize possible adverse effects of disturbance from human activity.

- While it is important to continue to study and monitor the levels of key contaminants such as heavy metals and organochlorines in the eastern DPS of Steller sea lions, based on the best available information, they do not appear to pose a threat to the long-term viability of the species and they are not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

- Existing and planned operations of oil and gas related activities are not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction within the foreseeable future.

Therefore, after weighing these findings, NMFS concludes that the eastern DPS of Steller sea lion is not likely in danger of extinction throughout all or a significant portion of its range, nor likely to become so in the foreseeable future due to the present or threatened destruction, modification, or curtailment of its habitat or range.

In the event the eastern DPS is delisted, the following continued monitoring activities are recommended to be included within a Post Delisting Monitoring Plan (see Section 5.2) to provide periodic checks on possible effects of habitat-related issues:

- Monitor and assess possible indirect effects of fishery removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and pup/non-pup ratios.
- Monitor the abundance, distribution and protection of important prey species, including prey removal levels in related aquatic habitats
- Monitor the protection, condition, and use of important terrestrial habitat (rookery and haulout sites)
- Conduct periodic contaminant sampling.
- Determine whether evidence suggests (data are unlikely to be sufficient to determine this statistically) there is a northward extension of the patterns observed in parts of California where rookeries were abandoned or where population increase either did not occur or occurred only weakly
- Evaluate whether geographic range shifts are occurring
- Determine if the overall extent of the range is shrinking
- Determine if new gaps in range use for breeding or feeding are developing
- Monitor the frequency, severity, and correlates of Steller sea lion-human interactions
- Monitor the emerging potential threat of climate warming and ocean acidification

4.3.3 *Factor B: Overutilization for Commercial, Recreational, or Educational Purposes*

4.3.3.1 Summary of Recovery Plan Discussion

The Recovery Plan (NMFS 2008) stated that "Human-caused mortality of Steller sea lions includes subsistence harvest, incidental takes in fisheries, illegal shooting, entanglement in marine debris, and take during scientific research. In general, the MMPA provides adequate protection for sea lions from the eastern population. None of these factors now appear to be preventing recovery, although it would be appropriate to reduce the magnitude of these when possible."

4.3.3.2 Subsistence Harvests of Steller Sea Lions

Indigenous people hunt Steller sea lions from the eastern DPS for subsistence and traditional handicraft uses in both southeast Alaska and adjacent areas of Alaska to the north, and in British Columbia (e.g., Zavadil et al. 2005, 2006; Wolfe et al. 2009). While levels of subsistence harvest have increased in recent years in Southeast Alaska compared to those from 1992-1998, the time period reported in the Recovery Plan for the eastern DPS, the last reported levels are still low, given the estimated population size and the related Potential Biological Removal level (PBR). New data available since the Recovery Plan continues to indicate that the subsistence hunting does not pose a threat to this population and that it is not likely to pose a threat in the foreseeable future (Table 5). Based on the pattern of reported take since 1999,

NMFS expects the current level of the likely take to continue for at least a decade. NMFS should continue to monitor this take and should, as recommended in the Recovery Plan (NMFS 2008), take steps to identify, evaluate, and reduce, levels of uncertainty in the estimates of subsistence harvest.

DFOC (2011) reported that aboriginal people in British Columbia traditionally hunted Steller sea lions for food and ceremonial garb. At present, indigenous people can hunt Steller sea lions without a license in B.C. but they are encouraged by the national government to have a Communal License (DFOC 2011). At present, DFOC (2011:28) summarized that as there are not commercial licenses for this activity and "…there is a very limited subsistence harvest….the level of concern associated with harvests is…negligible."

NMFS concludes that the current level of subsistence harvest is not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

Table 5. Estimated subsistence takes of Steller sea lions by Alaska Natives in 6 areas of coastal Alaska between 1992-2008. Data are taken from Table 20 of Wolfe et al. (2009b:63-64). Total take values include both retrieved harvest and reported struck and lost. Data in bold are from areas within the breeding range of the eastern DPS.

Year	**SE Alaska**	North Pacific. Rim and Upper Kenai-Cook Inlet	Kodiak and S. AK Peninsula	Aleutian Islands	Pribilof Islands	Bristol Bay	Total
1992	**6.4**	41	65.2	135.2	296.8	7.8	547.4
1993	**1.1**	46	46.5	123.8	245.4	6.5	487.1
1994	**4.6**	27.7	67	122.4	193.3	1.2	416.1
1995	**0**	31.4	143.8	96.1	67.9	0	339.2
1996	**0**	16.8	65.2	57.9	46.4	0	186.2
1997	**0**	5.8	46.5	51.9	55.9	3.6	163.7
1998	**7.6**	28.5	27	37	78.1	0	178.2
2000	**2.3**	16.7	32.3	76	43.3	0	170.7
2001	**0**	16	46.6	97.7	38	0	198.4
2002	**7.0**	5.5	24.2	105.1	43	0	184.7
2003	**6.9**	24.7	41	107	32	0	211.5
2004	**11.8**	53.9	20.9	96	32	1.2	215.7
2005	**19***	49.2	29.3	88.3	32	0	217.8
2006	**12.6**	25	25.5	82.8	40	0	186
2007	**6.1***	57.8	29	76	48	0	217
2008	**9.6**	24.6	27.4	48.4	36	0	146
Mean estimated take							
1992-98	**2.8**						331.1
1998-2008	**8.4**						194.2

*all struck and lost

4.3.3.3 Direct Fisheries Interactions

4.3.3.3.1 Summary of Recovery Plan Discussion

Intentional Take in Commercial Fisheries.--The Recovery Plan (NMFS 2008) did not identify intentional take in commercial fisheries as a threat to the viability of eastern DPS Steller sea lions. However, NMFS (2008) noted that prior to 1990, the MMPA allowed fishermen to lethally deter sea lions from interfering with commercial fishing operations:

> The provision allowing lethal deterrence was eliminated in 1990 when sea lions were listed as threatened under the ESA. Increased public scrutiny and the threat of fishery closures curbed illegal killings, and the current level of illegal shooting is believed to be minimal (Angliss and Outlaw 2002).

Incidental Take In Commercial Fisheries.--The Recovery Plan (NMFS 2008) did not identify incidental take in commercial fisheries as a threat to the viability of eastern DPS Steller sea lions.

The Recovery Plan (NMFS 2008) outlined the protections put in place by the MMPA to reduce and manage incidental take of marine mammals in commercial fisheries:

> The MMPA authorized the incidental take (serious injury and death) of marine mammals in the course of commercial fishing operations while striving to reduce that mortality to an insignificant level. The MMPA was amended in 1988 to better monitor the cumulative effects of fishery-specific incidental takes. As a result, each U.S. fishery is designated as being in one of three categories based on its frequency of marine mammal interaction; this "List of Fisheries" is reviewed annually.

4.3.3.3.2 Current Sources and Levels of Take in Commercial Fisheries

The MMPA prohibits intentional take of Steller sea lions and other marine mammals by commercial fishermen. The MMPA does include limited exceptions that allow for the incidental take of marine mammals and for intentional non-lethal take of marine mammals that interfere with gear or catch in limited circumstances. A more detailed discussion of the protections and exemptions under the MMPA can be found in section 4.3.5.2, below.

Section 118 of the MMPA requires NMFS to annually evaluate the potential for interaction between commercial fisheries and marine mammals (16 U.S.C. 1387(c)(1)). Observer programs and "self-reported" data are reviewed annually to estimate the number of marine mammals incidentally caught in commercial fisheries. Annual Stock Assessment Reports (SARs) prepared for each species include a summary of human-related serious injury and mortality data (e.g., Allen and Angliss 2011; 2012). The summary includes data from observer and stranding network reports (e.g., animals hooked and entangled in fishing net debris).

NMFS publishes an annual List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals associated with each specific fishery. If total incidental take of a marine mammal stock from all commercial fisheries

is greater than 10% of that stock's PBR, all fisheries that take from that stock are evaluated individually, as follows:

List of Fisheries Categories	***Annual mortality & serious injury as a proportion of PBR***	***Incidental mortality descriptive term***
Category I	≥ 50 % of PBR	"frequent"
Category II	≥ 1% & ≤ 50%	"occasional"
Category III	≤ 1%	"remote"

Category III fisheries are considered to have met the "zero mortality rate goal" (ZMRG), a primary goal of the MMPA. If total incidental take of a marine mammal stock from all commercial fisheries is less than or equal to 10% of that stock's PBR, then all commercial fisheries are considered to be in Category III for that stock, thereby meeting ZMRG.

In 2010, NMFS determined "the annual M/SI [morality/serious injury] incidental to commercial fisheries (25.6 animals), with a US EEZ total annual M/SI of 40.7 animals, will have a negligible impact for purposes of issuing a permit under section 101(a)(5)(E) of the MMPA because total human-caused mortality is less than 10% of the stock's PBR" (see NMFS 2010d; 75 FR 68767, November 9, 2010). NMFS evaluated all state and federal fisheries as well as other sources of human related mortality to make the "negligible impact determination" (as defined by NMFS), and ZMRG. On December 29, 2010 (75 FR 81972) NMFS issued a permit to authorize the incidental, but not intentional taking of six marine mammal stocks (including from the eastern DPS of Steller sea lions) listed under the ESA by participants in several groundfish fisheries in the Bering Sea and the Gulf of Alaska.

The five fisheries managed by the State of Alaska in which incidental take of eastern DPS Steller sea lions have been documented include: 1) Alaska Southeast salmon drift gillnet, 2) Alaska Yakutat salmon set gillnet, 3) Alaska salmon troll, 4) Alaska Gulf of Alaska sablefish longline, and 5) Alaska commercial passenger fishing vessel (charter boat). Each of these fisheries is included in the annual NMFS LOF as required by MMPA Section 118 (*see*, e.g., 76 FR 73912, November 29, 2011).

In none of the five fisheries with documented interactions with eastern DPS Steller sea lions has the documented take been estimated to be ≥ 1% PBR of this DPS. No State of Alaska fisheries are classified as Category I on the NMFS List of Fisheries. Two state-managed fisheries, the Southeast Alaska salmon drift gillnet, and the Yakutat salmon set gillnet, are classified as Category II fisheries. However, that categorization is not based on takes of eastern DPS Steller sea lions. The Southeast Salmon Drift Gillnet Fishery is classified as Category II due to reported interactions with Central North Pacific humpback whales. The Alaska Yakutat Salmon Set Gillnet Fishery is classified as Category II due to interactions with harbor porpoise. If not for the interactions with harbor porpoise and humpback whales, the minimal past interactions of these fisheries with eastern DPS Steller sea lions would qualify them for classification as Category III fisheries (i.e., less than 1% annual mortality or serious injury as a proportion of PBR). Table 4.3.3.2 illustrates the bases for assignment and categories assigned by NMFS for each of the Alaska State fisheries on the most recent List (November 29, 2011).

In the Alaska Yakutat salmon set gillnet fishery, a Steller sea lion was observed entangled in a net, but was able to self-release without serious injury or mortality. Four Alaska state-managed fisheries have been observed to cause serious injury or mortality to eastern DPS Steller sea lions (Alaska Southeast salmon drift gillnet, Alaska Gulf of Alaska sablefish longline, Alaska commercial passenger fishing vessel, and Alaska salmon troll). Uncertainty exists regarding the level of take, including serious injury and mortality in the Alaska salmon troll fishery, because troll gear found on eastern DPS Steller sea lions is indistinguishable between commercial and recreational fisheries (e.g., flashers). Steller sea lions in Southeast Alaska and British Columbia have been observed to have ingested hooks associated with flashers.

A sixth fishery that could potentially interact with eastern DPS Steller sea lions is the Alaska longline set line (including sablefish, rockfish, lingcod, and miscellaneous finfish), although that fishery has not had any documented interactions with marine mammals. It is still considered a fishery that could potentially directly interact with eastern DPS Steller sea lions because a similar fishery, the Alaska halibut longline/setline (state and federal waters), has taken western DPS Steller sea lions.

Data collected since 1990 in U.S. fisheries outside of Alaska reported eastern DPS Steller sea lion mortalities in the CA/OR thresher shark and swordfish drift gillnet, WA/OR/CA groundfish trawl (Cat III), and northern WA marine set gillnet. The eastern DPS Steller sea lion was removed from the list of marine mammals that the CA/OR thresher shark and swordfish drift gillnet fishery interacts with in 2007, because none had been reported taken by that fishery since before 1997.

It is important to note that not all fisheries known to have taken eastern DPS Steller sea lions are monitored each year in the U.S. Many rely on self-reporting of take by fishermen. Additionally, only limited observer data exist on mortalities of marine mammals incidental to commercial fisheries in Canada (i.e., including some that are similar to U.S. fisheries known to take Steller sea lions). As a result, the number of Steller sea lions taken in fisheries in Canada is not known and there is uncertainty about the number taken in U.S. Fisheries.

The issue of fisheries related entanglements of Steller sea lions has received wide attention in recent news reports and on the internet (e.g., http://vimeo.com/29863322). Such entanglement includes bands and gear around the necks and flashers and hooks in the mouths, esophagi, and stomachs of Steller sea lions. Based on the incidence of observed entanglements and estimates of abundance, Raum-Suryan et al. (2009) estimated that there were between 54-67 visibly entangled Steller sea lions in Southeast Alaska at any one point in time during the summer, 2002. It was not possible to identify if the source of these materials was from commercial and recreational salmon fishing because both fisheries use the same kinds of gear. The incidence of Steller sea lion entanglement in Oregon also has been investigated recently (Raum-Suryan, unpublished report). While those results are still preliminary, it was found that entanglement in fishing gear and marine debris occurs in that region, possibly at a greater incidence than for Southeast Alaska and northern British Columbia. Ingestion of hooks and flashers associated with salmon fisheries was also observed at the Farallon Islands (Hanni and Pyle 2000) and the percentage of salmon flashers to total entanglements (40%) observed by Raum-Suryan et al. (2009:1493) from 2000–2007 "…was similar to those reported by Hanni and Pyle (2000) at Southeast Farallon Island, California from 1976–1998 (37%)". Raum-Suryan et al. (2009) concluded that entanglement rates of Steller sea lions are likely underestimated because the likelihood of observing an entangled animal is poor, entangled animals may die at sea, there may be no external evidence of entanglement, or the external evidence may be lost over time.

In the Stock Assessment Report for 2011, Allen and Angliss (2012:17) summarized that "During the 3-year period from 2007-2009, a total of 20 Steller sea lion mortalities occurred in fisheries operating south of latitude 49". However, these mortalities could not be assigned to a particular fishery. Fourteen eastern DPS Steller sea lion mortalities were reported in 2007, 8 in 2008, and zero in 2009, resulting in an average annual take of 6.67 animals. Additional fishery-related entanglements are reported in the stranding database. Allen and Angliss (2012) noted that these are considered minimum estimates because not all entangled animals strand, and not all stranded animals are found or reported. They reported that there were eleven serious injuries and mortalities of Steller sea lions from 2005-2009 due to ingestion of "flashers" used in salmon trolling in which the hook was lodged in the esophagus and penetrating adjacent tissue (NMFS Alaska Region stranding database, unpublished data). Citing Raum-Suryan et al. 2009 and L. Jemison, pers. comm.), they reported that between 2003 and 2007, 121 Steller sea lions who had ingested such "flashers" were observed in Southeast Alaska and northern British Columbia. They noted that, based on Angliss and DeMaster (1998), it is appropriate to consider these as "serious injuries". Raum-Suryan et al. (2009: 1493) stated that "Ingestion of fish hooks can cause not only immediate harm but also long-term infection and death. Where hooks migrate from the stomach to the lungs, pleuritis may develop over a period of weeks. Where hooks embed in the jaw, abscesses may develop over weeks or months and cause tooth loss or the inability to feed (Angliss and DeMaster, 1998)".

Based on fisheries observer data (7.47), opportunistic observations (24.2), and stranding data (1.8), Allen and Angliss (2012) provided a minimum estimated mortality rate incidental to U.S. and Canadian commercial and recreational fisheries) of 33.5 Steller sea lions per year. NMFS refers readers to the most recent SAR (Allen and Angliss 2012; at http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011.pdf) for additional details of incidental catch estimated for various fisheries and areas within the range of the eastern DPS.

In summary, the best available information supports a conclusion that while Steller sea lions are taken incidental to commercial fishing, the known mortality level from this source is relatively small compared to the PBR. NMFS acknowledges uncertainty about the actual level of interactions during fishing and due to entanglement. However, analysis indicates that the population has nonetheless experienced a sustained increase since the 1970s.

NMFS will continue to monitor the take of Steller sea lions in selected fisheries and will, as recommended in the Recovery Plan (NMFS 2008), take steps to work cooperatively with the States to implement observer programs and other means to identify, evaluate, and reduce, levels of uncertainty in the estimates, and the occurrence of incidental taking by commercial fishing. We do not have evidence that indicates that the estimated level of incidental take in commercial fishing is likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

Table 6. MMPA List of Fisheries classifications for State-managed fisheries within the breeding range of the eastern DPS Steller sea lions, marine mammal species potentially affected, and stock/species driving the classification (adapted from NMFS List of Fisheries http://www.nmfs.noaa.gov/pr/interactions/lof/).

Fishery	***Category***	***Marine mammal species or stocks killed or injured***	***Basis (stock driving the classification)***
AK Southeast salmon drift gillnet	II	Dall's porpoise, AK Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific Pacific white-sided dolphin, North Pacific Steller sea lion, Eastern U.S.	Humpback whale, Central North Pacific
AK Yakutat salmon set gillnet	II	Gray whale, Eastern North Pacific Harbor seal, Southeast AK Humpback whale, Central North Pacific (Southeast AK)	Harbor porpoise, Southeast AK
AK salmon troll	III	Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK Gulf of Alaska sablefish longline	III	Sperm whale, North Pacific Steller sea lion, Eastern U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish)l	III	None documented[3]	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK commercial passenger fishing vessel	III	Killer whale, stock unknown Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]

[3] This fishery is included here on the basis of analogy with the federally managed Gulf of Alaska Sablefish longline fishery, which has had reported serious injury/mortalities of eastern DPS Steller sea lions. Although no such interactions have been reported in the State-managed fishery in State of Alaska waters, the two fisheries operate in similar means (e.g., time, space, and gear), and the State fishery occurs well within the range of seasonal concentrations of foraging eastern DPS sea lions, thus it is reasonable to consider that such interactions may occur.

4.3.3.4 Intentional Killing

Prior to 1970, control programs caused significant declines of Steller sea lions in multiple parts of the range of the eastern DPS (e.g., see NMFS 2008 and references given below).

In Canada, the killing of thousands of Steller sea lions during control programs caused a significant decline in the region. Readers are referred to DFOC (2008; see Figure 2 of DFOC 2008:4) for a review and estimates of historic intentional culls in Canada. DFOC (2011:27) noted:

> For most of the 20th century, the main factor limiting Steller Sea Lions along the west coast of North America was predator control...The only portion of the Eastern population range that escaped large culls was southeast Alaska, where there are no records of the species breeding or being abundant in the early 1900s.

DFOC (2011) reported that while commercial harvest and culls have not been authorized by management provisions in British Columbia since 1970, sea lions were killed in the past to protect fish in herring impoundments and fish farms under licenses that allowed for limited harvest of "nuisance animals." Allen and Angliss (2011, citing Olesiuk 2004) reported preliminary data indicated that from 1999 to 2003, a mean of 45.8 Steller sea lions per year were killed in British Columbia as part of this program. However, due to the designation of Steller sea lions as a Species of Special Concern in 2003, killing of this species under such predator control nuisance animal licenses has been prohibited since 2004 (DFOC 2011). The status of Steller sea lions in Canada is currently being reviewed and if they are delisted under SARA, predator kills at fish farms could resume.

Bounty payments were offered in both Washington and in Oregon (e.g., Scheffer 1928 as summarized in Stewart et al. 1993). In Washington, Steller sea lion abundance declined from several thousand in the early 1900s to less than a hundred by the late 1940s (DFOC 2011). High levels of human-caused mortality, related, at least in part, to bounty payments (Pearson and Verts 1970), resulted in a substantial reduction of the numbers of sea lions in both Washington and Oregon (DFOC 2011), including the Columbia River (Northwest Power and Conservation Council 2004). Rowley (1929) reported that "harassment and killing by bounty hunters and fisherman" reduced the numbers of sea lions in California and "apparently eliminated several breeding sites." Rowley (1929) also describes killing by "officers of the California Commission" in 1901 and 1902 (that likely decimated the breeding rookery at Seal Rocks, San Francisco).

When sea lions were listed as threatened under the ESA, the allowance for "lethal deterrence" was eliminated. A public information campaign to educate people not to shoot sea lions followed the listing. NMFS (2008a:75) noted that "[]ncreased public scrutiny and the threat of fishery closures curbed illegal killings."

There are cases of documented illegal kills in British Columbia (DFOC 2011, citing DFOC unpublished data). DFOC (2011) also states that mortality outside of the limits of permits issued for subsistence or predator control may occur. DFOC (2011:26) characterized the extent of illegal killing of pinnipeds in British Columbia as "poorly understood", with an unknown impact at the level of Steller sea lion populations, and with a moderate potential of mitigation.

New information indicates that the level of shooting in the Pacific Northwest has increased in recent years. In 2009, NMFS NWR records indicate that at least nine Steller sea lions (eight of which were adult

female) were shot. All but one of these shootings occurred in Oregon, while the other occurred in Washington. While one of these animals was found alive, it later died. Thus, all are confirmed mortalities due to shooting. In 2010, there were 7 confirmed lethal shootings of Steller sea lions, which were found stranded in Washington State (4) and Oregon (3) (K. Wilkinson, NMFS NWR unpublished data). In 2012, preliminary data between Jan. 1-April 1, 2012 confirmed 2 killings and between April 1-July 23, 2012 seven Steller sea lions were confirmed shot and 6 were likely shot (based on hemorrhage pattern) in the area from Seaside region to Long Beach, Washington, including the Columbia River (data provided by D. Duffield: email to K. Wilkinson, NWR, July 23, 2012).

Based on the available information, it seems likely the level of illegal killing may be underestimated due to the vast and remote nature of much of the range of this DPS and the specific circumstances that need to occur before a shot or seriously injured animal is definitively categorized as an "illegal take." In Alaska, dead sea lions that are found shot are not typically reported as suspected illegal takes as it is assumed that they result from subsistence harvest "struck and lost" events.

Allen and Angliss (2011) reported that between 2001 and 2005 there were three reported non-fishery related serious injuries or mortalities to Steller sea lions in Washington and Oregon for an estimated "other" interaction rate of 0.6 animals per year.

At present, there are no commercial harvests or predator control programs in which Steller sea lions can be legally killed in the United States or in Canada, there is a general moratorium on take of all marine mammals under the MMPA, and take of Steller sea lions is also prohibited under provisions of the ESA. (DFOC 2011:26) concluded it is "unlikely" that illegal killing in British Columbia currently affects the viability of the population; the impact of such taking in both Canada and the United States is "negligible." While it is likely the illegal take of Steller sea lions is underestimated, NMFS concludes the current estimated level of illegal take is not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.5 Scientific Research, Entanglement, and Other Human Related Mortality

Scientific research occurs within the range of the eastern DPS of Steller sea lions. This research is aimed at providing information needed for the conservation of this species. The potential effects of such research were evaluated by NMFS (2009) in the biological opinion related to permitting and funding of Steller sea lion and northern fur seal research. It was discussed more briefly in the biological opinion on the Groundfish Fisheries in the Aleutian Islands, Bering Sea, and Gulf of Alaska groundfish fisheries (NMFS 2010).

NMFS limits research-related mortality to those levels permitted in 2007: up to 15% of the Potential Biological Removal (PBR) level for each stock. Between 2003 and 2007, there were nine incidental mortalities resulting from research on the eastern stock of Steller sea lions, which results in an annual average of 1.8 mortalities per year from this stock (Allen and Angliss 2010).

Entanglement of Steller sea lions in packing bands, discarded fishing gear, rope, hooks and flashers may be reported through the Stranding Network, field studies or by opportunistic sightings. Such entanglement can lead to serious injury and mortality. Entanglements around the neck can be especially deadly if animals are entangled that are still growing (or gaining more massive necks with maturity, as do male sea lions). The Recovery Plan (NMFS 2008) did not identify entanglement as a threat to the eastern DPS. While noting that entanglement in a variety of debris occurs, including packing bands, loops of line,

and fishing gear, and may cause mortality, NMFS (2008a:199) noted that "the extent is unknown and may range from a fraction of a percentage to several percent a year."

Information that has become available since the publication of the Recovery Plan has further documented entanglement events and the potential consequences of entanglement to Steller sea lions, especially in the northern part of the range of the eastern DPS. Raum-Suryan et al. (2009) surveyed many haulouts and rookeries throughout southeast Alaska and northern British Columbia between 2000-2007. They observed that more juveniles were entangled or hooked (J hooks and flashers) than any other age class and estimated that the overall observed entanglement rate was 0.26%.

Other human related activities may infrequently result in mortality to Steller sea lions. For example, in 2008, two Steller sea lions died when the doors of research traps closed unintentionally at Bonneville Dam (K. Wilkinson, unpublished NMFS NWR data).

Based on stranding data (Allen and Angliss 2011), the total human-related serious injury and mortality of eastern Steller sea lions for the 2005-2009 period is 25 (11 ingested hooks, 9 entanglements, 3 gunshots, and 2 vessel collisions), giving an average annual serious injury and mortality of 5.0 animals/yr from "other human related sources."

The levels of mortality from research directed activity, entanglement, and "other human related sources" are very small relative to population size and productivity and are not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.6 Conclusion for Factor B

Based on information and analysis in the Recovery Plan (NMFS 2008), which has been updated and supplemented here, this review finds:

- Current and expected future levels of subsistence hunting in both Alaska and British Columbia are very low to negligible, not expected to increase appreciably in the foreseeable future, and thus, do not pose a threat to the viability of this population.

- Available data indicate that small numbers of eastern DPS Steller sea lions have been and are anticipated to be taken incidental to commercial fishing; the anticipated level of taking is not likely to pose a threat to this population. However, there is uncertainty about the levels of take in many fisheries.

- There are no commercial harvests or predator control programs in which Steller sea lions can be legally killed in the United States or in Canada. While it is likely that illegal take (e.g., shootings) of Steller sea lions is underestimated, NMFS concludes the existing level of this illegal take does not pose a threat to this population. If this population is delisted and there are future requests for predator control, such requests will be governed by the MMPA and, as such, should not reach a level where the taking could pose a threat to the viability of the population.

- Known current and anticipated levels of mortality from research directed activity, entanglement, and "other human related sources" are small relative to population size and productivity. It is likely that these levels of takes are underestimated. However, the sustained population increase

> seen throughout most of the range of the eastern DPS indicates that even if these rates are higher than known, they have not been at a level to threaten overall population.

Therefore, NMFS concludes that commercial, recreational, or educational activities are not likely to result in "overutilization," nor are the combined effects of these threats likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

In the event the eastern DPS is delisted, the following continued monitoring activities are recommended to be included within a Post Delisting Monitoring Plan (see Section 5.2) to provide periodic checks on possible effects of overutilization issues.

- Monitor intentional lethal takes
- Monitor impacts of research activities
- Monitor incidental takes in fisheries and aquaculture operations
- Monitor for mortality events caused by fishing gear and other human related materials, illegal shooting, etc.
- Monitor the frequency, severity, and correlates of Steller sea lion-human interactions.

4.3.4 *Factor C: Diseases, Parasites, and Predation*

4.3.4.1 Summary of Recovery Plan Discussion

In the Recovery Plan, NMFS (2008:VII-5) summarized that:

> Although Steller sea lions are taken by killer whales throughout their range there is no indication that killer whale predation is outside of normal or background levels expected in this population at this abundance level. The final evaluation is that predation is not limiting recovery.

However, NMFS (2008:VI-2) noted that previous authors (Long and Hanni 1993) have suggested that "... white shark predation could impede recovery of Steller sea lions in California if the number of sea lions declines further and the shark population continues to increase."

With respect to disease, NMFS (2008:VI-4) stated that:

> Whereas exposure to many disease agents has been identified in Steller sea lions, little is known about the disease agents themselves or how they may impact the sea lion populations and no evidence has been found of disease limiting population growth.

NMFS (2008:VII-5) concluded that

> Diseases are known to occur within this population but appear to be limited to those endemic to the population and are unlikely to have population level impacts.

Thus, NMFS (2008) did not include listing factor recovery criteria to reduce disease and predation in the Recovery Plan.

4.3.4.2 Disease

In this section, we consider current and future threats posed by infectious disease. While disease can be caused by other factors, such as contaminants, we consider those elsewhere in this status review (e.g., under toxic substances).

New information indicates that the threat of a novel, possibly pathogenic and infectious, disease is higher now than was expected at the time the Recovery Plan (NMFS 2008) was completed. This increased threat is due to: the documented infection and exposure of Steller sea lions to at least one infectious, and possibly pathogenic, virus (phocine distemper virus (PDV)) which is likely novel to them; the emergence and/or the detection of other diseases previously undocumented in marine mammals within their range; increased crowding at some rookeries that may result in increases in incidence of density-dependent related disease; and changing climatic and oceanic conditions that enhance the probability of Steller sea lion exposure to novel disease agents. Moreover, "[It] has become increasingly clear that infectious diseases represent an emerging cause of population declines and extinctions in threatened species" (Pedersen et al. 2007, citing: Daszak et al. 2000; Lafferty and Gerber 2002; and Smith et al. 2006).

PDV is a virus that has caused large scale epidemics and, in some cases, high levels of mortality in some phocids of the North Atlantic, and is now present in the North Pacific. Goldstein et al. (2009) documented the presence of PDV in wild-caught and salvaged sea otters in areas of Prince William Sound, Kachemak Bay, areas of the Kodiak Archipelago, and the Aleutian Islands. Some of these areas, particularly Prince William Sound, are within the range in which Steller sea lions from the eastern DPS are known to feed and to use haulouts also used by the western DPS (e.g., see DeMaster 2009). Goldstein et al. (2009) concluded that:

> "These results demonstrate that PDV has been introduced to the North Pacific Ocean since 2000. All Pacific marine mammal species are now at risk for phocine distemper–induced population decreases…Viral nucleic acid in nasal swabs from free-ranging, live-captured otters confirms viral shedding. Therefore, otters are capable of transmitting PDV to…other species.

Goldstein et al. (2009) reasoned that the entry of this virus into North America may have occurred due to global warming.

PDV has the potential to have population-level impacts in at least some wild populations of pinnipeds. Evidence from studies of pinnipeds in the North Atlantic indicates the effects of exposure to PDV have ranged from large scale epidemics in Atlantic harbor seals to no detectable population impacts in other species. Härkönen *et al.* (2006) summarized that PDV caused two epidemics in waters off of Northern Europe resulting in the deaths of an estimated 23,000 European harbour seals in 1988 (Dietz *et al.* 1989, Heide-Jørgensen *et al.* 1992) and more than 30,000 deaths in 2002 (Harding *et al.*2002, Jensen *et al.* 2002). Other morbilliviruses, such as canine distemper virus and dolphin morbillivirus have also been documented to adversely affect other marine mammal species (Härkönen *et al.* 2006; Osterhaus *et al.* 1997). However, in other documented instances, researchers have detected evidence of exposure to an infectious disease agent but did not detect an elevation of mortality.

According to the primary investigator on the relevant studies, the recent identification of PDV in northern sea otters in Alaska created an immediate need to evaluate the current exposure and infection status of other marine mammal species whose ranges overlap. Archived samples from Steller sea lions collected since 2001 (both nasal swabs from live captured animals and tissues from dead carcasses) were tested by PCR to detect the presence of viral nucleic acid, primarily from animals in the Aleutians and Prince

William Sound. Samples tested positive across several locations and sampling years indicating that PDV is also circulating in other marine mammals in Alaska, in addition to sea otters (T. Goldstein, unpublished data). Serology testing of samples from 2001-2010 indicated seropositive Steller sea lions from multiple locations throughout the western DPS (T. Goldstein, unpublished data). The goal of current research is to determine how widespread this viral infection is in Steller sea lions across their range and to attempt to determine the role this viral infection may be playing in the health of these animals (T. Goldstein, pers. comm.).

In the Recovery Plan, NMFS (2008a) wrote that:

> "Investigators have not seen large numbers of dying or dead Steller sea lions, although sick individuals are found on rare occasions. For example, two sick Steller sea lions that stranded in northern California and were brought in for treatment later died of acute bronchopneumonia of unknown etiology (Morgan *et al.* 1996)."

In 2009 and 2010, over the course of the summer, an abnormally high number of Steller sea lions were discovered dead in Southeast Alaska. A total of 69 stranded Steller sea lions were detected in Southeast Alaska, 55 of which were dead (24 in 2009 and 31 in 2010). Samples were collected for histopathology from a portion of these animals; however, preliminary results did not show any indication that these individuals were exposed to PDV (K. Burek Huntington, pers. comm.). Studies are also being conducted to determine whether PDV or other known disease agents were associated with 4 aborted Steller sea lion pups found by a researcher in the Kodiak Archipelago in the spring of 2012.

A novel gammaherpesvirus, Otarine herpesvirus-1, is associated with urogenital carcinoma in California sea lions (*Zalophus californianus*) (King et al. 2002). However, currently no such herpes-related tumors have been found in Steller sea lions within the eastern DPS or elsewhere. Herpes-associated neoplasia has not been found up until now despite a large amount of monitoring of the population (K. Burek-Huntington, pers. comm.). Thus, we conclude, based on expert input (K. Burek-Huntington, pers. comm.) that it seems unlikely that this neoplastic disease occurs at a high enough frequency to cause a population level effect alone or in combination with other factors.

Lafferty and Gerber (2002) concluded that: key threats to biodiversity, such as climate change, resource exploitation, pollution, and habitat alteration can affect the transmission of an infectious disease. Other conclusions from Lafferty and Gerber (2002) relevant to the eastern DPS of Steller sea lion are that:

- introduced pathogens can make abundant species rare
- conditions that cause stress may increase susceptibility to disease
- cross-species contact may increase transmission
- pathogens are of increasing concern for conservation

The marine environment of the eastern North Pacific is changing and is likely to change in the future due to global warming and related changing ocean conditions (see section on Climate Change and Ocean Acidification). Climate change can lead to shifts in the range of the eastern DPS of Steller sea lion, or in the range of other species. Such range shifts increase the likelihood that Steller sea lions will be exposed to novel disease agents brought into their habitat by other species (e.g., Lafferty and Gerber 2002).

Individuals from the eastern DPS cohabit some haulouts with other populations and/or species at which they could be exposed to disease agents present within those other species (e.g., in British Columbia with

California sea lions (Olesiuk 2008) or at Cape St. Elias with individuals from the western DPS (NMFS unpublished data)). They inhabit range that, based on studies of sea otters in California and other marine mammals in Britain (Forman et al. 2009), may risk their exposure to novel pathogens (e.g., the parasite, *Toxoplasma gondii*) from land-based sources. In California, the risk of exposure to *T. gondii* infection is likely associated with locations of maximal freshwater outflow along the California coast (Miller et al. 2002).

In a review of information about the potential ability of infectious diseases to affect the overall status and trend of a population, which is the central issue here, Gulland and Hall (2005) noted:

> Little is known about the ecological significance of disease in marine mammal populations because work to date has focused mostly on individual health. Limited data from terrestrial populations indicate that the effect that a living disease may have on a wild population is influenced by… nutrition and…body condition, levels of genetic variation within the population (e.g., Siddle et al. 2007, 2010), and climate (Hudson et al. 2002). Detailed studies sufficient to make these determinations are rare in marine mammal populations.

However, based on the marine mammal studies to date, Gulland and Hall (2005:48) summarized that such studies have shown that

> "…there are a number of diseases in free-living marine mammal populations that can cause mortality or disease growth and reproduction both as primary or secondary factors…".

We conclude that the risk of disease to eastern DPS Steller sea lions is likely higher than was known at the time of the Recovery Plan and it is likely to increase over time due to increased crowding and, especially, due to the emergence of disease vectors that may be novel to this species. However, neither the temporal or spatial pattern of the occurrence of new disease vectors, Steller sea lion exposure to known or new disease vectors (e.g., toxoplasmosis), nor the potential health effects at the individual and population levels from some of the disease agents is sufficiently understood at this time to allow us to make reasonably accurate predictions about the severity of impact. This increased risk and large amount of uncertainty about the potential for population-level effects argues for regular and systematic disease surveillance. NMFS recognizes the need to continue to test and monitor for the presence of novel and potentially threatening disease agents such as PDV and other viruses (see 4.3.7.3 and 5.2, below) and has included such monitoring into our post-delisting monitoring plan for this species (Appendix 3).

At present, information available to us does not indicate that disease is causing population–level effects in the eastern DPS, such that alone, or in combination with other threats, this factor is likely to result in the species being in danger of extinction in the foreseeable future. However, the foreseeable future for this threat factor is limited by our present understanding of the health risks from some of these disease agents necessary to be able to predict their likely future effect.

4.3.4.3 Parasitism

NMFS (2010) identified parasites as one of the main factors that "…have affected Steller sea lions throughout their existence." Parasitism was not identified as a threat to recovery in the revised Recovery Plan (NMFS 2008). Available information indicates that Steller sea lions may carry many different kinds and species of parasites including acarian mites in the nasopharynx and lungs; an anopluran skin louse; intestinal cestodes; trematodes in the intestine and bile duct; nematodes in the stomach, intestine, and

lungs; and acanthocephalans in the intestine (Dailey and Hill 1970; Dailey and Brownell 1972; Fay and Furman 1982; Shults 1986; Gerber et al. 1993; Haebler and Moeller 1993).

Hookworm infections have been detected in healthy-looking pinnipeds (e.g., California sea lion pups; Spraker et al. 2007); however, they have also been associated with a high level of mortality. Gross and histological findings suggest that a synergism of bacteria and hookworms is involved in pup mortality. As crowding continues to increase on eastern DPS Steller sea lion rookeries, hookworm infection may become a larger factor in mortality of Steller sea lion pups. Preliminary data (Rea et al. 2010) indicates there are higher stress protein (haptoglobin) levels in eastern DPS animals (than in western DPS animals), where a high prevalence of hookworm parasites has been found, and where animals are crowded. Adequate research has not been conducted to assess the relative magnitude, importance and synergistic effects of parasitism, disease, and crowding in Steller sea lion populations. The potential for these factors to cause population-level effects as density on rookeries and haulouts increases remains uncertain.

Available data indicate that eastern DPS Steller sea lions are naturally exposed to many parasites and will continue to be exposed to them for the indefinite future. Based on available data discussed above, it is likely that the prevalence of at least some parasites, such a hookworm, will increase with increased crowding. However, this kind of density-dependent phenomenon is normal in a natural population and considered a natural part of the outcome of the recovery of this species. Based on a review of the best available information, there is no information indicating that parasitism is likely to cause the eastern DPS Steller sea lion to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.4.4 Predation by Orcas and Sharks

NMFS (2010c) identified predation as one of the factors that have affected Steller sea lions throughout their existence. Steller sea lions are preyed upon by transient killer whales (*Orcinus orca*) (e.g., Matkin et al. 2007; Zerbini et al. 2007; Heise et al. 2003) great white sharks (*Carcharodon carcharias*) (Klimley et al. 2001) and Pacific sleeper sharks (*Somniosus pacificus*) (Sigler et al. 2006). Predation by killer whales is likely a major cause of natural mortality for eastern DPS sea lions (Dahlheim and White 2010). Ecosystem models (Guenette et al. 2006) indicate that killer whales probably account for a high proportion of natural mortality of coastal pinnipeds. However, the populations of many pinniped populations along the west coast are large and robust. The current status and trend of the transient killer whale population along western Canada has been described as stable (Baird 2001) or uncertain (Williams and Thomas 2007). Based on bioenergetic models (Williams et al. 2004) transient killer whales have the potential to be an important threat, but that effect of predation tends to be dispensatory, such that small, depressed prey populations may be more susceptible than large, robust prey populations (e.g., Bourbeau-Lemieux et al. 2011). Thus, it is expected that killer whales would be more of a threat when the eastern DPS of Steller sea lions is at a low population level (Horning and Mellish 2012).

Given the continued population increase of the eastern DPS Steller sea lion even as it has experienced current levels of natural mortality associated with killer whale and shark predation, NMFS concludes predation is not likely to cause the eastern DPS Steller sea lion to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.4.5 Conclusions for Factor C.

Based on information and analysis in the Recovery Plan (NMFS 2008), which has been updated and supplemented here, this review finds:

New published information has documented the appearance of PDV in the eastern North Pacific. Unpublished data (T. Goldstein) indicate the presence of PDV nucleic acid in Steller sea lions, and seropositive Steller sea lions, from multiple portions of the range of the western DPS, including areas used as seasonal foraging habitat by some eastern DPS animals. Resources have not permitted testing throughout the range of the eastern DPS sufficient to accurately characterize the exposure or infection of eastern DPS Steller sea lion and health effects are uncertain. We do not currently have data sufficient to know whether this disease agent poses a threat to the viability of this population. Through established programs such as Marine Mammal Stranding Networks and ongoing collaborative research, sampling procedures to monitor the occurrence of this virus and associated disease (if any) have begun and will be included as part of post-delisting monitoring. Appropriate responses (e.g., Unusual Mortality Event response) to critical events (e.g., an epizootic) will be implemented if the need arises.

Given the continued population increase of the eastern DPS Steller sea lion, even as it has experienced current levels of natural mortality associated with killer whale and shark predation, as well as parasitism, and endemic disease, NMFS concludes that currently available evidence does not indicate that disease, parasitism, or predation are threats likely to cause the eastern DPS of Steller sea lions to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

In the event that this species is delisted, NMFS has incorporated the following actions into the post-delisting monitoring plan to monitor for threats related to disease, parasites, and predation:

- Monitor for disease, contaminants, and health
- Monitor for unusual mortality events, via marine mammal stranding networks, including, but not limited to events caused disease outbreaks
- Monitor the influence of predation.

4.3.5 *Factor D: The Inadequacy of Existing Regulatory Mechanisms*

4.3.5.1 Summary of Recovery Plan Discussion

NMFS (2008a) addressed the issue of the inadequacy of existing regulatory mechanisms related to the eastern DPS in two places in the Recovery Plan. In the first section, NMFS (2008a: II-1) highlighted the apparent effectiveness of the MMPA and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) in reducing illegal shooting and incidental take in fishing gear:

> The primary conservation effort for the eastern DPS has been the prohibition of shooting. Historically, shooting destroyed many animals and extirpated rookeries and haulouts in the mid-1900s. In the western DPS, incidental take in fishing gear and the shooting of sea lions by fisherman and others were factors in the decline during the 1970s and 1980s. However, by the early 1990s…the Marine Mammal Protection Act (MMPA), ESA, and the Magnuson-Stevens Fishery Conservation and Management Act reduced the level of intentional take to a negligible amount.

The Recovery Plan's second consideration of regulatory adequacy (Ibid: VII-5) primarily focused on the potential threat of human disturbance to Steller sea lions in remote areas:

> Little is known about the potential impacts from changes to the physical environment, disturbance due to vessel traffic, or tourism related activities. Because of lack of information, it is not possible to quantify these threats. However, the potential threat from increased human disturbance highlights the need to keep regulatory mechanisms such as the MMPA in place to protect sea lions.

These summary statements continue to be supported by the best available information (e.g., Allen and Angliss 2011).

4.3.5.2 Existing Regulatory Mechanisms

Currently, the conservation of the eastern DPS of Steller sea lion is governed by national laws and related regulations and policies in both the United States and in Canada. In the United States, the species is protected under both the ESA and the MMPA, which provide some overlapping protections, particularly in terms of the prohibitions against take included in both statutes. State laws offer additional protections. These are discussed briefly below; the reader is referred to each of these laws and regulations and the related citations for the specific details.

In the United States, there are two primary federal laws that largely govern Steller sea lion management: the ESA and the MMPA. In addition, protections have been afforded to Steller sea lion habitat within the breeding range of the western DPS of the Steller sea lion under regulations adopted under the MSFCMA. At issue is whether, in the absence of ESA protection, the existing regulatory mechanisms would be inadequate to the extent that the species would be in danger of extinction throughout all or a significant portion of its range or likely to become so within the foreseeable future. Clearly there are a myriad of regulations that may provide varying levels of protections; the following review addresses the laws key to the conservation of the eastern DPS Steller sea lion. In particular, protections afforded under the MMPA are examined as this would be the primary federal law governing the conservation of this DPS, should it be delisted.

The adequacy of existing regulatory mechanisms must be evaluated in light of the potential threats to the species that have been identified (i.e., if the DPS is removed from the ESA, will other existing regulatory mechanisms be adequate to protect the species from known threats?). If a potential threat presents little or no danger of extinction within the foreseeable future, then regulatory mechanisms that provide minimal protection against such threat, or even a complete absence of such regulatory mechanisms, may be adequate. Accordingly, this section will evaluate the adequacy of existing regulatory mechanisms in light of the potential threats that we have identified throughout this document.

4.3.5.3 Protections Afforded Under the MMPA and the ESA

Previous sections of this review (e.g., 4.3.2.4, above) have noted how the moratorium on taking and other mechanisms in the MMPA provide protection to marine mammals, including the eastern DPS of the Steller sea lion, specific to a wide variety of human activities and development activities. Below we review the moratorium on taking and other relevant provisions of the MMPA, and provide additional discussion of how protections may change in the event the stock is delisted under the ESA as well as how

aspects of the MMPA will either continue, or may be further developed through regulation, to provide protection to eastern DPS Steller sea lions in the event the stock is delisted from the ESA.

Eastern DPS Steller sea lions are protected in U.S. waters and on the high seas by the MMPA (16 U.S.C. 1361 et seq.). The MMPA was enacted in response to growing concerns that certain species and populations of marine mammals were in danger of extinction depletion or extinction as a result of human activities. The MMPA set forth a national policy to prevent marine mammal species or population stocks from diminishing to the point where they are no longer a significant functioning element of the ecosystems. In section 2 of the MMPA, Congress included the following findings:

> (2) [marine mammal] species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population. Further measures should be immediately taken to replenish any species or population stock which has already diminished below that population. In particular, efforts should be made to protect essential habitats, including rookeries, mating grounds, and areas of similar significance for each species of marine mammal from the adverse effects of man's actions;
> ***
> (6) marine mammals have proven themselves to be resources of great international significance, esthetic and recreational as well as economic, and it is the sense of the Congress that they should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem.

Under the MMPA, NMFS has jurisdiction over Steller sea lions. With respect to eastern DPS Steller sea lions, NMFS is responsible conducting scientific research, issuing permits, promulgating regulations, and conducting enforcement as necessary to carry out the purposes of the MMPA. Thus, the federal agency that is responsible for this species would not change if the species is removed from the list of threatened species. Oversight is provided by the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals. This oversight would also stay in place if this species is delisted.

Protection Against Take Under the MMPA.--The MMPA includes a general moratorium on the taking and importing of marine mammals. The moratorium is subject to a number of exceptions, including take for subsistence use by Alaska Natives, for scientific purposes, and for purpose of public display. The MMPA provides for the Services to authorize unintentional incidental take coincident with conducting lawful activities. The MMPA defines "take" as "to harass, hunt, capture, or kill, or to attempt to harass, hunt, capture, or kill any marine mammal." The MMPA defines "harassment" to include "any act of pursuit, torment, or annoyance which … has the potential to injure a marine mammal or marine mammal stock in the wild" (Level A harassment), 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" (Level B harassment).

As described in Cameron et al. (2010), the MMPA provides for NMFS to authorize the incidental, but not intentional take of marine mammals, provided the agency finds that the authorized take will have no

more than a negligible impact on the species and will not have an unmitigable impact on the availability of the species for taking for subsistence purposes:

> U.S. citizens who engage in a specified activity other than commercial fishing (which is specifically and separately addressed under the MMPA) within a specified geographical region may petition the Secretaries to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region for a period of not more than five consecutive years (16 U.S.C. 1371(a)(5)(A)). The Secretary "shall allow" the incidental taking if the Secretary finds that "the total of such taking during each 5 year (or less) period concerned will have a negligible impact on such species or stock and will not have an immitigable [sic] adverse impact on the availability of such species or stock for taking for subsistence uses." If the Secretary makes the required findings, the Secretary also prescribes regulations that specify (1) permissible methods of taking, (2) means of affecting the least practicable adverse impact on the species and their habitat, and (3) requirements for monitoring and reporting. The regulatory process does not authorize the activities themselves, but authorizes the incidental take of the marine mammals in conjunction with otherwise legal activities described within the regulations.
>
> Similar to promulgation of incidental take regulations, the MMPA also established a process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals where the take will be limited to harassment (16 U.S.C. 1371(a)(5)(D)). These authorizations are limited to one-year and, as with incidental take regulations, the Secretary must find that the total of such taking during the period will have a negligible impact on such species or stock and will not have an immitigable adverse impact on the availability of such species or stock for taking for subsistence uses. The Service refers to these authorizations as Incidental Harassment Authorizations.

To authorize such incidental take or incidental harassment, NMFS must prescribe means of affecting the least practicable impact on the species and must establish monitoring and reporting requirements.

Under these provisions, NMFS may not authorize incidental take or harassment of marine mammals, including the eastern DPS of Steller sea lions, if such take is likely to, or reasonably expected to, adversely affect the species' rates of survival or recruitment. To authorize incidental take, the agency must find that the total of such authorized take will have a negligible impact on the species or stock. NMFS regulations (50 CFR 216.103) define "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the population through effects on annual rates of recruitment or survival." This limitation, together with the general moratorium against taking, provides substantial protection against takes, whether intentional or incidental to a specified activity that would affect the continued growth of the eastern DPS Steller sea lion population.

The MMPA provides for NMFS to authorize the incidental take of marine mammals that are designated depleted because they are listed as threatened or endangered species by persons using certain commercial fishing vessels (16 U.S.C. 1371(a)(5)(E)). Among other limitations, to authorize such take, NMFS must first determine that the take will have no more than a negligible impact on the species or stock (see 75 FR 81972, December 29, 2010).

The intentional lethal take of any marine mammal during commercial fishing is prohibited unless such taking is "imminently necessary in self-defense or to save the life of a person in immediate danger," and is promptly reported (16 U.S.C. 1371(c); 16 U.S.C. 1387(a)(5)). In addition, the provisions of section 118 of the MMPA (16 U.S.C. 1387), apply to take of all marine mammals by commercial fisheries. Section 4.3.3.2 discusses these provisions and concludes that the level of incidental take of eastern DPS Steller sea lions that has occurred and that is likely to occur in the future is not likely to have population-level effects such that would place the species at risk of extinction within the foreseeable future.

The MMPA provides a mechanism to permit deterring, moving, hazing or intentionally (non-lethally) taking individual marine mammals for certain purposes. These include the use of measures:

i. by the owner of fishing gear or catch, or an employee or agent of such owner, to deter a marine mammal from damaging the gear or catch;
ii. by the owner of other private property, or an agent, bailee, or employee of such owner, to deter a marine mammal from damaging private property;
iii. by any person, to deter a marine mammal from endangering personal safety; or
iv. by a government employee, to deter a marine mammal from damaging public property, so long as such measures do not result in the death or serious injury of a marine mammal.

Furthermore, in the event the eastern DPS Steller sea lion is delisted and found to no longer be depleted, the MMPA (16 USC 1389: section 120(a)) provides that a:

> State may apply to the Secretary to authorize the intentional lethal taking of individually identifiable pinnipeds which are having a significant negative impact on the decline or recovery of salmonid fishery stocks which—
>
> A. have been listed as threatened species or endangered species under the Endangered Species Act of 1973 (16 U. S.C. 1531 et seq.);
> B. the Secretary finds are approaching threatened species or endangered species status (as those terms are defined in that Act); or
> C. migrate through the Ballard Locks at Seattle, Washington.

If the eastern DPS is delisted, the States of Oregon and/or Washington may apply for an exemption under MMPA Sec. 120 to lethally remove eastern DPS Steller sea lions at the Bonneville Dam in order to protect ESA listed stocks of migrating salmonids. At various times in the past (e.g., March of 2008 and May 2011), NMFS authorized the States of Washington, Oregon, and Idaho to kill and remove individually identifiable California sea lions that feed on ESA-listed salmon. In 2008, during pinniped trapping that occurred in the Columbia River, two Steller sea lions were taken in traps at the Bonneville Dam (K. Wilkinson, unpublished NMFS NWR data). Recently, NMFS issued a Letter of Authorization (LOA) under the MMPA on March 15, 2012 to the States of Washington, Oregon and Idaho that approved, with specific conditions, the lethal removal of specific California sea lions to minimize their predation on threatened and endangered salmonids in the Columbia River. Under this LOA, the States may not remove more than 1 percent of the potential biological removal level (PBR) annually.

During public comment related to this status review, the Columbia River Inter-Tribal Fish Commission reported that its member tribes"… have observed an increase in the number of Steller sea lions in the Columbia River" and that they "…feed on the spring chinook, which includes listed populations, creating a

management conflict." These tribes are participants "on the Columbia River Pinniped Fisheries Interaction Task Force, which recommends management actions to minimize the negative effects of pinnipeds on the listed salmon populations. While still protected under the MMPA, delisting the Steller sea lions EDPS would allow the Task Force to consider a wider range of management options" (Columbia River Inter-Tribal Fish Commission 2010:1).

However, while Steller sea lions have been feeding below Bonneville Dam and the number of Steller sea lions observed in the area are similar to, or at times greater than, that reported for California sea lions (Stansell et al. 2011), their primary prey is white sturgeon rather than spring Chinook (see http://www.nwr.noaa.gov/Marine-Mammals/Seals-and-Sea-Lions/States-MMPA-Request; and see *wdfw.**wa**.gov/conservation/endangered/species/**steller_sea_lion**.pdf*). Despite this, if, following delisting, the lethal removal of Steller sea lions were authorized in the Columbia River, it is likely that conditions similar to those placed on the lethal taking of California sea lions would be put into place, including that the authorized annual level of taking for Steller sea lions would be a small percentage of the estimated PBR for the eastern stock. Thus, even if such lethal taking is authorized at some point in the future, it is likely the level of take would not cause the eastern DPS of Steller sea lions to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

The MMPA exempts Alaska Natives from the prohibitions on the taking of marine mammals, including eastern DPS Steller sea lions, for subsistence purposes. Sections 101(b)(3) and 103 of the MMPA provide for subsistence harvest regulations for marine mammal stocks designated as depleted under that Act, after notice and administrative hearings as prescribed by the MMPA. No such regulations have been adopted for the subsistence harvest of eastern DPS Steller sea lions. As discussed in Section 4.3.3.1, the documented average annual level of subsistence take represents a small fraction of the overall population, has not impeded the recovery of the species, and, if current levels continue, is not expected to affect the continued growth of the DPS. Based on the past levels of take, we conclude that the current known levels of take are likely to continue for at least the next 10 years, the period during which post-delisting monitoring will occur.

As discussed above, we have not identified any present or future sources of disturbance, injury, or lethal take (i.e., potential threats) that are likely to place the eastern DPS of Steller sea lions at risk of extinction within the foreseeable future throughout all or a significant portion of its range. Therefore, NMFS concludes that the MMPA's moratorium on take of marine mammals, though subject to exceptions, affords adequate protection to the eastern DPS Steller sea lion population against such potential threats.

Protection for Habitat under the MMPA.--As described in Cameron et al. (2010), the MMPA places an emphasis on ecosystem and habitat protection:

> The habitat and ecosystem goals set forth [in section 2 of the MMPA] include: (1) management of marine mammals to ensure they do not cease to be a significant element of the ecosystem to which they are a part, (2) protection of essential habitats, including rookeries, mating grounds, and areas of similar significance "from the adverse effects of man's action", (3) recognition that marine mammals "affect the balance of marine ecosystems in a manner that is important to other animals and animal products" and that marine mammals and their habitats should therefore be protected and conserved, and (4) directing that the primary objective of marine mammal management is to maintain "the health and stability of the marine ecosystem." Congressional intent to protect marine mammal habitat is also reflected in the definitions section of the MMPA. The

> terms “conservation” and “management” of marine mammals are specifically defined to include habitat acquisition and improvement [(MMPA section 3)].

The MMPA’s moratorium against take of marine mammals, including the eastern DPS of Steller sea lion, provides a measure of protection to marine mammal habitat when that habitat is occupied by marine mammals. Terrestrial habitat sites such as rookeries or haulouts are used for important behaviors, including breeding, rearing and nursing pups, resting, and seeking refuge from marine predators. Marine habitats are used for behaviors that include feeding and migration. Any activity with the potential to disturb an eastern DPS Steller sea lion by disrupting such behaviors could constitute harassment that would be prohibited under the MMPA unless otherwise authorized.

As discussed above, we have not identified any threat that would destroy, modify or curtail eastern DPS habitat such that the species is likely to become in danger of extinction within the foreseeable future (section 4.3.2). Therefore, the indirect protection of habitat afforded by the take prohibition of the MMPA, together with the additional protections for habitat discussed below (sections 4.3.5.3 – 4.3.5.8) appear adequate.

Should it become necessary to protect specific habitat of the eastern DPS in the future, the MMPA provides authority that NMFS could use to develop additional and specific protections for Steller sea lion habitat. Section 112(a) of the MMPA provides an existing mechanism that NMFS could use to develop future regulations to protect eastern DPS habitat. NMFS has used this authority to regulate vessel approach to certain marine mammals (60 FR 3775; 62 FR 6729; 66 FR 29502) or to limit vessel speed in certain marine habitats during times that correspond to North Atlantic Right whale occurrence. Baur et al. (1996) noted that this section of the MMPA could be used to protect marine mammal habitat:

> section 112 authorizes the Secretary to "prescribe such regulations as are necessary and appropriate to carry out the purposes of the MMPA" (Id. § 1382(a)). This authority can be used to promulgate regulations to protect habitat areas. In the legislative history of the 1994 Amendments, Congress made it clear that section 112 includes such authority. As stated by the House Merchant Marine and Fisheries Committee in its legislative history for amendments to section 2(2), by adding the phrase "essential habitats," "[t]he Committee believes that the Secretary currently has the authority to protect marine mammals and their habitats under the general rulemaking authority of section 112 of the MMPA" (H.R. Rep. No. 439, 103d Cong., 2d Sess. 29 (1994)). The Committee expressly noted, as an example, that this authority would apply "to protect polar bear denning, feeding, and migration routes . . . ." (Id.).

However, at present, existing protections afforded to eastern DPS Steller sea lion habitat appear adequate. As described above, NMFS has not identified any threats to the habitat of the eastern DPS that likely would cause the species to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range (section 4.3.2).

<u>Protections Against Take Under the ESA</u>

The ESA requires the designation of Critical Habitat for listed species (16 U.S.C. Section 1533(a)(3)(A); (b)(6)(C)(ii); see Figures 2 and 3), and provides for consultations to ensure that federal agency actions do not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Under the ESA, federal agencies proposing actions that “may affect” listed species must consult

with NMFS or FWS. For actions that are likely to adversely affect listed species, NMFS (the responsible agency in the case of Steller sea lions) prepares a Biological Opinion to determine whether the subject federal action is likely to jeopardize the continued existence, or to adversely modify or destroy the critical habitat, of any listed species. If a finding of jeopardy or destruction or adverse modification of critical habitat is made, NMFS must suggest reasonable and prudent alternatives to the proposed action that would avoid jeopardy and the destruction or adverse modification of critical habitat. In the event the eastern DPS Steller sea lion is removed from the ESA, federal agencies would no longer be required to consult with NMFS to ensure that their actions do not jeopardize the continued existence of the eastern DPS or destroy or adversely modify its critical habitat.

During the time that the eastern DPS has been listed as a threatened species, NMFS has completed section 7 consultations on numerous proposed actions by federal agencies. NMFS has not concluded that any of these actions are likely to jeopardize the continued existence of the eastern DPS Steller sea lion or adversely modify critical habitat within the breeding range of the eastern DPS Steller sea lion. In the context of any formal consultations where NMFS authorized incidental take of eastern DPS Steller sea lions, the agency's incidental take statements may have imposed reasonable and prudent measures to minimize the impact of such takes. If the species is delisted, and the agency/applicant applied for incidental take authorization under the MMPA, NMFS must prescribe methods of taking in order to effect the least practicable adverse impact on the species and its habitat. Moreover, in this status review, we have considered current and potential future threats to the eastern DPS Steller sea lion, including threats to its habitat, but have not identified any current or potential future threats, including future federal agency actions, that would cause this species to be in danger of extinction throughout all or a significant portion of its range in the foreseeable future (Sections 4.3.2, 4.3.3, 4.3.4, 4.3.6).

Protections under the MMPA that may be affected by a decision to delist the eastern DPS.--By default, marine mammal populations listed either as endangered or threatened under ESA are categorized as depleted under MMPA (Baur et al. 1996). If the eastern DPS of Steller sea lion is removed from the list of threatened species, their depleted designation under the MMPA also could be removed following a demonstration that they are above their optimum sustainable population (OSP) level (see below).

Optimum sustainable population.--In the event the eastern DPS of Steller sea lion is delisted, NMFS will be required, under the MMPA, not to permit the population to "diminish beyond the point at which it is a significant functioning element in the ecosystem of which they are a part, and not permit it to diminish below the optimum sustainable population" (Id. § 1361(2)). At this time OSP for the eastern DPS Steller sea lion has not been determined. Allen and Angliss (2011) summarized that "…the status of this stock relative to its …" OSP "is unknown."

Under the MMPA, OSP means:

> [W]ith respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element…

According to NMFS MMPA implementing regulations (50 C.F.R. § 216.3), OSP "…is a population size which falls within a range from the population of a given species or stock which is the largest supportable within the ecosystem to the population level that results in maximum net productivity. Maximum net productivity is the greatest annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality." Maximum net

productivity level (MNPL) is defined as "the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality" (16 U.S.C. § 1362(9)).

Strategic Stock.--The MMPA includes the concept of a strategic stock, defined as "…a marine mammal stock—

(A) for which the level of direct human-caused mortality exceeds the potential biological removal level;
(B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the Endangered Species Act of 1973 [16 U.S.C. 1531 et seq.] within the foreseeable future; or
(C) which is listed as a threatened species or endangered species under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), or is designated as depleted under this chapter."

NMFS is required under the MMPA to annually review the stock assessments for each strategic stock. Because it is currently listed as threatened, the eastern DPS currently falls under this requirement. If this DPS is delisted, NMFS would likely shift to updating its status review every 3 years, unless significant new information is available or the species is determined to be a strategic stock because the level of direct human-caused mortality exceeds the potential biological removal level. If monitoring is sufficient to detect a downward trend in abundance, this change in classification under the MMPA should not reduce protections sufficiently to pose a threat to the long term viability of this species.

Other Considerations.--The Marine Mammal Commission (2012) noted that "…existing regulations may or may not be adequate or, if adequate in concept or principle, may not be implemented effectively." By example of inadequate implementation, they noted that the take of Steller sea lions in fisheries may be underestimated because some of the fisheries in which Steller sea lions are injured or killed are not observed. They also noted that the probability of detecting animals that are shot is likely very small and that the number dying from entanglement in debris is unknown.

NMFS agrees that the effectiveness of laws and regulations hinges upon diligent implementation.

Conclusion.--Based on this review, we conclude that in the event the eastern DPS Steller sea lion is delisted, the MMPA will provide a variety of regulatory measures designed to provide protection from unauthorized disturbance. These measures , if implemented effectively, provide protections against the unauthorized take of Steller sea lions, mechanisms for authorizing take, and mechanisms for monitoring activities in which take is authorized. The MMPA also provides a mechanism by which NMFS can provide protection to eastern DPS Steller sea lion habitat in the future if a threat arises which necessitates such protection.

4.3.5.4 U.S. Protected Areas

Protective federal land and water area designations provide benefit to the eastern DPS of Steller sea lions and their habitat in various parts of the range. For example, National Park designation (e.g., in the Channel Islands in California and the Olympic National Park in Washington), and National Wildlife Refuge establishment (e.g., as in the Alaska Maritime refuge), afford various levels of protection by prohibiting certain kinds of habitat modifications and activities that could harm or harass marine mammals. In a few locations (e.g., Oregon Islands National Wildlife Refuge (coast-wide) and Three Arch Rocks National Wildlife Refuge (Tillamook County, North Coast)), all refuge rocks, reefs, and islands are closed to public

use and FWS requests all aircraft to maintain a 2,000-foot minimum Above Ground Level altitude over all NWRs including the rocks, reefs, and islands along the Oregon coast in order to minimize disturbance to wildlife. The Three Arch Rocks NWR is closed to public use and waters within 500 feet of the Refuge are closed to all watercraft from May 1 through September 15. "All rocks and islands used by SSL in Oregon are included in National Wildlife Refuges" (ADF&G et al. 2011).

ADF&G et al. (2011) specified that "Human activity on" these "refuges is prohibited except by Special Use Permit primarily limited to research and management activities." This information, considered in whole, indicates that key Steller sea lion terrestrial habitats, and aquatic areas very near to these sites in Oregon are afforded a relatively high level of protection, excepting the allowance of vessels to approach to 500 feet during key periods for Steller sea lions, and to, apparently, approach closer between September 16th to April 30th.

ADF&G et al. (2011) also provided information related to U.S. protected area designations related to Steller sea lion habitat in Washington State:

> "All rocks and islands used by SSL on the Washington Coast are also under federal protection, which is generally overlapping. There are three National Wildlife Refuges: Copalis, Flattery Rocks, and Quillayute Needles, as well as the Olympic National Park and the Olympic Coast National Marine Sanctuary. Carroll Island and Sea Lion Rocks are likely the most critical habitat on the Washington Coast since they host large numbers and support an increasing number of births (25 in 2010); they are included in the Quillayute Needles National Wildlife Refuge. Protection of SSL haulouts in inshore waters is not universal, but is still fairly comprehensive. Three National Wildlife Refuges: Dungeness, Protection Island, San Juan Islands, protect several important SSL haulout and foraging areas…."

ADF&G et al. (2011) identified the following Federally Protected Areas within the range of the eastern DPS: Glacier Bay National Park and Preserve, Wrangell-St. Elias National Park and Preserve, Alaska Maritime National Wildlife Refuge, and Tongass National Forest.

There also are Alaska state marine parks within the range of the eastern DPS (see details in ADF&G et al. 2011).

4.3.5.5 National Parks and National Marine Sanctuaries

During the public comment period related to this status review, the National Park Service provided NMFS with a data file "Data from the NPS ESA Database for 2007-2009 for park status, trends, and expenditures for Steller sea-lion." These data were from six national parks that currently have "populations" of Steller sea lions: Glacier Bay National Park (NP), Golden Gate NP, Olympic NP, Point Reyes NP, Redwood NP and Wrangell-St. Elias NP. The NPS identified one park, Channel Islands NP that historically had a "population."

The overall mission of the NPS (Organic Act 16 USC 1) is:

> to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

Furthermore, the NPS has an explicit mission goal to protect, restore, and maintain in good condition natural and cultural resources and associated values and to manage those resources within their broader ecosystem context (NPS Strategic Plan 2001-2005). Clearly these statements support protection of wildlife (including Steller sea lions), their habitat, and the ecosystems on which they depend within the parks**.** Within specific parks, protections have been put in place to protect marine mammals and their habitat. Glacier Bay National Park and Preserve (2012) noted that regulations currently in place within the park to protect marine mammals from human related disturbance (36 CFR § 13.65) will continue to apply following delisting.

Several National Marine Sanctuaries (NMS) also contain Steller sea lion habitat occupied by the eastern DPS, these include the Olympia Coast, Cordell Bank, Farallon Islands, Monterey Bay, and Channel Islands NMS. NMSs are established and managed under provisions of the National Marine Sanctuaries Act (NMSA). As clarified by the NMS program website, this act provides tools that protect designated sanctuaries and living resources within them. For example:

- The NMSA requires federal agencies whose actions are "likely to destroy, cause the loss of, or injure a sanctuary resource," to consult with the program before taking the action. The program is, in these cases, required to recommend reasonable and prudent alternatives to protect sanctuary resources. [See section 304(d) of the NMSA.]

- The NMSA authorizes NOAA and the program to assess civil penalties (up to $130,000 per day per violation) for violations of the NMSA or its implementing regulations and damages against people that injure sanctuary resources. [See sections 306, 307, and 312 of the NMSA.]

- The NMSA provides the program with the authority to issue regulations for each sanctuary and the system as a whole. These regulations can, among other things, specify the types of activities that can and cannot occur within the sanctuary. [See section 308 of the NMSA.]

- The NMSA requires the program to prepare and periodically update management plans that guide day-to-day activities at each sanctuary. [See sections 304(a) and 304(e) of the NMSA.]

An example of protections that specifically exist because of the NMS, park, or other special designation are protections put in place by the Monterey Bay National Marine Sanctuary to restrict motorized personal watercraft, an activity known to have the potential to disturb sea lions on haulouts, rookeries, or in the water.

4.3.5.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFMCA) is the primary domestic legislation governing management of the nation's marine fisheries. Because the eastern DPS of Steller sea lion is currently listed under the ESA, NMFS is required to consult under Section 7 on its authorization and management of such fisheries if Steller sea lions or their critical habitat may be affected. If NMFS removes the eastern DPS from the list of threatened species, NMFS would no longer be required to consult over such effects of its authorization and management of fisheries. The food requirements of marine mammals are factored into fishery management plans and assessment models as components of the ecosystem that contribute to natural mortality of the subject species. Additionally, in the event the eastern DPS Steller sea lion is removed from the list of threatened species, NMFS will continue to

consider the effects of proposed fishery management measures to eastern DPS Steller sea lions through NEPA analyses of Fishery Management Plans, amendments, and associated regulations.

4.3.5.7 National Environmental Policy Act

NEPA became law in 1969. NEPA established a public policy and procedural framework designed to ensure that before any proposed federal action is approved by a federal agency, the agency evaluates the impacts of its actions on the human environment, informs the public of those impacts and considers other alternative courses of action that reduce such impacts. The human environment is defined as being comprised of the physical, biological, economic, and social environment in the affected area. To document this process, NEPA requires federal agencies to prepare analyses of the potential environmental effects of each action alternative (e.g., an Environmental Impact Statement or EIS). NEPA does not require an agency to adopt the alternative with least environmental effects; rather, the law established a public process where the agency evaluates alternatives that meet the agency's purpose and need for the action and, after evaluating the environmental impacts of the alternatives, makes an informed choice among the alternatives. NMFS routinely provides review and comment on draft and final Environmental Assessments (EAs) and EISs issued under NEPA used to assess the consequences of proposed federal actions that may interact with Steller sea lions, other trust resources and their habitat. These reviews often recommend design alternatives and protective measures to avoid, reduce, and mitigate any adverse effects to marine mammals such as the eastern DPS of Steller sea lions. Such reviews are expected to continue, and perhaps to play a more important future role in conservation of the eastern DPS Steller sea lion in the event it is delisted.

4.3.5.8 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or water body. The statute requires federal agencies to take into consideration the effect of such development on fish and wildlife resources; to take action to prevent injury to these resources; and provide for the development and improvement of these resources. The statute requires consultation with the U.S. Fish and Wildlife Service or NMFS (as appropriate) to develop measures to protect, develop, and improve wildlife. Where possible, the federal action agency must incorporate the recommendations of these agencies into project plans.

4.3.5.9 State Laws

In addition to the federal statutes described above, various state laws and land use policies are significant to the recovery and management of Steller sea lions. Although state laws directly governing sea lions or other marine mammals are preempted by the MMPA (Baur et al. 1996), a number of state laws intended to protect a variety of species provide benefits to marine mammals including Steller sea lions. ADF&G et al. (2011:2) specified that

> "…the Oregon Department of Fish and Wildlife has seasonal (reproductive season, April-August) closures for sport and commercial fisheries in the areas within 1000 feet of the three primary rookeries on the South Coast (one at Rogue Reef and two at Orford Reef). The Oregon State Marine Board also established a closure to all vessel traffic within 500 feet of the North Oregon Coast rookery at Three Arch Rocks."

State-based enforcement and public education associated with these laws can help to reduce human disturbance to resting or breeding animals.

Given the potential for marine mammals to interact with commercial fisheries, California state law has included restrictions on gill net and trammel fisheries since the early- and mid-1980s (see details at: http://www.dfg.ca.gov/marine/regulations.asp).

The State of Alaska has implemented various fisheries regulations that either directly or indirectly to reduce the impact of commercial fishing to Steller sea lions from disturbance, competition for prey, and incidental taking. Some of these steps are described in Section 4.4.5.9 and Appendix 2.

4.3.5.10 Protections in Canada

A significant portion of the eastern DPS of Steller sea lion inhabits areas within Canada. Thus, protections in Canada are relevant to assessing the overall level of protection for this population. In Canada, protection of key habitat is afforded by measures including, but not limited to: 1) the location of the habitat within Ecological Reserves (e.g., the rookeries at Triangle and Beresford Islands) which are closed to entry except as authorized by a permit or within a National Park Reserve (e.g., the rookeries at Cape St. James and Garcin Rocks); 2) Marine mammal mitigation procedures developed to mitigate disturbance due to tactical sonar (Department of National Defense (2007); and 3) Regulatory tools to protect against adverse environmental effects from PBDE contamination and from ship-based pollution (DFOC 2011:30-31).

The waters surrounding Gwaii Haanas, which include the rookeries at Cape St. James and new rookery at Garcin Rocks, were recently designated a Marine Conservation Area and the waters surrounding the rookery at Triangle Island have been proposed as a Marine Wildlife Area. These designations enhance the protection of sensitive areas and habitats, and limit (but do not exclude all) human activities.

DFOC (2011) summarized provisions of the Marine Mammal Regulations of the *Fisheries* Act prohibiting disturbance of marine mammals, unless authorized by a scientific or fishing license. Guidelines have been developed to address disturbance in Canada due to close approaches on land and sea; such guidelines are "often" followed for pinniped viewing. Violations involving disturbance to Steller sea lions are prosecuted in the courts. Educational and management actions have been implemented with the ecotourism industry to enhance compliance with these guidelines. The "Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment" (DFOC 2007: available at http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/pdf/statement-enonce-eng.pdf) specifies requirements for mitigation during the planning and conduct of marine seismic surveys. These requirements were developed to minimize impacts on life in the oceans and were set as minimum standards that will apply in all non-ice covered marine waters in Canada. Key requirements are given in the Statement (http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/pdf/statement-enonce-eng.pdf).

Steller sea lions in Canada are designated as a species of "special concern" under the Species at Risk Act (SARA). With respect to harvest controls, they are protected from commercial hunting and culls under the Marine Mammal Regulations of the federal *Fisheries Act*. No person, other than a First Nation person, can "fish for" or disturb any marine mammal unless this has been explicitly authorized by a license (DFOC 2011). DFOC (2001) clarified that while First Nation peoples do not need a license to hunt

a marine mammal for social, food, or ceremonial purposes, the use of Communal Licenses with harvest limits is common. While commercial harvest and culls have not been authorized by management provisions since 1970, licenses have been issued that allow Steller sea lions to be killed to protect fish in herring impoundments and fish farms which allowed for limited harvest of "nuisance animals," subject to monitoring requirements to ensure removals were within sustainable levels. Recent changes to Marine Mammal Regulations have exempted licensed aquaculture farms from the prohibition on killing as a condition of the license. The designation of the Steller sea lion as a Species of Special Concern is currently being reviewed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and if delisted under SARA, killing of this species might be expected to resume.

Monitoring and assessment are key to ensuring a species' protection. Without information from such programs, it is not possible to detect whether factors, known or not, are having an adverse effect on the population, such that it is beginning to decline and/or to show other signs (e.g., poor body condition) of reduced population vitality. DFOC (2001) noted that, following a recommendation in the original 1992 Recovery Plan, Canadian and U.S. researchers have made efforts to standardize census techniques and coordinate survey schedules. The effectiveness of this coordination and standardization was demonstrated in the first survey of the population over its entire range (Pitcher et al. 2007) and continues to date.

In January 2011, Canada finalized a Management Plan for the Steller sea lion. DFOC (2011:32) specified two management goals for the plan:

- To ensure that anthropogenic threats from Canadian sources do not cause unsustainable population declines, or a contraction of the current range or number of breeding sites in Canada.

- Support for, and contribution to, an environment where research and monitoring of Steller Sea Lions in B.C. contributes to achieving an improved global knowledge of the Eastern Pacific Population.

This plan articulates: historical and current status; ecological needs; the history of management in Canada; knowledge gaps; needed research; management goals and assessment of threats; population and distribution objectives for management; research and monitoring objectives and needed management, research, monitoring, and outreach and communication. Hence, Canadian managers have developed a detailed framework to guide their management of this species. As was the case with the revision of the Recovery Plan (NMFS 2008), both the process of developing such a framework and the existence of the framework itself helps focus attention on Steller sea lion status and increases the probability that high priority tasks needed to conserve this species are accomplished.

4.3.5.11 Conclusion for Factor D

Based on information and analysis in the Recovery Plan (NMFS 2008) and updated here, this review finds:

- The MMPA provides a variety of existing regulatory measures designed to provide protection from unauthorized disturbance and other forms of take, aimed at ensuring that the population stock should not diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, not fall below their optimum sustainable population level. It provides mechanisms to permit take to occur through a regulated process aimed at ensuring that the taking is small in number, has a negligible

effect on the affected marine mammals, and minimizes adverse effects on the population and its habitat to the least practicable level. In addition, although NMFS has not identified any serious threats to eastern DPS habitat in the foreseeable future, the MMPA provides a mechanism for future regulations to protect the habitat of the eastern DPS against certain kinds of threats, should they emerge.

- Protections afforded by the location of key terrestrial and aquatic habitats within state and federal parks and marine protected areas offers additional protections for the eastern DPS of Steller sea lion.

- Federal regulations and management plans established by the government of Canada provide protection for eastern DPS Steller sea lions and their habitat in that country. Cooperative programs between the US and Canada support research and monitoring necessary for ensuring the long term health and well-being of this population within Canadian waters.

- There are a number of other federal and state statutes including the MSFCMA, NEPA, Clean Water Act, and the Marine Sanctuaries Act that will continue to provide protection to wildlife and habitat and will likely foster the continued growth and stability of this population.

Given the lack of identified population-level threats (e.g., sections 4.3.2-4.3.6, above) to the continued survival and expansion of this population at present and within the foreseeable future, NMFS concludes that the protections afforded by existing regulatory mechanisms make it unlikely that the eastern DPS will become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

To address and fulfill aspects of Listing Factor D, the Recovery Plan (NMFS 2008) noted:

> One potential threat to Steller sea lions is increased human disturbance in previously remote areas. Little is known about the potential impacts from changes to the physical environment, disturbance due to vessel traffic, or tourism related activities. Because of lack of information, it is not possible to quantify these threats. However, the potential threat from increased human disturbance highlights the need to keep regulatory mechanisms such as the MMPA in place to protect sea lions. Research and/or monitoring programs should be put into place to oversee activities that have the potential to negatively impact Steller sea lions. Other actions to protect haulout and pupping areas (as described under factor A) could provide substantial insurance against future impacts from development and anthropogenic disturbance. These actions are:
>
> 1. Agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA.
>
> 2. A Steller sea lion recovery coordinator is on staff at NMFS.

During the process of conducting this Status Review, NMFS and the State of Alaska, Department of Fish and Game, held meetings to discuss the above Recovery Plan recommendation for reaching an agreement clarifying how, in the event the eastern DPS of Steller sea lion is delisted, future State actions will continue to take into account biological and behavioral requirements of the stock and comport with

existing federal regulation. NMFS recognizes the action recommended by the Recovery Plan was somewhat unclear as once the stock is delisted, ESA measures would no longer apply (unless of course the population declined substantially or was otherwise found to be under threat and re-listed). In addition, the Recovery Plan discussion seemed to focus on a desire to provide protection primarily from human disturbance, although it also specifically addressed fishery management activities, seemingly alluding to potential adverse effects of direct interaction (e.g., incidental take) and/or indirect effects of fisheries such as ecological alteration. The State of Alaska has provided correspondence that describes state fishery management plans, explains how existing practices followed by the State with respect to fisheries management have minimized the take of eastern DPS Steller sea lions and will continue to do so, and how such fishery management practices will contribute to continued recovery of the eastern DPS and will continue to comport with all aspects of the MMPA for the foreseeable future. NMFS has evaluated this material (Appendix 2) and has agreed (Balsiger 2012) with the State of Alaska that the described plans and management actions satisfy the recommended delisting action # 1.

NMFS has a Steller sea lion coordinator on staff. This satisfies recommended delisting action #2.

Therefore, NMFS concludes the actions identified under factor D in the Recovery Plan have been met.

4.3.6 *Factor E: Other Natural or Anthropogenic Factors Affecting Its Continued Existence*

4.3.6.1 Summary of Recovery Plan Discussion

Beyond those threats already discussed above, the Recovery Plan did not provide any further discussion regarding other factors that need to be identified, discussed, or considered under Listing Factor E.

With respect to Listing Factor E, the 2008 Recovery Plan noted the following criteria should be achieved and accomplished in such a way that delisting is not likely to result in re-emergence of the threat:

> To provide assurance that delisting is warranted for the eastern population of Steller sea lions, several actions are recommended to assure that factors do not develop that would threaten its persistence.
>
> 1. An outreach program is established to educate the public, commercial fishermen and others to the continued need to conserve and protect Steller sea lions.
>
> 2. An Alaska stranding network is in place and functional.

4.3.6.2 Outreach Program

Both NMFS and the Alaska Department of Fish and Game (ADF&G) have outreach programs devoted to Steller sea lion conservation and management in an effort to educate commercial fishermen and the general public about the ongoing need to protect and conserve Steller sea lions. Much of the outreach to date has focused on the conservation issue of Steller sea lion ingestion of gear and entanglement in marine debris. Although the state and federal agencies address this outreach campaign independently, much of the effort occurs through a coordinated and integrated working group called the Pinniped Entanglement Group (PEG). PEG meets regularly with the goal of minimizing and/or eliminating the negative effects of marine debris and fishing gear on pinnipeds. Its work focuses primarily on Steller sea lions and northern fur seals. Members of PEG include staff from NMFS Protected Resources Division,

ADF&G's Steller Sea Lion Program, NOAA's Marine Debris Program, Oregon State University, the Marine Conservation Alliance, and other interested stakeholders. Many of the outreach products and initiatives described below have originated through PEG.

NMFS Alaska Region and Northwest Region have Marine Mammal Stranding Programs that provide outreach related to Steller sea lion conservation. In 2009, NMFS Alaska Region instituted a 24-7 Marine Mammal Stranding Hotline (877-925-7773) to receive reports of stranded marine mammals, including both dead animals and live animals in distress. Many cases of stranded Steller sea lions both live and dead have been reported by the public using this communication tool in the last several years. The Northwest Region also maintains a Marine Mammal Stranding Hotline (800-853-1964) and receives both live and dead Steller sea lion reports. A web-reporting tool also exists, and regular newsletters are prepared and distributed by NMFS with contributions from stranding network members to alert responders to marine mammal conservation issues of concern. In 2011, the NMFS Alaska Stranding Program produced stranding brochures and wallet cards with program information and the hotline number.

The following descriptions detail outreach materials and activities aimed at educating both the general public and fishing industry about the need to conserve and protect Steller sea lions:

Entanglement Video.-- A number of products have been created specifically to address Steller sea lion entanglement. An 11-minute educational video called "Entanglement of Steller sea lions in marine debris: Identifying causes and finding solutions" was produced in 2008 by the ADF&G and Sea Gypsy Productions which addresses the problem of Steller sea lion entanglement in marine debris. The video describes how sea lions become entangled, the most common sources of entangling debris, and what the public can do to help reduce the number of entanglements. Numerous presentations have been made using this video at scientific meetings and conferences, trainings, workshops and schools in Alaska and Oregon. These events include Sitka Whalefest, the Alaska Marine Mammal Stranding Network annual meeting, the Alaska Marine Science Symposium, and the International Marine Debris Conference. The targeted audience for this video includes commercial and sport fishing organizations, tour boat companies, tourists, the marine recreational community, students, and the general public. This video has been distributed to government agencies, non-profit organizations, tribal councils, and fishing groups within Alaska and the Pacific Northwest, aquariums, zoos, and conservation groups throughout the United States and the world.

Interpretive Displays.—NMFS and ADF&G have collaborated to develop 'Lose the loop!' harbor side entanglement displays. These permanent interpretive displays have been installed in harbors throughout Alaska to educate the public about marine mammal entanglements. These displays are currently affixed to harbors in Juneau, Sitka, Dutch Harbor, and Kodiak. Future installations are planned for the Pribilof Islands. The target audience for this interpretive material is commercial and sport fishing organizations, tourists, the marine recreational community, and the general public.

Entanglement Bumper Stickers.--ADF&G and NMFS are producing bumper stickers with outreach messages designed to reduce marine entanglements and marine debris that threaten Steller sea lions. These will be distributed at various outreach events and educational opportunities. The target audience is commercial and sport fishing organizations, marine mammal subsistence hunters, tour boat companies, tourists, the marine recreational community, Alaska residents, and the general public. Bumper stickers are now available and being distributed.

Tide Books and Calendar Ads.--ADF&G and NMFS purchased ad space for educational messages in 2012 Alaska tide books and tide calendars promoting the "Lose the Loop" message to help reduce sea lion marine entanglements.

Naturalist Training.--Since 2008, NMFS and ADF&G have presented annually at a naturalist training workshop organized by the Alaska Fisheries Science Center TSMRI lab in Juneau on Steller sea lion biology, natural history, impacts of marine debris, and current research. The presentations are aimed at naturalists working on tour boats who are responsible for educating the public during Juneau's tour season.

Web Pages.-- NMFS Alaska Region maintains Steller sea lion program web pages to educate the public about conservation and management issues for the species. From this portal, users can access the Recovery Plan, critical habitat maps, description of special protections, biological opinions, and fisheries regulations. Links to research topics are also provided. In addition, the Alaska Region website includes a page with Marine Mammal Viewing Guidelines and Regulations describing the federal *take* prohibition and includes a code of conduct for viewing marine mammals to avoid disturbance or harassment. Steller sea lion protection measures are provided here, and extra caution to prevent harassment of sea lions on rookeries and haulouts is advised.

NMFS Northwest and Southwest Regions maintain webpages on deterrence of pinnipeds, distinguishing for the public that only marine mammals not listed under the Endangered Species Act (ESA) may be deterred to protect private property, including gear and catch. ESA-listed and non-ESA-listed species of sea lions and seals are described on these pages. Authorized and humane methods of deterring non-ESA listed species are also provided on these sites, which will become important for the eastern DPS population of Steller sea lions if recovery warrants delisting.

ADF&G maintains numerous sea lion web pages which include research, conservation, and management topics. A central Steller sea lion program email address (dfg.dwc.sealions@alaska.gov) facilitates public contact and the ability to gather incidental brand-resight photographs.

NMFS links:
http://209.112.168.2/protectedresources/stellers/default.htm
http://www.fakr.noaa.gov/protectedresources/mmv/guide.htm
http://www.nwr.noaa.gov/Marine-Mammals/Seals-and-Sea-Lions/Deterring-Pinnipeds.cfm

ADF&G links:
http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.stellerresearch
http://www.adfg.alaska.gov/index.cfm?adfg=stellersealion.main
http://www.adfg.alaska.gov/static/education/wns/steller_sea_lion.pdf

Fishery Survey.-- During fall 2011, ADF&G began oversight of the development of a survey for commercial salmon trollers to assess the prevalence and impact of Steller sea lion-troll fishery interactions. The survey is a student project through UAF, in collaboration with ADF&G. The goal is to develop the survey, send it to salmon trollers in Southeast Alaska, and analyze survey results. Ideally, work could then begin with industries to develop ways to reduce Steller sea lion–troll fishery interactions.

Classroom Presentations.--Sea lion biology and "Lose the Loop: Entanglements of Steller sea lions in marine debris" programs are presented to students in Alaska and in Oregon by ADF&G and a contractor through Oregon State University. Audiences include elementary, high school, and college students.

General Education and Outreach Presentations.--Numerous outreach events conducted by NMFS and ADF&G occur annually on the issue of marine debris and sea lion entanglements, including identifying causes and finding solutions. Events include oral presentations, poster presentations, panel discussions, workshops, video presentations, news articles, and informal discussions. Venues have included conferences, industry peer-peer meetings, boat shows, council meetings, science centers, film festivals, documentaries, naturalist trainings, fairs, news magazines and articles, public radio, and television. These are expected to continue to occur into the foreseeable future.

Outreach Involving Alaskan Native Organizations.—Since 2008, NMFS has entered into two cooperative agreements with The Alaska Sea Otter and Steller Sea Lion Commission (TASSC). Both of these cooperative agreements, the second of which is still ongoing, included outreach and education projects on Steller sea lions. Completed projects included : 1) Convening of a workshop "Understanding and Working Through the Federal Administrative Process for Alaska Native Tribes and Marine Mammal Co-management Groups" This workshop was organized to provide attendees with a solid foundation and understanding of the federal administrative rule-making process, and relevant natural resource laws and policies (e.g., the MMPA, ESA, NEPA, tribal consultation and executive orders, etc.; 2) Development and dissemination of a calendar which presented information about Steller sea lion biology and status, relevant laws and regulations governing marine mammals, critical habitat, and traditional Alaska Native customary and traditional uses of marine mammals; 3) Quarterly newsletters which provided non-technical summaries of recent Steller sea lion research results, information about law and regulations, etc.; 4) Development and dissemination of a biosampling handbook for Alaska native subsistence hunters. This project was undertaken to enhance linkages between researchers and subsistence hunters and to attempt to obtain valuable samples from Steller sea lions harvested for subsistence; and 5) Updating and maintenance of the TASSC website to serve as a source of information and key links on topics related to Steller sea lions for Alaska native subsistence hunters and other interested readers. Many of these products are available to anyone with internet access and are provided directly to Alaska Native tribal organizations with membership in TASSC, including those in Southeast Alaska. Many of the Alaska Native Steller sea lion subsistence hunters are also involved in commercial fishing and/or from villages in which fishing is a major industry. However, these products may not be available much longer as this project has nearly completed its outreach activities. An education and outreach project that is still being developed is the revision, updating, and expansion of a handbook on the laws and regulations affecting Steller sea lions aimed at teens and young adults. More information can be found at http://www.seaotter-sealion.org/.

Conclusions on Outreach.—There are considerable efforts directed towards educating the public, commercial fishermen, Alaska Native organizations, and others to the continued need to conserve and protect Steller sea lions. Therefore, NMFS concludes that an active outreach program is in existence.

4.3.6.3 Alaska Marine Mammal Stranding Network

NMFS has a well-developed national stranding program (http://www.nmfs.noaa.gov/pr/health/networks.htm) and regional stranding networks. There are three regional (Alaska, Northwest, and Southwest Regions) marine mammal stranding networks within the U.S.

range of the eastern DPS of Steller sea lion. These regional stranding networks include state, university, other federal, tribal, research, aquarium, and private partners who are part of the network. State networks exist within this framework (e.g., the Oregon Marine Mammal Stranding Network).

These Marine Mammal Stranding Networks provide considerable information to the public, such as summaries of strandings, causes of death of stranded animals (when known), etc. In addition to the U.S. national and related regional stranding programs, Canada has a staffed a Marine Mammal Incident Coordinator and the British Columbia Marine Mammal Response Network has been established consisting of federal and provincial government agencies, academics, aquaria and rehabilitation facilities, and NGOs. A Primary Response Manual has been developed and national stranding hotline established – referred to as "DFO's Observe, Record and Report 24-hour hotline."

The Alaska Region Marine Mammal Stranding Network was created to provide a consistent framework in which to collect and compile data about marine mammal strandings statewide. The network is composed of state and federal wildlife and fisheries agencies, veterinary clinics, Alaska Native organizations, academic institutions, and others who respond to marine mammal strandings (http://www.fakr.noaa.gov/protectedresources/strandings.htm).

The Alaska program has grown significantly since the first stranding agreements were signed in the early 1990s. Currently, there are 14 organizations that hold active Stranding Agreements with NMFS Alaska Region. These members are distributed across the state, from Ketchikan to Dutch Harbor to Barrow. Most members, however, are located in southeast and southcentral Alaska (including Petersburg, Sitka, Tenakee, Gustavus, Juneau, Anchorage, Seward, and Kodiak), reflecting population centers and regions where most reported events occur. The Alaska SeaLife Center in Seward acts as the single rehabilitation facility for stranded marine mammals in the state. The operations of the Alaska network are highly collaborative, in part due to the unique challenges inherent in reporting and response across remote coastlines with few trained responders. Network members consistently coordinate efforts and pool resources to retrieve carcasses, send necropsy teams into the field, verify reports, and respond to entanglements or other cases of animals in distress.

Since its inception in 2002, the John H. Prescott Marine Mammal Rescue Assistance Grant Program has greatly enhanced capacity building and infrastructure development for the Alaska Stranding Network. Numerous organizations in Alaska have applied for and been awarded funding through this national competitive federal grant program, including the Alaska SeaLife Center, the University of Alaska Fairbanks, St. Paul Tribal Government, the Alaska Whale Foundation, Alaska Veterinary Pathology Services, and the North Slope Borough. Through this program, the Alaska SeaLife Center has been able to organize and host an annual meeting for the stranding network, which brings together agreement holders, researchers, managers, Alaska Native representatives, students, and veterinarians to exchange information, build collaborations, and work to promote successful response, safe protocols, and coordinated health investigations on marine mammals in Alaska. The 2012 meeting was the 7th annual meeting of the Alaska statewide network under this program.

The Alaska Stranding Network also receives annual trainings to develop skill sets, comply with safety standards, and stay current with national expectations and protocols. In recent years, network members have received training in the following: oil spill preparedness, safety, and response guidelines (HAZWOPER); the Incident Command System; aviation safety; necropsy protocols; and large whale disentanglement response.

Through the Alaska Stranding Network, NMFS receives Steller sea lion stranding reports from various locations throughout their range on an annual basis. Reports include sea lions entangled in marine debris and cases of gear ingestion. Reports also include sea lions that have been shot, are ashore and acting sickly, and carcasses that are beach-cast or floating.

When resources allow, necropsies are performed on dead stranded sea lions in an effort to determine cause of death. Such response and examination enables the collection of: samples for disease and contaminants surveillance; basic biological information; information about status and diet; information about human interactions, such as entanglements, shooting, ship strikes; etc. Data on human interactions inform conservation actions and management decisions for the species. Information on disease and other parameters from these cases contributes to further understanding of Steller sea lion biology and ecosystem health.

If an unusual pattern of Steller sea lion deaths is reported through the Stranding Network or other means, as for example in 2009-2010 in Southeast Alaska, the relevant information is provided to the Working Group on Marine Mammal Unusual Mortality Events (WGMMUME). This working group evaluates the relevant facts and then makes a determination, using seven predetermined criteria, as to whether the pattern qualifies for a marine mammal "unusual mortality event" (UME). An UME is "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." Further details are provided about the WGMMUME at: http://www.nmfs.noaa.gov/pr/health/mmume/history.htm.

NMFS Alaska Region maintains a stranding program webpage which provides educational information regarding the causes of strandings, the purpose of the network, and the diversity of biological, environmental and health parameters that are obtained from live and dead marine mammals. The website emphasizes that the public cannot pick up stranded marine mammals without authorization, but encourages people to report and document strandings to allow stranding network members to respond. Stranding information can be given to NMFS online via the Marine Mammal Stranding Event Report Form or by phone (via the NMFS statewide 24-hour Stranding Hotline, regional contact numbers, or the Alaska SeaLife Center Stranding Hotline.

As an Alaska stranding network is in place and fully functional, NMFS concludes this recommended listing factor criteria has been met.

4.3.6.4 Conclusion for Factor E

Based on information and analysis in the Recovery Plan (NMFS 2008) and updated here, this review finds there are no other factors likely to cause the eastern DPS of Steller sea lions to become extinct within the foreseeable future throughout all or a significant portion of its range. The recommended delisting actions under Factor E have been met.

4.3.7 Have the Recommended Recovery Plan Delisting Actions for the Five ESA Listing Factors Been Met?

4.3.7.1 Actions Recommended Under Delisting Criteria A (habitat issues):

The Recovery Plan recommended:

> To provide assurance that delisting is warranted for the eastern population of Steller sea lion, threats to its habitat should be reduced as specified under this factor:
>
> 1. Marine habitats, particularly in regard to prey populations, must be maintained through appropriate fisheries management and control of contaminants.
> 2. Rookery and haulout sites need to be adequately protected (through state, federal, or private measures) to insure the continued use of these sites for pupping, breeding, attending young, and resting. Research and monitoring plans should be in place for all projects that have a high probability of negatively impacting sea lions in order to make sure that these activities do not result in harm to sea lions or their habitat.

Research and management programs have been identified in this review that provide for inclusion of Steller sea lion habitat requirements within fisheries management and other programs. Agreement between the State of Alaska and NMFS, ongoing research, law enforcement, and the Post Delisting Monitoring Plan (below), as well as existing regulations under the MMPA that govern authorization for take of marine mammals, including eastern DPS Steller sea lions, provide a means to maintain marine habitats and prey populations and to monitor projects that are likely to adversely affect individual Steller sea lions, consistent with the above recommendations. Consistent with the primary goals of the MMPA, MSFMCA, NEPA, and other law, many avenues exist to enable NMFS to reduce the impact that human activities have on sea lions and their habitat. Moreover, as described above (section 4.3.2), we have not identified any threats to eastern DPS Steller sea lion habitat that are likely to cause the species to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. Therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.2 Actions Recommended Under Delisting Criteria B (overutilization):

The Recovery Plan found:

> Human-caused mortality of Steller sea lions includes subsistence harvest; incidental takes in fisheries, illegal shooting, entanglement in marine debris, and take during scientific research. In general, the MMPA provides adequate protection for sea lions from the eastern population. None of these factors now appear to be preventing recovery, although it would be appropriate to reduce the magnitude of these when possible.

Research and management programs have been discussed and are in place to monitor and regulate these factors and, in the case of some of these kinds of take, and as consistent with the primary goals of the MMPA, to reduce or eliminate the magnitude of the takes. Therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.3 Actions Recommended Under Delisting Criteria C (disease, predation):

In the Recovery Plan, NMFS (2008) found that normal or background predation has not been limiting recovery. NMFS (2008) also concluded that diseases appeared "...to be limited to those endemic to the population and are unlikely to have population level effects. Therefore no criteria are necessary to reduce disease and predation."

However, as noted, above, review of new information available since the Recovery Plan was completed (e.g., Goldstein et al. 2009) identified the emergence of PDV, a virus that may be novel to Steller sea lions, within Alaska at multiple locations and other new unpublished evidence (T. Goldstein, pers. comm.) indicates exposure of Steller sea lions to this virus, including in areas in which eastern DPS animals are known to occur. While there is an uncertain and unknown potential for this disease to cause adverse effects on the reproduction or survival of Steller sea lions, there are a number of research and monitoring programs already in place or proposed here (see 5.2, below) that NMFS believes will provide adequate mechanisms for detecting, documenting, and responding to possible epizootic events such as that posed by the emergence of PDV. Through these mechanisms, NMFS and its partners will take action to address appropriately this issue, should it emerge. Therefore, NMFS concludes the actions recommended and/or needed (given the new information) to meet this listing factor have been met.

4.3.7.4 Actions Recommended Under Delisting Criteria D (inadequate regulations):

The Recovery Plan recommended that:

1. Agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA.
2. A Steller sea lion recovery coordinator is on staff at NMFS.

NMFS (Balsiger 2012) reached agreement with the State of Alaska on the first of these recovery criteria and a Steller sea lion coordinator is on staff at NMFS.

4.3.7.5 Actions Recommended Under Delisting Criteria E (other):

The Recovery Plan recommended several actions to assure that factors do not develop that would threaten the persistence of Steller Sea Lions:

1. An outreach program is established to educate the public, commercial fishermen and others to the continued need to conserve and protect Steller sea lions.

2. An Alaska stranding network is in place and functional.

NMFS concludes these recommended actions have been completed and are in place; therefore this listing factor has been met.

4.3.8 Final Conclusion of the Review of the Biological and Threats Based Listing Criteria

Based on information in the Recovery Plan and our review (above) of new information, NMFS finds:

- The biological (demographic) criteria for delisting have been met.

- The five ESA Listing Factor Recovery Criteria set forth in the Recovery Plan (NMFS 2008) have been met.

- None of the potential threats evaluated under the five ESA listing factors, individually or cumulatively, is likely to result in the species becoming in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

- The recommended delisting factor actions are in place.

- In the event the eastern DPS is delisted, NMFS concludes current measures under the MMPA, other laws, and regulations provide, if effectively implemented, the protection necessary to facilitate the continued recovery of the eastern DPS of Steller sea lions such that it is not likely to become an endangered species throughout all or a significant portion of its range within the foreseeable future.

5 RESULTS OF THE STATUS REVIEW

5.1 Conclusion

The Recovery Plan (NMFS 2008) concluded:

> …it is now apparent that the eastern DPS has been consistently increasing at about 3% per year throughout its range for about 25 years, with the exception of central California. The southernmost sites appear to have stabilized, albeit at levels far below their historical maximums. The eastern DPS has increased by about 225% over the last 25 years and four new rookeries have been established in Southeast Alaska. With the exception of the southern portion of the range, the reduced population size in the 1970s was thought to be the result of direct human related mortality, largely in the form of shooting by fisherman and others who viewed sea lions as competitors for fishery resources. With the passage of protective legislation in both the U.S. and Canada and with changing social values, this source of mortality has been substantially reduced. *Although there are still a number of factors that negatively impact the dynamics of the eastern DPS, none of these either alone or in combination appear to pose a threat to recovery.* (Italics added for emphasis).

Based on our review of the demographic criteria, ESA listing factors and associated criteria in this status review, NMFS finds that conclusions of the 2008 Recovery Plan remain valid. After a detailed review of the best available information since completion of the Recovery Plan, NMFS concludes that the biological (demographic) and ESA listing criteria for the eastern DPS of the Steller sea lion have been met and that this information indicates that there is a low likelihood that this DPS will become in danger of extinction in the foreseeable future throughout all or a significant portion of its range.

5.2 Recommended Recovery Actions: Status Review and Post-Delisting Monitoring Plan

Based on the lack of threats to the eastern DPS and the population status and trends, the Recovery Plan (NMFS 2008: VII-7) recommended a Status Review be conducted and that:

> A post delisting monitoring plan should be developed … which would guide monitoring activities for 10 years post delisting. The objective should be to ensure that necessary recovery actions remain in place and that it can be confirmed that there are no threats to the population's continued existence.

Both of these recovery actions have been implemented here with the completion of this status review and the development of a post-delisting monitoring plan (PDMP) (Appendix 3).

As noted previously (4.3.7.4), NMFS (2008) recommended under Listing Factor D an additional, but not numbered, recommended management action: "Research and/or monitoring programs should be put into place to oversee activities that have the potential to negatively impact Steller sea lions." In part, these types of "programs" are already an integral component of ongoing research, existing stranding networks, and other management and enforcement programs implemented under the MMPA. These activities are conducted by NMFS in collaboration with other federal and state agencies, the North Pacific Fisheries Management Council, university affiliates, private research groups, or other NMFS permittees. As noted in the discussions above (e.g., 4.3.2, 4.3.3 and 4.3.5) there are many regulatory avenues already in existence that provide for both pre- and post- threats-based project review and monitoring that provide protection to Steller sea lions and penalties for violation of such statutes.

However, the addition and implementation of a PDMP will provide an additional degree of attention and a warning system to detect the response of the population to threats and/or to detect the re-emergence of threats or the development of new threats.

5.3 New Recovery Priority Number: 10

NMFS established a recovery priority system to guide recovery task implementation and resource allocation (55 FR 24296; June 15, 1990). A numerical priority from 1 to 12 is assigned based on a matrix assigned to the magnitude of threats, recovery potential, and conflict (e.g., in conflict with construction, development, or other economic activities) and the intensity of each (e.g., high-moderate-low). The Species Recovery Priority number for the eastern DPS of Steller Sea Lion is 10. This was the recovery priority number at the initiation of this status review, due to a low magnitude of threat, high recovery potential, and no significant potential for economic conflict. This number remains unchanged until regulations are issued to delist the eastern DPS of the Steller sea lion.

5.4 Delisting Priority Number: 3

NMFS concludes the Delisting and Reclassification Priority Number for this action should be 3. NMFS (55 FR 24296, June 15, 1990) provides guidance for assigning priorities for listing and recovery actions, including priorities for delisting under the ESA. A priority from 1 to 6 is assigned based on a matrix of management impact and petition status, scaled on a high-moderate-low basis.

NMFS has considered the management impact entailed by the species inclusion on the list. Under the aforementioned guidance (55 FR 24296), the:

> (M)anagement impact is the extent of protective actions, including restrictions on human activities, which must be taken to protect and recover a listed species. If the current listing is no longer accurate, continuing protective management actions could divert resources from species more in need of conservation and recovery efforts, or impose an unnecessary restriction on the public. Because the Act mandates timely response to petitions, the system also considers whether NOAA Fisheries has been petitioned to remove a species from the list…Higher priority will be given to petitioned actions than to un-petitioned actions that are classified at the same level of impact.

NMFS received two petitions to delist this species. Thus, the priority we assigned was the higher of the two recommended given the management impact of the action.

NMFS concludes the management impact of this action will be moderate to low because the eastern DPS Steller sea lion will continue to be protected under the MMPA. The primary effect of retaining this species on the list of threatened species would be to continue the requirement that federal agencies consult, under Section 7 of the ESA, on actions that may affect this species or its critical habitat. Another effect of retention of ESA protections would be to retain special prohibitions on the discharge of firearms at or within 100 yards (91.4 meters) (50 CFR 224.103 and 223.202) to this DPS that currently apply to both DPSs of Steller sea lions.

The combination of a moderate management impact with petitioned actions results in assigning a Delisting Priority of 3 within the matrix.

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APPENDICES

APPENDIX 1A. DeMaster, D., 2011. Memo from AFSC to AKR Transmitting the AFSC's "Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment"

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

ALASKA FISHERIES SCIENCE CENTER
7600 Sand Point Way NE, Bin C15700
Seattle, Washington 98115-0070

6 May 2011

MEMORANDUM FOR: James W. Balsiger, Ph.D.
Regional Administrator

FROM: Douglas DeMaster, Ph.D.
Science and Research Director

SUBJECT: AFSC evaluation of eastern distinct population segment of Steller Sea Lions

On 19 April 2011, the Alaska Region requested assistance from the Alaska Fisheries Science Center (AFSC) on an issue related to a status review for the eastern distinct population segment (EDPS) of Steller sea lions. We were asked to evaluate whether or not the current designation of the EDPS comprises a distinct population segment (DPS) as defined under the Endangered Species Act (ESA).

The AFSC has completed a thorough review of the best available scientific information and has determined that the EDPS of Steller sea lions, as currently designated under the ESA, does satisfy the first condition of the policy for discreteness (61 FR 4722). The EDPS of Steller sea lions comprise a distinct population segment as defined under the ESA and the EDPS is significant to the taxon. This conclusion is based on an extensive body of research that includes sea lion population genetics, ecology, behavior, and details regarding the physical and physiological characteristics of the species. The attached document summarizes the information considered and the conclusions drawn by scientists at the AFSC; the document was peer-reviewed by several external experts. The reviewers endorsed the conclusions drawn by AFSC scientists and the reviewers' comments and suggestions were incorporated into the final document.

APPENDIX 1B. Alaska Fisheries Science Center, National Marine Fisheries Service/NOAA, 2011. Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment

Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment

Alaska Fisheries Science Center
National Marine Fisheries Service/NOAA
Seattle, Washington

May 6, 2011

1 Introduction and History of Relevant Decisions

Steller sea lions were first listed as a single threatened species throughout their range under the Endangered Species Act (ESA, or "the Act") in 1990 (55 FR 12645, April 5, 1990). At that time there was no subpopulation distinction identified. In September, 1994 Tom Loughlin presented a paper at the *Workshop on the Analysis of Genetic Data to Address Problems of Stock Identity as related to Marine Mammals*, held at the National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center in San Diego, California. In that presentation and in the subsequent publication Loughlin (1997) concluded, based on an evaluation of distribution, population response, phenotypic, and genotypic data, that Steller sea lions should be managed as two discrete populations, with the separation point at about 144º west longitude. Loughlin (1997) used the phylogeographic method (Dizon et al. 1992) and relied heavily on results from mitochondrial DNA (mtDNA) analysis of samples from Russia, the eastern Aleutian Islands, the Gulf of Alaska, and Southeast Alaska (Bickham et al. 1996) to argue for two distinct population segments (Loughlin 1997).

In November 1994, NMFS re-convened the Steller Sea Lion Recovery Team (the Team) to consider the appropriate status for the species, and the Team recommended that "NMFS list the Steller lion as two distinct population segments, split to the east and west of 144ºW longitude." A Federal Register notice (61 FR 4722) jointly produced by the U.S. Fish and Wildlife Service and NMFS in February 1996 noted the adoption of a policy to "clarify their interpretation of the phrase 'distinct population segment of any species of vertebrate fish or wildlife' for the purpose of listing". These were the criteria used by NMFS in the status review for the 1997 listing following the recommendation of the Team "that the western population segment be listed as endangered and the eastern population segment remain listed as threatened" (62 FR 24346, May 5, 1997). The agency used all of the available information involving diverging population trends, phenotypic differences, and primarily the deep division in the mtDNA clades to justify the decision. The eastern distinct population segment (DPS) includes sea lions born on rookeries from central California north through Southeast Alaska; the western DPS includes those animals born on rookeries from Prince William Sound westward (Bickham et al. 1996; Loughlin 1997).

2 Elements of the 1996 Distinct Population Segment (DPS) Policy

The 1996 policy (61 FR 47222) states that, "The authority to list a 'species' as endangered or threatened is thus not restricted to species as recognized in formal taxonomic terms, but extends to subspecies, and for vertebrate taxa, to distinct population segments (DPSs)". There are three fundamental elements listed in the 1996 policy that must be "considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act". These same elements must also be considered in the case of a delisting. They are as follows:

- Discreteness of the population segment in relation to the remainder of the species to which it belongs;
- The significance of the population segment to the species to which it belongs; and
- The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

2.1 Discreteness of the population segment

The 1996 policy (61 FR 47222) states that a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions which have here been phrased as questions.

2.1.1 Is the currently identified Eastern DPS of Steller sea lions markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors? Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

The present range of Steller sea lions extends around the North Pacific Ocean rim from Northern Japan, the Kuril Islands and the Sea of Okhotsk, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Kenyon and Rice 1961; Loughlin et al. 1984, 1992; Burkanov and Loughlin 2005). The regulatory division between the eastern and western DPSs was chosen as Cape Suckling (144º west longitude) in the northeast Gulf of Alaska using the phylogeographic method suggested by Dizon et al. (1992) as applied by Loughlin (1997). This approach combined the available information on Steller sea lion distribution, population response, phenotype, and genotype and argued that the population of Steller sea lions in the United States qualified under the Dizon et al. (1992) definition of a Category II population. A Category II population is characterized by a "discontinuous genetic diversity pattern between groups of closely related genome assemblages existing sympatrically or parapatrically – that is, great genetic divergence accompanied by weak geographic partitioning (Dizon et al. 1992)".

Loughlin (1997) cited population demography and animal movement data but focused a heavy reliance on a mitochondrial DNA study by Bickham et al (1996) to justify the Category II

ranking. Bickham et al. (1996) used mitochondrial DNA from 224 sea lions sampled between the Commander Islands and Oregon to reveal a broad scale of geographic structuring present within the population and suggested that the overall population be divided into eastern and western stocks or DPSs. Loughlin (1997) also presented data on morphological differences found by Merrick et al. (1995) who noted a significant difference of mean pup mass existed at rookeries between pups from the Aleutian Islands and those in the Gulf of Alaska and Southeast Alaska, with pups from Oregon being the lightest. Since publication of Loughlin (1997) a significant amount of work has been conducted which reveals additional information on the basic ecology of the species. Relevant information is summarized below.

Population Trends - Southeast Alaska and British Columbia

In the northern portion of the range of the eastern DPS of Steller sea lion (southeast Alaska and British Columbia), Steller sea lion populations have increased at rates exceeding 3% per year since the 1970s and have expanded their use of terrestrial habitats northward (Pitcher et al. 2007; Olesiuk 2008; Fisheries and Oceans Canada 2010; NMML, unpublished). Pup production increased at a rate of 3.6% per year between 1979 (N=2,219) and 2009 (N=7,442) in southeast AK, and at a rate of 3.9% per year between 1971 (N=941) and 2006 (N=4,118) in British Columbia. Counts of adult and juvenile sea lions (non-pups) have also increased in both regions during the last 30 years, almost doubling between 1982 (N=6,898) and 2009 (N=11,798) in southeast Alaska and more than tripling between 1971 (N=4,617) and 2006 (N=15,700) in British Columbia.

In the 1970s, there was only a single functional rookery in southeast Alaska, the Forrester Complex, which produced 2,187 pups in 1979. During the 1980s, however, a new rookery had become established on Hazy Island (638 pups counted in 1990), and between 1990 and 2005, three new rookeries became established in the northern half of southeast Alaska (White Sisters, Graves Rock and Biali Rock). By 2009, pup production at these four new rookeries totaled 3,407 where 30 years previously only 32 were counted, an increase of over 100-fold. At the Forrester Complex, pup production also increased, but by less than 2-fold during this same time period (N=4,036 in 2009).

In British Columbia, the pattern of increase in pup production at rookeries has been different than in southeast Alaska, with the establishment of a single dominant rookery. In the 1970s, there were five small rookeries on Maggot, Sartine and Triangle Islands (together they form the Scott Islands), plus North Danger Rocks and Cape St. James that each produced less than 350 pups. By 2006, production at one rookery, Triangle Island, had increased over 13-fold (from 181 in 1971 to 2,674 in 2006), while at all of the other four rookeries combined, production increased by only a factor of 1.25 (from 760 to 1,366 pups). In addition, there is evidence from the 2006 survey that a new rookery may be forming on Virgin Rocks, where 55 pups were counted.

Population Trends - Washington, Oregon and California

Although Steller sea lions haulout throughout their eastern DPS range from central California through southeast Alaska, there are no breeding rookeries along a more than 600 mile stretch of the Pacific coastline between the northern end of Vancouver Island and Orford Reef in Oregon. Because there are no rookeries in Washington State, the southern portion of the eastern DPS range has primarily been monitored in Oregon and California. Breeding populations in both

states have increased significantly since the 1970s. However, a rookery at the southern end of the range in California (on San Miguel Island in the Channel Islands) was abandoned in the early 1980s (Stewart et al. 1993). Counts of Steller sea lions in the Channel Islands peaked in the late 1930s and declined considerably in the 1940s and 1950s (Pitcher et al. 2007). Currently, the southernmost rookery is on Año Nuevo (37° 6'N), about 230 miles north of San Miguel Island.

The earliest reliable pup counts in Oregon were conducted in 1990 at both rookeries, Rogue and Orford Reefs (N=790), and pup production increased at 3% per year through 2009 (N=1,418) (NMFS 2008; NMML unpublished). In addition, over the 25-year period from 1977 to 2002, non-pup counts at the two Oregon rookeries increased at 2.5% per year (Pitcher et al. 2007). At the three rookeries in California (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef), pup production increased at 5.3% per year between 1996 (N=546) and 2009 (N=891) while non-pup counts at all sites in California have been stable (no discernible trend) over this same period (NMFS 2008; NMML, unpublished). However, sea lion abundance in central California (Año Nuevo and the Farallon Islands) in 2002 was only about 20% of that recorded in the period from the 1920s through the 1960s (Pitcher et al. 2007).

Pup production trends since the early 1990s have been different at each of the California rookeries. Annual pup production has been relatively stable on Año Nuevo between 1993 and 2009 (average of 225; minimum of 152 in 1999 to a maximum of 244 in 1994; 2009 pup count was 214). The Farallon Islands does not produce enough pups to be considered a rookery (<50), but the number counted there has increased from a range of 2-10 from 1990 through 2002 to a high of 24 in 2009. To the north, pup production between 1996 and 2009 has more than doubled at Sugarloaf/Cape Mendocino (from 62 to 161) and at St. George (from 243 to 492).

Population Trends - Eastern DPS Overall

Pitcher et al. (2007) estimated that the overall abundance of the eastern DPS of Steller sea lion increased at a rate of 3.1% per year for the 25-year period between 1977 and 2002. Between 2002 and 2009, NMFS and Fisheries and Oceans Canada conducted additional surveys. Adding these data to Pitcher's time series improves the annual rate of increase for the period 1977 through 2009 to 4.0% (NMML, unpublished; Olesiuk 2008). Most of the overall improvement is due to increases in the northern portion of the range in southeast Alaska and British Columbia, but the smaller population in the south (Washington, Oregon and California) has significantly increased in abundance as well.

Pitcher et al. (2007) described the northward shift in the breeding population of Steller sea lions within the eastern DPS that has occurred over the last 80 years. This shift began at the southern end of the range in the 1930s with the decline of the southern California rookery on San Miguel Island and continued in the 1960s and 1970s when the central California population declined (Pitcher et al. 2007). At the northern end of the range, Steller sea lions established rookeries in southeast Alaska on Forrester Island in the 1950s, Hazy Island in the 1980s, and on White Sisters, Biali Rock and Graves Rock in the 1990s. In the 1920s, the center of the breeding population was at approximately 46°N (Washington-Oregon border), but by 2002, it had moved northward over 400 miles to the central British Columbia coast. Over the last 13 years (1996-2009), the regional distribution of pup production within the eastern DPS has changed only slightly: in 1996, 79% of all eastern DPS pups were born on northern rookeries in southeast

Alaska and British Columbia, while the remaining 21% were born on southern rookeries in Oregon and California; in 2009, northern rookeries produced 83% and the southern rookeries 17%. Consequently, it appears that most of the northern shift in the distribution of pup production within the eastern DPS occurred during the period from the 1930s through the early 1990s. Since the mid-1990s, pup production in both the northern and southern portions of the eastern DPS has increased significantly.

Physical and Physiological Factors

At least two studies to date have examined Steller sea lion cranial morphology to explore possible phenotypic differences between the western and eastern DPS. Brunner (2002) examined 104 Steller sea lion specimens from Alaska, California, Japan and Russia and reported that animals in Alaska from the eastern and western DPS were morphometrically similar. However, Philips et al. (2009) conducted a separate analysis of 127 skulls using identical measurements as that of Brunner (2002). Their results indicated a notable difference in skull morphology of both sexes between the two stocks (Phillips et al. 2009*a*). It was suggested that the difference in results obtained by Brunner (2002) and Phillips et al. (2009*a*) was related to differences in sampling distributions and frequencies. Furthermore, Phillips et al. (2009*a*) argued that their work, when combined with existing genetic evidence and population trajectory data, was sufficient to warrant a subspecies ranking for the eastern and western DPSs and recommended that the currently designated western and Asian stocks (wDPS) should be recognized as *Eumetopias jubatus jubatus*, while the eastern stock (eDPS) should be designated *Eumetopias jubatus monteriensis*. This subspecies ranking for Steller sea lions is currently recognized by the Society for Marine Mammalogy on their list of Marine Mammal Species and Subspecies (www.marinemammalscience.org<http://www.marinemammalscience.org>)

Variation in morphometric and physiological measurements has been found among sea lions across their range, with consistent notable differences between locations in the western and eastern DPS areas. Merrick et al. (1995) found that during 1987-1994 pups were lighter at eDPS rookeries in Oregon and Southeast Alaska than were pups at wDPS rookeries in the Gulf of Alaska and Aleutian Islands, and Brandon et al. (2005) found faster growth rates of pups in the Aleutian Islands and western Gulf of Alaska (wDPS) than of pups in Southeast Alaska (eDPS) during 1990-1997. Juvenile Steller sea lions up to two years-old captured in the Aleutian Islands and Gulf of Alaska grew faster (Fadely et al. 2004; 2000-2003 study period) and were larger than juveniles captured in Southeast Alaska (King et al. 2007; 2001-2005 study period). Similarly, Richmond et al. (2005) showed that hematology and erythropoietin values differed significantly between sea lions sampled in Prince William Sound and those sampled in Southeast Alaska. Myers et al. (2009) measured serum cortisol in samples from over 656 sea lions from the western DPS (Russia and southwest Alaska), and 285 sea lions from eastern DPS (Southeast Alaska) and also found a significant difference between the areas.

Ecological or Behavioral Factors - Sea Lion Movement

Satellite telemetry and resightings of branded sea lions offer the greatest amount of information on the behavior and an interpretation of the age and sex-specific movements within and out of the currently designated eastern DPS. Observations of animals (primarily young males) marked in one DPS but seen in another have been reported.

An examination of movements from 1975-1995 by the Alaska Dept. of Fish and Game (L. Jemison, pers. comm.) revealed that sea lions branded as pups on their natal rookeries dispersed widely but there was little interchange between eastern and western DPSs (Raum-Suryan et al. 2002). Additional indications of post-weaning movements were detected through deployment of satellite-linked transmitters during 1998-2001 (Raum-Suryan et al. 2004); of 103 instrument deployments (74 eastern DPS / 29 western DPS) a 19-month male moved from Benjamin Island (eastern DPS) to sites in the western DPS and a 9-month old male tagged near Kodiak Island was tracked into the eastern DPS area until the telemeter failed after 2 months. However, none of those published studies provided indication of permanent trans-boundary movements. In more recent research, of nearly 2,000 pups marked at eastern DPS rookeries from 2001-2005, 107 individuals have traveled to the western DPS; only 2 of the animals traveling west were females (ADF&G, unpublished data). One female returned to her natal rookery at breeding age and the other has not been seen since traveling west at one year of age. Thirteen males (1.9%) that were marked as pups in the eastern DPS have been seen in the western DPS at older ages (7-9 years; note that not all marked cohorts have yet reached 7 years of age). During the breeding season in 2010, ten of those had returned to an eastern rookery, one was sighted at Cape St. Elias (near the boundary between eastern and western DPSs), one remained in the western DPS, and one was never observed.

Of the nearly 800 animals branded at the Forrester Island rookery (which includes Lowrie Island) in 1994-1995, 2.8% of the males traveled west of Cape Suckling, but no females traveled west. Of the 12 traveling males, 10 later returned to rookeries in the eastern DPS during the breeding season and most (9) were territorial bulls at either the Forrester Islands or Hazy Islands rookeries. Seventy-seven animals marked at western rookeries (in Prince William Sound and near Kodiak Island; N = 1241) from 2000 – 2008 have traveled to the eastern DPS; 43 were males and 34 were females. Of the females, all but one was seen in northern Southeast Alaska. Most (89%) of the 18 reproductive-age females were resighted at either the Graves Rock or the White Sisters rookery during the breeding season. At least seven western DPS females are known to have pupped at eastern DPS rookeries (five at Graves Rock, two at White Sisters), based on resightings of branded animals. Six of the seven females that pupped at eastern DPS rookeries have thus far only been resighted in the eastern DPS. Of the males marked at western rookeries, four individuals (1.1%) traveled to the eastern DPS at older ages (7-10 years). All four were seen at Graves Rock rookery during the breeding season and one was considered a territorial bull, hauled out among adult females.

In summary, observations of branded sea lions in both DPS's have indicated that eastern DPS males travel west more frequently than eastern DPS females, and in fact there are very few sightings of an eastern DPS female in the western DPS. Conversely, similar numbers of western DPS males and females travel east. Some western DPS females have been seen within the eastern DPS annually since a young age, eventually pupping there, suggesting a permanent emigration although one female following this pattern later returned to the west and pupped at a western rookery. It appears that most males return to their natal DPS as they near breeding age.

Ecological or Behavioral Factors - At-Sea and Dive Behavior

Diving behavior of Steller sea lions is strongly influenced by time-of-day, age, gender, and season (Merrick and Loughlin 1997; Loughlin et al. 2003; Fadely et al. 2005; Pitcher et al. 2005;

Rehberg and Burns 2008; Thomton et al. 2008), but several studies have compared diving and at-sea trip behavior between western and eastern DPS populations. Juvenile Steller sea lions in Southeast Alaska (eastern DPS) had significantly greater dive depths, dive durations, and dive rates than did juveniles from the western DPS (eastern Aleutians-Prince William Sound), but sea lions from the western DPS spent more time at sea (Pitcher et al. 2005). Pitcher et al. (2005) could not conclude that sea lions from one population were 'working harder' than the other because differences were relatively small and likely due to variations in bathymetry and prey distribution. Similarly, Loughlin et al. (2003) found that Washington yearlings (eastern DPS) dove deeper and longer than yearlings in Alaska (western DPS: central Aleutians – eastern Gulf of Alaska), and also related this finding to differences in local prey habitat. Round-trip distances of western DPS (eastern Aleutian Islands-Prince William Sound) juveniles were greater than eastern DPS (Southeast Alaska) juveniles (Raum-Suryan et al. 2004), and trip durations of juveniles from the eastern Aleutian Islands and central Gulf of Alaska (western DPS) were greater than trip durations of juveniles in Southeast Alaska (eastern DPS; Call et al. 2007). Differences in trip distance and durations between western and eastern DPSs are possibly explained by juveniles in the western DPS weaning or supplementing their diet at younger ages than occurs in the eastern DPS (Raum-Suryan et al. 2004; Pitcher et al. 2005; Call et al. 2007), or indicates differences in prey abundance, distribution or composition (Call et al. 2007) such that western DPS juveniles had more difficulty obtaining prey than juveniles in Southeast Alaska (Raum-Suryan et al. 2004).

Rehberg et al. (2009) compared breeding season dive behavior of 11 adult females from Southeast Alaska with four measured in the eastern Aleutian Islands-central Gulf of Alaska by Merrick and Loughlin (1997) and found similar mean dive depths, dive durations, dive rates, and proportion of time at-sea between the two populations. Adult females from both populations had similar mean maximum trip distances, but eastern DPS females had much smaller home ranges suggesting that eastern DPS females were accessing concentrated prey features through directed movements, whereas western DPS female behavior was indicative of foraging on more dispersed prey resources through broader exploration movements (Rehberg et al. 2009). Davis et al. (2006) found that during the first 1-1.5 months postpartum, adult females in Southeast Alaska had longer foraging trip durations than females from Chirikof (central Gulf of Alaska) and Seguam Island (central Aleutian Islands), and suggested there was evidence of a cline of decreasing trip durations from east to west. When all studies of maternal foraging trip duration using either visual, radio-tag, or satellite telemetry data (Higgins et al. 1988; Merrick and Loughlin 1997; Trites and Porter 2002; Milette and Trites 2003; Davis et al. 2006; Maniscalco et al. 2006; Rehberg et al. 2009) are considered however, a cline is not readily apparent over a broad range from the central Aleutian Islands through Southeast Alaska, and the trip duration and proportion of time at sea measured at Chirikof/Seguam Islands stand out as being much lower than measured at other sites, perhaps in part due to the measurement period of that study relative to others, as maternal trip duration increases with pup age (Higgins et al. 1988; Milette and Trites 2003; Maniscalco et al. 2006). Too few studies of non-breeding season adult female behaviors have been conducted to provide meaningful western/eastern DPS comparisons.

Sea lion diving and foraging behavior thus likely reflects phenological and diurnal cycles of sea lion prey, sea lion dive ontogeny, and sex-specific life history constraints in addition to regional differences in prey composition, abundance and distribution. However as pointed out by Pitcher

et al. (2005), it is not possible to conclude whether groups of animals from any particular area may be working harder than others to obtain prey because of uncertainty of the relationships among dive and travel behaviors and how that ultimately relates to foraging success.

Genetic Factors

There has been an extensive amount of work conducted on the population genetics of Steller sea lions since the last status review and the Bickham et al. (1996) paper. Here we note some of the relevant studies and their results as they pertain to the criteria of quantitative measures of genetic or morphological discontinuity that might provide evidence of the separation of a population segment.

In 1998 Bickham et al. investigated the geographic variation in the mitochondrial DNA (mtDNA) of Steller sea lions in Russia with an analysis of over 1,200 animals and re-confirmed evidence for an eastern stock that was later recognized as the eastern DPS. In addition, they proposed the possibility of an Asian stock delineated just west of the Commander Islands. The most differentiated lineages of Steller sea lions were still found between the western part of the range (Russia to the eastern Gulf of Alaska) and eastern locations (Southeast Alaska and Oregon) indicating restricted gene flow between the two populations. This three stock hypothesis was again confirmed in a study by Baker et al. (2005) who analyzed sequence variability at a segment of the mtDNA control region from 1,568 individuals representing every significant rookery range-wide.

An additional study by Bickham et al. (1998b) analyzed samples of sea lions collected in the Gulf of Alaska in 1976-1978 and compared the results with samples collected in the 1990's following the steepest population decline. The authors found that genetic diversity and haplotype frequency in sea lions sampled in the Gulf of Alaska, an area in which abundance had declined, had not changed significantly between the two time periods. .

Harlin-Cognato et al. (2006) used mtDNA to explore the phylogenetic relationships of sea lions in the context of Plio-Plestocene insular refugia. The authors suggested that the current genetic structure of sea lions is the result of Pleistocene glacial geology which influenced the availability of suitable habitat. The phylogeographic break observed for Steller sea lions is geographically analogous to breaks for several other species, including other marine mammals.

O'Corry-Crowe et al. (2006) examined a longer segment of the mtDNA than had previously been completed on a large sample (n = 1,654) of sea lions from across Alaska and also confirmed a high level of phylogeographic differentiation between the populations in southeastern Alaska and western Alaska. The authors went further to examine fine-scale dispersal patterns and found distinct differences between rookeries east and west of Samalga pass within the western DPS that they attributed to substantial female-mediated philopatry. The authors went further and specifically spoke to the policy addressed here stating that, "The phylogeographic partitioning between eastern and western mtDNA lineages reported here agrees with earlier studies (e.g., Bickham et al. 1996) and supports the current DPS designations within Alaska" (O'Corry-Crowe et al. 2006).

Two genetic studies have used the same pup tissue samples to conduct microsatellite analysis of the nuclear genome to address the question of a clear stock delineation. This method accounts for the male contribution rather than just focusing on the female contribution as with mtDNA. Trujillo et al. (2004) genotyped 208 individuals using 6 microsatellite loci and found that the population separation apparent from mtDNA was not clearly defined when males were taken into account. The authors postulated that the difference in population genetic structure described by microsatellites and mtDNA may be explained by high male dispersal and female philopatry, or insufficient isolation time for nuclear loci divergence. Hoffman et al. (2006) followed up on the research by Trujillo et al. (2004) and Baker et al. (2005) by genotyping 709 individuals from across the species range at 13 microsatellite loci. The authors found corroborating support for a significant divergence of the eastern and western populations using microsatellites, contrary to the findings of Trujillo et al. (2004). The contrasting results of these two studies were most likely due to insufficient genetic resolution provided by inclusion of fewer samples, and more importantly, fewer microsatellite markers by Trujillo et al. (2004).

Hoffman et al. (2009) analyzed amplified fragment length polymorphism (AFLP) of 285 sea lions at rookeries throughout their range to provide an alternative nuclear DNA perspective on population structure. Basing their work on previously collected samples, the authors observed that the eastern stock has the greatest mtDNA diversity but the least nuclear diversity (from microsatellites and AFLPs). The AFLP findings concurred with previous studies (Bickham et al. 1996; 1998; Ream 2002; Baker et. al. 2005; Hoffman et al. 2006) that showed differentiation between the eastern and western populations.

Recently Phillips et al. (2009*b*) examined the substitution patterns, rates, and homoplasy (wherein a particular haplotype has multiple origins due to identical base substitutions in separate individuals) of the hypervariable region I of the mitochondrial control region and found that this region of the mitochondrial genome had a higher substitution rate than previously noted. The results of this study indicated that some of what had previously been thought to be evidence for common ancestry between the two DPS's were actually parallel mutations in the sequence region of study, having occurred in both DPS's resulting in convergence of haplotypes rather than evidence of dispersal or gene flow. Ultimately, these results indicated that long-distance dispersal in Steller sea lions is less common than previously estimated. The authors showed that using their analysis, all three of the long distance dispersal events reported in the paper by Harlin-Cognato et al. (2006) were likely cases of homoplasy and not instances of gene flow. In a recent study, Phillips et al. (*in press*, 2011) documented only seven haplotypes occurring in both DPSs. These findings combined with those of Phillips et al. (2009*b*) describe a 30% reduction in the number of shared haplotypes between the two DPSs, further demarcating the genetic discontinuity between DPSs.

This recent paper (Phillips et al. 2011) addressed the effect of climate change in the form of glacial events on the evolution of Steller sea lions. They reported mtDNA sequence data from >1,000 pups taken throughout the species range and using three mtDNA regions; two coding genes and the control region. Using the method described in Phillips et al. (2009*b*) a fully resolved haplotype network allowed for a greater estimate of statistically significant associations of haplotype distributions to geography than was possible in Harlin-Cognato et al. (2006). This manuscript concludes that the effect of a glacial event on the species' demographics and

phylogeography has been dependent upon the effective population size at that time. Namely, they found that during historic glacial periods dispersal events were correlated with historically low effective population sizes, while range fragmentation type events were correlated with larger effective population sizes. Their study also documented further evidence for the division between the two DPS's (or subspecies) and dated the initial divergence between these lineages at approximately 360,000 years ago. They observed that this ancient population subdivision has led to the sequestering of most haplotypes as DPS, or subspecies specific (Phillips et al. 2011).

In 1998 Steller sea lion pups were first noted on Graves Rock just north of Cross Sound in Southeast Alaska. By 2002 the population had increased to approximately 100 pups and 50 of those pups were captured, branded, and tissue-sampled in July of 2002. Mitochondrial and microsatellite work with those samples revealed that approximately 70% of the pups had mtDNA haplotypes that were consistent with those found in the western DPS (Gelatt et al. 2007). Similarly, a rookery to the south on the White Sisters Islands near northern Chichagof Island where pups were first noted in 1990 was also sampled in 2002 and approximately 45% of those pups had western DPS haplotypes. Collectively, this information suggested that these two most recently established rookeries have been at least partially established by females that were born in the western DPS.

In two recent reports to the National Marine Mammal Laboratory, Bickham (2010*a*,*b*) reported new mtDNA data for eastern DPS rookeries from California and British Columbia. As recommended in the 2008 Steller Sea Lion Recovery Plan, a new analysis of the genetic structure of the southern and eastern-most rookery in the species description at Año Nuevo Island, California was initiated. As this is a small and difficult rookery from which to sample, the 13 tissue samples were collected from a combination of strandings and carcasses (6 pups, 2 fetuses, 2 adults, one yearling and 2 juveniles) collected during 2000-2009. Three mtDNA genes and 1 Y-chromosome gene were used to compare the specimens to the rest of the population. The control region results which are comparable to the largest data set used across the species range indicated that the Año Nuevo population fits within the eastern DPS and did not contain any new haplotypes or any haplotypes unique to the western DPS (Bickham 2010*a*). Likewise no new haplotypes or any haplotypes that were not previously found in the eastern DPS were found in the two protein coding genes, cytochrome *b* and ND1. Of the seven males in the data set, six had a common Zfy haplotype and a single male had a rare haplotype only found previously in Oregon and British Columbia, indicating some Y-chromosome diversity and male movement within the DPS. Comparing the mtDNA control region results with those of the only previous study by Ono (1993) indicated that haplotypic diversity had remained high in the intervening years (Ono (1993) H = 0.85; Bickham 2010*a* H = 0.89). Ono (1993) examined 13 samples and found 9 haplotypes. Bickham (2010*a*) also sequenced 13 samples and found 10 haplotypes including 5 of the same haplotypes described by Ono. Overall, Bickham (2010*a*) suggested that despite changes in abundance, the Año Nuevo population has not declined in genetic diversity and is not genetically unique.

At the British Columbia rookeries, all 52 specimens were collected from pups and were added to previously collected samples for a total of 67 samples from the area. All but one of the pups had haplotypes characteristic of the eastern DPS. The exception was haplotype 3BB which has been found previously in southeast Alaska but is most common in the western DPS from the western

Aleutians to Prince William Sound and Bickham (2010*b*) suggested represented a potential dispersal event. Bickham (2010*b*) also reported that his results were consistent with all previous genetic studies showing the differentiation of the eastern and western DPSs. The following information is excerpted from that report:

"*The examination of three mtDNA genes, including their comparison to large pre-existing datasets, shows that the four British Columbia rookeries as expected share haplotypes with the other eastern stock rookeries and are largely isolated from the western stock and Asian rookeries. However, there are some haplotypes whose distributions cross the eastern stock/western stock boundary. There are three possible explanations for this cross boundary distributional pattern. One explanation is that haplotypes can be transferred across the boundary by gene flow; i.e., successful migration with reproduction since we are studying pups taken at their natal rookeries. This almost surely happens, but rarely. The second explanation is that shared haplotypes are plesiomorphic (primitive) haplotypes whose distributions were established prior to the isolation of the eastern and western stocks. This easily explains broadly distributed and common haplotypes such as the control region haplotypes BB and A which are found throughout the range of the species and are two of the most common haplotypes. It can also explain disjunct distributions which on the surface appear to be the result of dispersal but in fact are due to a process known as lineage sorting. And third, trans-boundary haplotype distributions can be the result of homoplasy in which identical mtDNA sequences evolve independently due to the rapid rate of sequence evolution at certain hyper-mutable sites. This has been thoroughly discussed by Phillips et al. (2009b) who showed that this is a common phenomenon in control region haplotypes but the use of more conserved protein coding genes such as cytochrome b and ND1 help to resolve these errors. In fact, Phillips et al. (2009b) produced a highly resolved haplotype phylogeny for Steller sea lions by this method and resolved all apparent instances of long-range dispersal, as estimated using control region haplotypes alone, as being due to sequence homoplasy."(*Bickham 2010*b).*

Summary of Discreteness Findings

Overall, the observations of marked sea lion movements corroborate the extensive genetics research findings for a strong separation between the two currently recognized DPSs. Although recent colonization events in the far northern part of the eastern DPS indicate movement of the western DPS into this area this mixed part of the range remains small, and the overall discreteness of the eastern from the western DPS remains distinct. Hybridization among subspecies and species along a contact zone such as now occurs near the DPS boundary is not unexpected as the ability to interbreed is a primitive condition whereas reproductive isolation would be derived. In fact as stated in the 1996 policy (61 FR 47222) responses to previous comments, "*The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment*". The fundamental concept overlying this distinctiveness is the overwhelming collection of morphological, ecological and behavioral, and genetic evidence for DPS differences provided here. Although a few migrants a year may indeed occur and that in and of itself may be sufficient to prevent genetic differentiation among populations within a DPS (such as within the entire eastern DPS) there is no evidence to suggest such a rate of exchange is sufficient to merge distinct populations.

The published recommendation (Phillips et al. 2009*a*) and recognition for subspecies designation of the two DPS's further substantiates this justification. In addition, the persistent population trend trajectories combined with the physical and physiological differences, and behavioral characteristics unique to each DPS indicate that all of the potential factors in the discreteness criteria contribute to this continued separation and as such the population segment as described for this status review should be considered discrete.

2.1.2 Is the population segment delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act?

The population segment addressed for this analysis completely surrounds the portion of the population located in British Columbia, Canada. However, the current conservation and management plan for Steller sea lions in Canada is similar to the protection measures provided by the U.S. Marine Mammal Protection Act and thus the protection measures are not interpreted as being significantly different. Therefore, this condition is not met. Within Canada, Steller sea lions are included on the List of Wildlife Species at Risk as a species of special concern, and have been protected under the Species at Risk Act (SARA) since 2005. Under the SARA a species of special concern is one that because of their biology and identified threats could become threatened or endangered. In 2011 a Management Plan for the Steller Sea Lion was finalized (Fisheries and Oceans Canada 2010), identifying conservation activities and protection measures necessary to prevent them from becoming threatened or endangered, and with the ultimate goal of removing Steller sea lions from the List of Wildlife Species at Risk.

2.2 Significance of the Population Segment

The 1996 policy (61 FR 47222) states that if a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance will then be considered in light of Congressional guidance that the authority to list DPSs be used sparingly while encouraging the conservation of genetic diversity. In carrying out this examination, the Services will consider available scientific evidence of the discrete population segments importance to the taxon to which it belongs. This consideration may include, but is not limited to, the following four pieces of evidence which are phrased as questions.

2.2.1 Is the persistence of the discrete population segment in an ecological setting unusual or unique for the taxon?

No. As noted above, the eastern DPS has consistently occupied this portion of its range for millennia, but there is evidence of northward range extension within the eastern DPS in the last 100 years. As to whether the ecological setting of southeast Alaska, British Columbia, and southward to Central California is unique to the taxon one could argue that the information presented previously combined with available studies of sea lion prey use and habitat areas would indicate that indeed these areas are unique. However, our interpretation of this criterion is that with almost one half of the global population residing in this area it is not unusual.

2.2.2 Is there evidence that the loss of the discrete population segment would result in a significant gap in the range of a taxon?

Yes. As currently designated the eastern DPS includes the entire Steller sea lion range east of 144° W longitude through southern California and constitutes approximately 47% of the global population. Losing this population would truncate the range in the Gulf of Alaska and eliminate all breeding areas from Southeast Alaska to Central California.

2.2.3 Is there evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range?

No. There are no records of an introduced population of Steller sea lions.

2.2.4 Is there evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics?

Yes. As noted previously the genetic characteristics of the two DPSs differ significantly leading to recommendation for sub species designation. The mtDNA haplotype frequency distributions are supportive of distinct differences in the two population segments while the similarities among sites within each segment confirm movement among the areas.

2.2.5 Summary of Significance Findings

In addressing whether the population segment is considered significant the policy also allows for consideration of other factors if they are appropriate to the biology or ecology of the species. Therefore, the information provided previously is relevant to the significance question as it was to the question of discreteness. This information is sufficient to determine that the population segment is discrete and significant and should retain its DPS designation.

2.3 Conservation Status

The conservation status comes into play once the population segment is determined to be distinct. The above information summarizes why the population segment does meet the criteria of a DPS and therefore this population is able to be considered discrete for the purposes of listing, delisting, and reclassifying.

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APPENDIX 2. Agreement between NMFS and State of Alaska on post delisting management actions related to fisheries and the MMPA.

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

March 12, 2012

Doug Vincent-Lang
Acting Director
Division of Wildlife Conservation
State of Alaska, Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518-1599

Dear Mr. Vincent-Lang:

Staff from our respective organizations have been working cooperatively to develop information concerning actions the State of Alaska would implement in the event the National Marine Fisheries Service (NMFS) proceeds with a proposed rule to remove the "threatened" eastern Distinct Population Segment (DPS) of Steller sea lion from the list of endangered and threatened species under the Endangered Species Act. A key recommendation of the final 2008 Steller Sea Lion Recovery Plan was that as part of the de-listing process "agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA."

The State of Alaska submitted materials to NMFS describing these actions on February 24, 2012. I have reviewed this material and agree that the State has adequately described and addressed the recommendation of the Recovery Plan on this topic. We appreciate the collaboration and effort your staff has made over the last months in reaching this agreement.

Sincerely,

James W. Balsiger, Ph.D.
Administrator, Alaska Region

cc: Cora Campbell -- ADF&G, Commissioner
Moira Ingle -- ADF&G, Wildlife Biologist
Brad Meyen – DOL, Attorney

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

SEAN PARNELL, GOVERNOR

333 Raspberry Road
Anchorage, AK 99518-1599

February 24, 2012

James Balsiger,
Alaska Regional Administrator
NOAA Fisheries' National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Re: Eastern DPS, Steller sea lion

Dear Dr. Balsiger:

As you are aware, the State of Alaska petitioned NMFS in 2010 to delist the Eastern Distinct Population Segment of Steller sea lions ("EDPS"). As part of the delisting process, the 2008 Steller Sea Lion Recovery Plan directs NMFS to reach agreement with the State regarding expected future management plans for fisheries that may interact with EDPS sea lions, including actions expected to minimize anthropogenic impacts on the population after delisting.

The attached document was prepared by the Alaska Department of Fish & Game in cooperation with the NMFS Protected Resources Division. It describes how future State fishery management actions within the breeding range of the EDPS will continue to comport with the Marine Mammal Protection Act and will continue to minimize incidental take of sea lions associated with those fisheries.

Please contact me at douglas.vincent-lang@alaska.gov or (907) 267-2339 with any questions.

Sincerely,

Doug Vincent-Lang
Acting Director, Division of Wildlife Conservation
Endangered Species Coordinator

Cc: Cora Campbell -- ADF&G, Commissioner
Moira Ingle -- ADF&G, Wildlife Biologist
Brad Meyen – DOL, Attorney
Dana Seagars -- NMFS Protected Resources Division
Clayton Jernigan – NOAA Office of the General Counsel

***How Future State of Alaska Fishery Management Actions Will Comport with the MMPA and Minimize Incidental Take of Eastern DPS Steller Sea Lions*.**

The Steller Sea Lion Recovery Plan (NMFS 2008) provides criteria for delisting that the National Marine Fisheries Service ("NMFS") must address before the agency takes action to delist the Eastern Distinct Population Segment ("EDPS") of Steller sea lions, currently listed as threatened under the Endangered Species Act ("ESA").

The Recovery Plan ("Plan") concludes that "*protection for the eastern [sea lion] population has been provided primarily by the MMPA, the Magnuson-Stevens Fishery Conservation and Management Act, and the Fisheries Act of Canada*." Plan, p. VII-1. The "*most important protection*" achieved under these statutes "*has likely been prohibitions on lethal takes*." Although none of the potential threats are considered likely to affect the recovery of the species, the Plan identifies several possible forms of increased disturbance by humans as the most likely threat facing the EDPS as it continues to expand its range. The Plan acknowledges, however, the demonstrated effectiveness of the existing regulatory mechanisms, including the Marine Mammal Protection Act ("MMPA"), which would remain in place after delisting under the ESA, to minimize potential impacts to sea lions related to human disturbance.

The Recovery Plan directs that, before it can delist the species pursuant to Section 4(c)(1) of the ESA, NMFS must first determine that certain demographic criteria are met. NMFS must then document that perceived threats to the DPS, as characterized under the five ESA listing factors, are reduced or eliminated to the point that ESA listing is no longer appropriate.[1] Regarding ESA listing factor D, the Plan enumerates actions that "could provide substantial insurance against future impacts from development and anthropogenic disturbance." One of those enumerated actions is for NMFS to reach agreement with the State of Alaska regarding expected future management plans for fisheries that may interact with EDPS Steller sea lions. Specifically, the Recovery Plan calls for:

- descriptions of relevant State fishery management plans;
- descriptions of how expected State actions minimize the take of [EDPS] Steller sea lions; and

[1] *See* 50 C.F.R. 402.02 definition: "*recovery* means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act."

- descriptions of how future actions taken by the State will comport with the ESA and MMPA.[2]

This document identifies and describes the State's general approach to management of particular fisheries and discusses certain current management measures to illustrate (i) how measures minimize take of sea lions and (ii) how they comport with the MMPA. NMFS fully recognizes, however, that fisheries management is a dynamic process that must be responsive to changes in socio-economic and environmental conditions. Accordingly, although there are currently no specific plans to do so, the State reserves the right to modify any of the existing management measures discussed in this document. The State anticipates that any such future changes would continue to comport with the MMPA.

State-managed Fisheries:

Each State-managed fishery referenced in this document is guided by a Fishery Management Plan developed by the Alaska Department of Fish and Game (ADF&G) and adopted by the Alaska Board of Fisheries. Section 118 of the MMPA requires NMFS to annually evaluate the potential for interaction between these State-managed fisheries and marine mammals. 16 U.S.C. 1387(c)(1). Section 118 also directs NMFS to publish an annual List of Fisheries ("List" or "LOF") that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals associated with each specific fishery. Criteria for the three Tier 2 categories relevant to the EDPS are as follows:

List of Fisheries Category	***Annual mortality & serious injury as a proportion of PBR[3]***	***Incidental mortality descriptive term***
Category I	≥ 50 % of PBR	"frequent"
Category II	≥ 1% & ≤ 50%	"occasional"
Category III	≤ 1%	"remote"

Table 1. Criteria for classification of fisheries on MMPA Section 118 List of Fisheries.

[2] Although the Recovery Plan refers to "how future actions taken by the State will comport with the ESA and MMPA," in the event the EDPS is delisted, the ESA would not apply to the EDPS unless it were re-listed. The population would continue to be protected under the MMPA, however.

[3] "PBR" is the Potential Biological Removal level for each marine mammal stock. The MMPA defines the PBR level as the maximum number of animals, aside from natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. 16 U.S.C. 1362(20).

Pursuant to its Section 118 authority, NMFS has identified six fisheries managed by the State of Alaska that may interact *directly* with marine mammals:

- Southeast Salmon Drift Gillnet;
- Alaska Yakutat Salmon Set Gillnet;
- Alaska Salmon Troll;
- Alaska Gulf of Alaska sablefish longline;
- AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish); and
- Alaska Commercial Passenger Fishing Vessel (charter boat).

Each of these fisheries is included on the annual NMFS List (*see*, e.g., 76 FR 73912, November 29, 2011). The management plan for each fishery is described in Appendix I, with additional information and State management regulations available at http://www.adfg.alaska.gov/index.cfm?adfg=fishregulations.commercial.

Of the six fisheries identified on the List, only four (AK Southeast Salmon Drift Gillnet, AK Salmon Troll, AK Gulf of Alaska Sablefish Longline, and AK commercial passenger fishing vessel fisheries) have had direct interaction with EDPS Steller sea lions. The following table illustrates the categories and bases for assignment by NMFS for each of the State fisheries on the most recent List (November 29, 2011):

Fishery	***Category***	***Marine mammal species or stocks killed or injured***	***Basis (stock driving the current classification)***
AK Southeast salmon drift gillnet	II	Dall's porpoise, AK Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific Pacific white-sided dolphin, North Pacific Steller sea lion, Eastern U.S.	Humpback whale, Central North Pacific
AK Yakutat salmon set gillnet	II	Gray whale, Eastern North Pacific Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific (Southeast AK)	Harbor porpoise, Southeast AK

AK salmon troll	III	Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK Gulf of Alaska sablefish longline	III	Sperm whale, North Pacific Steller sea lion, Eastern U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish)	III	None documented[4]	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK commercial passenger fishing vessel	III	Killer whale, stock unknown Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level

Table 2. MMPA List of Fisheries classifications for State-managed fisheries within the breeding range of EDPS Steller sea lions, marine mammal species potentially affected, and stock/species driving the classification.

No State-managed fisheries are classified as Category I on the NMFS List. Two State-managed fisheries that operate within the breeding range of EDPS Steller sea lions are classified as Category II, but not because of reported interactions with EDPS sea lions. Instead, the Southeast Salmon Drift Gillnet Fishery is classified as Category II due to reported interactions with Central North Pacific humpback whales. In turn, the Yakutat Salmon Set Gillnet Fishery is classified as Category II due to interactions with harbor porpoises. If not for the interactions with humpback whales or harbor porpoises, the minimal past interactions of these fisheries with EDPS Steller sea lions would qualify them for classification as Category III fisheries (i.e., less than 1% annual mortality or serious injury as a proportion of PBR).

NMFS classifies the remaining three State-managed fisheries within the breeding range of the EDPS as Category III, indicating only a remote likelihood or no known levels of

[4] This fishery is included here on the basis of analogy with the Federally managed Gulf of Alaska Sablefish Longline fishery, which has reported serious injury/mortalities of EDPS Steller sea lions. Although no such interactions have been reported in the State-managed fishery in State of Alaska waters, the two fisheries operate in similar means (e.g., time, space, and gear) and the State fishery occurs within the range of seasonal concentrations of foraging EDPS sea lions; thus it is reasonable to consider that such interactions may occur.

incidental mortality or serious injuries to marine mammals, including EDPS Steller sea lions. Although NMFS observers have not directly monitored any of these three fisheries,[5] the absence of reported interactions or other anecdotal information (e.g., logbook data) confirms that the level of incidental mortality and serious injuries to EDPS Steller sea lions associated with these fisheries is likely less than one percent of the PBR level for the stock. More details concerning estimated levels of incidental catch and/or serious injury or mortality are identified in the annual Stock Assessment Reports issued by NMFS (e.g., Allen and Angliss 2010).

State management measures that limit effects on EDPS sea lions in LOF Fisheries. None of the State-managed fisheries on the current LOF has more than a "remote" likelihood of causing incidental mortality or serious injury to EDPS Steller sea lions. The fisheries have maintained this status for 10 to 15 years, depending on the fishery, indicating that State management strategies have minimized the take of EDPS Steller sea lions, consistent with NMFS's Recovery Plan for the species. Based on this information, State-managed fisheries within the breeding range of EDPS Steller sea lions have minimal direct effects on this population. The EDPS Steller sea lion is not identified as the "driving" species or stock for any Category II classifications, and for two of the LOF fisheries, there is no known incidental mortality or injury of sea lions associated with the fishery. Thus, by implication, few fishery management measures directed at minimizing sea lion mortality are necessary, since the EDPS population continues to increase even in the core areas of these active fisheries.[6]

Attributing an absence of mortality to specific fishery management measures is not possible. In general, however, the science-based management approach followed by the State results in abundant escapement of targeted species and limited bycatch of non-target species. In addition, season and area restrictions and gear limitations for these fisheries limit any direct or indirect effects on EDPS sea lions. For example, although the fisheries are prosecuted near but outside rookeries and haulout areas protected as critical habitat under 50 CFR 226.202, there is no indication that the location or timing of current fishery activities has impacted the recovery of the EDPS population.

[5] As of the date of this document, no monitoring of these fisheries has occurred. NMFS has contracted with an observer group to observe the State-managed District 6 and District 8 driftnet fisheries (near Wrangell and Petersburg) in 2012 and 2013, however. http://www.saltwaterinc.com/alaska_marine_mammals_program_saltwater_inc/alaska_marine_mammal_boat_operators_saltwater_inc.html

[6] The Recovery Plan concludes that "the level of intentional and incidental killing of Steller sea lions by humans has apparently been relatively small as the population has been increasing for about 30 years." Recovery Plan, p. VI-3. On page VI-5, the Plan reports that "the eastern DPS of Steller sea lion has also increased at approximately 3% /year . . . ."

Some fisheries may interact indirectly with EDPS sea lions. As with all its fisheries, the State carefully manages these fisheries through a science-based, biologically sound regulatory process that accounts for and fully comports with the MMPA. Although there are currently no specific plans to modify any of the existing management plans for these fisheries, the State receives new regulatory proposals on a three-year cycle and reserves the right to modify those plans. The State anticipates that any such future modifications would continue to comport with the MMPA.

How the State will continue to minimize the take of EDPS Steller sea lions:

Current State management achieves insignificant levels of mortality. The State of Alaska supports the continued conservation of all marine mammals, including the EDPS of Steller sea lions. The State also recognizes and supports the goal identified in MMPA Section 118(a) that commercial fisheries will achieve and maintain insignificant levels of incidental mortality and serious injury of marine mammals. The State will continue to collaborate with NMFS to implement, through its State fishery licensing program, the requirement under 16 USC 1387(c)(2) for owners of fishing vessels or gear engaging in a Category I or II fishery to register with NMFS and to obtain a marine mammal authorization to lawfully take non-endangered and non-threatened marine mammals incidental to commercial fishing operations. Category III fisheries are exempt from this requirement. Accordingly, and as documented by the LOF, the consistently minimal level of direct or indirect interactions between fisheries and marine mammals indicates that under current State management, the Category III fisheries and each of the Category II fisheries identified above have achieved insignificant levels of serious injury and mortality of EDPS Steller sea lions, in compliance with MMPA Section 118(b).

Reporting requirements. The State also affirmatively supports actions to ensure that vessel owners and operators promptly report to NMFS any incidental injuries to or mortalities of marine mammals that may occur during commercial fishing operations, regardless of the category in which the fishery is placed (i.e., Category I, II, or III), as required by MMPA Section 118(e). Such reports must be submitted within 48 hours of the end of the fishing trip.

In addition, the State supports actions to ensure that vessel owners and operators are familiar with the MMPA definition of injury: i.e., “a wound or other physical harm. In addition, any animal that ingests fishing gear or any animal that is released with fishing gear entangling, trailing, or perforating any part of the body is considered injured, regardless of the presence of any wound or other evidence of injury, and must be reported.” 50 CFR 229.2. Of particular relevance to EDPS Steller sea lions, the State recognizes the importance of ensuring that vessel owners and operators in the Alaska Salmon troll and the Alaska Commercial Passenger Fishing Vessel (Charter Boat) fisheries are aware of this definition and the reporting requirements. The State uses

several means to inform fishermen of their responsibilities to adhere to NMFS marine mammal guidelines and reporting requirements.

Other current management activities that minimize take of EDPS Steller sea lions. The intent of the State to work cooperatively with NMFS with respect to conservation of threatened and endangered species was formalized in a 2009 cooperative agreement,[7] which outlines a "cooperative program for the conservation of endangered and threatened species, which may involve law enforcement, research, management, and public information and education activities for the benefit of resident endangered and threatened species" in Alaska. Consistent with that agreement, and in addition to managing fisheries that achieve insignificant levels of marine mammal mortality, the State currently works cooperatively with NMFS to carry out an active **public outreach program** and to reinforce federal **law enforcement** efforts.

The State also maintains its own Marine Mammal Program, including a research program that focuses on both the Eastern and Western DPSs of Steller sea lions. The **ADF&G sea lion research program** collaborates extensively with outside cooperators, including NMFS. The State program comprehensively examines sea lion population dynamics, physiology and disease, animal movements and diving behavior, genetics, nutrition, and body condition, and makes use of extensive in-house laboratory analysis capabilities along with a complete set of specialized equipment and skiffs. Long-term collaboration with the NOAA National Marine Mammal Laboratory, the University of Alaska, the Alaska SeaLife Center, the University of British Columbia, and numerous other cooperating institutions ensures that ADF&G staff maximize use of collected field data and samples and effectively coordinate resources and knowledge to better support recovery of Steller sea lion populations in all regions of Alaska.

State staff also participate in the interagency **Pinniped Entanglement Group**, regularly partnering with NMFS to report and assist in responses to marine mammal strandings, and to report any sea lions that may become hooked or entangled in fishing gear. To further minimize entanglements, ADF&G is also working to educate the public and fishermen about reducing ocean debris, and working with the fishing industry to develop modified gear or deterrents to keep sea lions away from fishing boats. More information

[7] The *Limited Cooperative Agreement Between the United States Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service and the Alaska Department of Fish and Game for the Conservation of Threatened and Endangered Species* provides that:[T]he parties to this agreement are in accord that the programs administered by the State of Alaska are designed to conserve resident endangered and threatened species, and that it is the mutual desire of ADF&G and NMFS to cooperate for the common purpose of planning, developing, and conducting programs to protect, manage, and enhance populations of all resident endangered and threatened species covered by this agreement within the State of Alaska;

on State sea lion research programs may be found at http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.stellerprogram

Potential future monitoring. Under certain conditions, MMPA Section 118 and its implementing regulations can require monitoring of fisheries to determine levels of incidental catch and serious injury. The State continues to support efforts by NMFS to monitor various fisheries via observer programs or other means (e.g., directed research), consistent with the agency's authority under Section 118. These programs can help not only to determine levels of incidental catch or injury, but also to collaboratively identify or devise mechanisms to reduce and minimize such interactions through gear alterations or fisheries management measures (e.g., season or area restrictions). The State recognizes that NMFS is authorized to take action to impose measures to reduce take in fisheries as set forth in Section 118. The State believes that NMFS's authority to address these contingencies, should they arise, together with State fishery management practices and State and Federal laws and regulations that protect marine mammals, will continue to minimize take of EDPS Steller sea lions in State-managed fisheries.

Future actions taken by the State will continue to comport with the MMPA:

Under the ESA, de-listing the EDPS would be warranted if NMFS determines that the species has "recovered," indicating that its population status has improved to the point at which listing is no longer appropriate under the criteria set out in ESA Section 4. 50. C.F.R. 402.02. In the event that NMFS removes the EDPS of the Steller sea lion from the list of threatened species, the State of Alaska notes with approval that provisions of the MMPA and its implementing regulations will continue to provide adequate protection to the population and its habitat.

Particularly relevant to the proposed de-listing action for EDPS Steller sea lions are the MMPA prohibitions on "take."[8] This continuing prohibition provides the protection necessary for growing colonies of EDPS Steller sea lions on rookeries and haulouts throughout its range. In addition, the State will continue to work cooperatively with NMFS to carry out an active public education program, reinforced by diligent, cooperative law enforcement. Through its Marine Mammal Program and participation in the interagency Pinniped Entanglement Group, the State will also continue to partner with NMFS to report and assist in responses to marine mammal strandings, and to report any Steller sea lions that may become hooked or entangled in fishing gear.

[8] Including "harassment" as defined in MMPA Section 3(18): "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of breeding patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Moreover, State research staff will continue to work collaboratively with NMFS on research designed to ensure sound management and continued stability of the EDPS Steller sea lion.

Finally, the Alaska Departments of Fish and Game (Habitat Division), Natural Resources, and Environmental Conservation regularly conduct compliance reviews of proposed projects that may interact with fish and wildlife species and their habitat within Alaska lands and waters. These reviews will continue to consider any possible consequences that such projects may have on EDPS Steller sea lions, and will continue to recommend appropriate design alternatives that may eliminate or minimize adverse effects to the population and its habitat, in accordance with the MMPA and other Federal and State wildlife laws and regulations.

APPENDIX I

Descriptions, State of Alaska Management Plans
Category II and III Fisheries, MMPA Section 118 "List of Fisheries"

AK Southeast Salmon Drift Gillnet Fishery

Fishing gear type: Gillnet

Current category: Category II

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of humpback whale (Central North Pacific stock) in this fishery is greater than 1% and less than 50% of the stock's Potential Biological Removal (PBR) level.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Dall's porpoise, AK; Harbor porpoise, Southeast AK; Harbor seal, Southeast, AK; Humpback whale, Central North Pacific[(1)] ; Pacific white-sided dolphin, central North Pacific; Steller sea lion, Eastern U.S..

Estimated number of current participants: In 2010, 474 permits were renewed of which 422 were fished

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the LOF: 1996

Category when originally listed: Category II

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category II because observer and stranding data indicated that incidental mortality and serious injury of harbor porpoise (Southeast AK) was 3 animals/year, or 1.3% of PBR (PBR=231); and incidental mortality and serious injury of humpback whale (Central North Pacific) was 0.13 animals/year, or 4.6% PBR (PBR=2.8). Also, Category III reports from fishermen indicated that mortalities of both species occurred prior to 1994.

Estimated number of participants when originally listed: 443

Past names, if any: Southeast Alaska salmon drift gillnet (until 2001).

Gear description/method for fishing: This fishery uses drift gillnet gear with soak times of 20 minutes to 3 hours. The gear is set during the day and night, with 6-20 sets set per day.

[1] The fishery is classified based on mortalities and serious injuries of a marine mammal stock greater than 1% and less than 50% (Category II) of the stock's Potential Biological Removal (PBR) level.

Target species: Salmon.

Spatial/temporal distribution of effort: There are five traditional drift gillnet areas in Southeast Alaska. These areas include Tree Point (District 1), Prince of Wales (District 6), Stikine (District 8), Taku (District 11) and Lynn Canal (District 15). These areas generally open from mid-June to early October for two to five days per week on a weekly basis depending on salmon run strength. In addition to the five traditional fishing areas, there are also drift gillnet fisheries in the Annette Island reserve, in terminal harvest areas (THA) adjacent to hatchery facilities, and for hatchery cost recovery. In years when Chinook salmon run strength is sufficient to support directed fisheries, the Stikine and Taku areas may open in early May. The majority of salmon are caught by drift gillnets in the five traditional fishing areas (73% for the recent 10-year average) and the THAs (17% for the recent 10-year average), with relatively small contributions from Annette Island (9% for the recent 10-year average), and for hatchery cost recovery (1% for the recent 10-year average).

Levels of observer coverage each year[2]: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the Alaska Department of Fish and Game as a limited entry fishery with gear restrictions on the mesh and net size, and area closures.

History of Changes on the LOF

2009 LOF: Estimated number of participants updated from 481 to 476.

2006 LOF: Added a superscript “1” in Table 1 after humpback whale (Central North Pacific), indicating that takes of this stock are driving the classification of the fishery.

2001 LOF:

- Renamed this fishery from “Southeast AK salmon drift gillnet” to "AK Southeast salmon drift gillnet.”
- Estimated number of participants updated from 439 to 481.

1999 LOF: Estimated number of participants updated from 452 to 439.

1998 LOF:

- The stock of harbor porpoise on the list of species/stocks killed/injured in this fishery was changed from “AK” to “Southeast AK.”
- Estimated number of participants updated from 443 to 452.

[2] Observer coverage levels include the latest information reported in the most current final Stock Assessment Reports (SAR)

AK Yakutat salmon set gillnet

Fishing gear type: Gillnet

Current category: Category II

Basis for current classification on the List of Fisheries: Harbor porpoise incidental take >1% PBR, but <10% PBR.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Harbor Porpoise [(1)], Eastern North Pacific gray whale, Southeast Alaska harbor seal, Central North Pacific (Southeast Alaska) humpback whale.*

Estimated number of current participants: 166

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category II

Basis for original classification on the List of Fisheries: Logbook data showed total known incidental mortality and serious injury for harbor porpoise across all fisheries does not exceed 10% PBR, but low levels of observer coverage have been inadequate and data suggests levels may be >10%. Known incidental mortality and serious injury of harbor porpoise for this fishery is 30/year (1.5% PBR).

Estimated number of participants when originally listed: 152

Past names, if any: None.

Gear description/method for fishing: Set gillnet

Target species: Salmon

Spatial/temporal distribution of effort: The season runs from June 4 to mid-October in the Yakutat Alaska area. The Yakutat set gillnet fisheries are divided into two fishing districts, the Yakutat District and the Yakataga District. The bulk of the Yakutat salmon harvest is usually reported from a few fisheries but as many as 25 different areas are open to commercial fishing each year. With few exceptions, gillnetting is confined to the intertidal area inside the mouths of the various rivers and streams, and to the ocean waters immediately adjacent to each. Due to the terminal nature of these fisheries ADFG has been able to develop escapement goals for most of the major and several of the minor fisheries.

Levels of observer coverage each year: Observed in 2007 (5.3% overall coverage) and 2008 (7.6% overall coverage).

Management and regulations:

This fishery is managed by the Alaska Board of Fisheries and the Alaska Department of Fish and Game as a limited entry fishery with gear restrictions on the mesh and net size, and time and area closures.

The Yakutat area encompasses the waters of Alaska between Cape Suckling and Cape Fairweather. The area is divided into two fishing districts: the Yakataga District between Cape Suckling and Icy Cape, and the Yakutat District between Icy Cape and Cape Fairweather. All five salmon species are harvested in the Yakutat area, with sockeye, coho, Chinook, and pink salmon comprising the majority of the catch in order of commercial value.

Set gillnet gear is the only net gear permitted in the Yakutat area. About 170 commercial setnet entry permits are renewed annually. Setnet permit holders in the Yakutat area do not have registered sites and may fish in any open fishing area. They may also move between fishing areas during the season as long as not more than one area is fished concurrently.

There are 25 unique setnet fisheries in the Yakutat area. Most of these fisheries target sockeye salmon from mid-June through July and coho salmon in August and September. The only targeted pink salmon fishery occurs in the southeast portion of Yakutat Bay on fish returning to Humpback Creek. Set gillnet fisheries in the Yakataga District primarily harvest coho salmon.

Each unique set gillnet fishery area is managed on a weekly basis by adjusting fishing time and/or area by emergency order in response to inseason assessments of run strength. These actions are taken to provide adequate spawning escapements and to allow harvests of salmon that are surplus to escapement goals. Inseason assessment methods include both fishery performance and spawning escapement information. In the glacial systems, fishery performance data is utilized for management because poor visibility prevents the accurate observation of spawning escapements. The most important inseason stock assessment project in the Yakutat area is the Situk River adult salmon counting weir. Salmon passage through the weir is monitored and fishery openings for the Situk-Ahrnklin Inlet and Yakutat Bay are adjusted specifically in response to the weir counts. Several of the Yakutat set gillnet fisheries initial opening date are specified by regulation [5 AAC 30.310] and the rest are opened and closed by emergency order. The areas with set opening dates include the Alsek River (first Sunday in June), the Dangerous River (second Sunday in June), the Situk-Ahrnklin Inlet, Lost River, and Yakutat Bay (third Sunday in June), and the East River (fourth Sunday in June).

<u>History of changes on the List of Fisheries:</u>

2009: Estimated number of participants/vessels updated to 166.

2006: Central North Pacific Humpback Whale (Southeast AK) added to list of species incidentally killed/injured to update stocks associated with newly delineated (into more discrete fisheries according to area, gear and target species to reflect fisheries as managed under the FMPs) fisheries in 2004.

2001: Estimated number of participants/vessels updated to 170.

1999: Eastern North Pacific Gray Whale added to stocks incidentally killed/injured.
Estimated number of participants/vessels updated to 139.

1998: Estimated number of participants/vessels updated to 147.

1996: Added to the List of Fisheries as a Category II fishery.

* Additional information:

There has been an observation of interaction between this fishery and an EDPS Steller sea lion, based on one report of a self-released incidental take in 2008 (Manly 2009).

AK Salmon Troll Fishery

Fishing gear type: Troll

Current category: Category III

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the PBR level (i.e., a remote likelihood or no known incidental mortality and serious injuries of marine mammals)

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Steller sea lion, Western U.S. and Steller sea lion, Eastern U.S.

Estimated number of current participants: In 2010, a total of 2,006 power and hand troll permits were issued of which 1,068 permits were fished

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category III fishery because 1990 logbook data indicated that incidental takes were less than 10% of PBR, and known Steller sea lion incidental mortalities and serious injuries were less than 1% of PBR.

Estimated number of participants when originally listed: 1450

Past names, if any: None.

Gear description/method for fishing: This fishery uses salmon troll gear.

Target species: Salmon.

Spatial/temporal distribution of effort: The commercial troll fishery in Southeast Alaska and Yakutat (Region 1) occurs in State of Alaska waters and in the Federal Exclusive Economic Zone (EEZ) east of the longitude of Cape Suckling. The winter season is defined as October 1–April 30, or until 45,000 Chinook salmon are harvested, followed by the summer season from May 1 (or the end of the winter season) to September 30.

By regulation, the open area during the winter fishery is restricted to those areas of Southeast Alaska lying east of the surf line south of Cape Spencer, and the waters of Yakutat Bay [5 AAC 29.020 (b)]. All outer coastal areas, including the EEZ, are closed during the winter fishery. The summer season is divided into the spring and general summer fisheries. The spring fisheries are intended to increase the harvest of Alaska hatchery-produced Chinook salmon and occur primarily in inside waters near hatchery release areas or along migration routes of returning hatchery fish. These fisheries begin after the winter fishery closes and may continue through June 30. The spring troll fisheries can begin prior to May 1 if the

winter fishery closes early, when the harvest cap of 45,000 Chinook salmon is reached. The general summer fishery opens July 1 and harvests the majority of the annual Chinook salmon quota. During the summer fishery, most waters of the Southeast Alaska–Yakutat area are open to commercial trolling, including outer coastal waters. The general summer fishery is open by regulation through September 20 unless the department determines that coho salmon abundance is high in which case the fishery can be extended through September 30.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the AK Department of Fish and Game as a limited entry fishery with gear restrictions and area closures.

History of Changes on the List of Fisheries:

2009 LOF: Estimated number of participants/vessels updated to 2,045.

2001 LOF:

- Western DPS of the Steller sea lion added to list of species killed/injured in this fishery.
- Estimated number of participants/vessels updated to 2,335.

1999 LOF: Estimated number of participants/vessels updated to 1,149.

1998 LOF: Estimated number of participants/vessels updated to 1,278.

1996 LOF: Added to the List of Fisheries as a Category III fishery.

AK State-managed waters longline/set line (including sablefish, rockfish, lingcod, and miscellaneous finfish)

Fishing gear type: Longline

Current category: Category III

Basis for current classification on the List of Fisheries: No documented interaction with marine mammals.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): None.*

Estimated number of current participants (sablefish only): In 2010, 24 longline permits were issued for SSEI of which 23 were fished. In addition, 3 pot permits were issued for SSEI in 2010 and all of those permits were fished. A total of 93 longline permits were issued for NSEI of which 87 were fished (there is no pot fishery allowed for NSEI).

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 2001

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category III fishery because there were no documented interactions with marine mammals.

Estimated number of participants when originally listed: 731 (including sablefish, rockfish, lingcod, and miscellaneous finfish)

Past names, if any: None.

Gear description/method for fishing: This fishery uses longline gear.

Target species: Sablefish.

Spatial/temporal distribution of effort: Southeast Alaska State sablefish fisheries are split into two areas: NSEI, where fishing occurs primarily in Chatham Strait, and SSEI, where fishing occurs primarily in Clarence Strait and the adjacent waters of Dixon Entrance. The NSEI fishery is open between August 15 and November 15. The SSEI fishery is open for longline gear between June 1 and August 15 and for pot gear from September 1 to November 15.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the AK Department of Fish and Game as a limited entry fishery with gear restrictions and area closures.

History of Changes on the List of Fisheries (sablefish, rockfish, lingcod, and miscellaneous finfish):

2009 LOF:

- This fishery was renamed "AK State-managed waters longline/set line (including sablefish, rockfish, lingcod, and miscellaneous finfish)" to more accurately reflect the current target species.
- Estimated number of participants/vessels updated to 1,448.

2001 LOF: Added to the List of Fisheries as a Category III fishery. Created by splitting the "AK southern Bering Sea, Aleutian Islands, and Western Gulf of Alaska sablefish longline/set net (federally regulated waters)" into 3 fisheries to make the LOF consistent with the Stock Assessment Reports and observer data for these fisheries.

* Additional information:

This State of Alaska-managed fishery has been included within this agreement on the basis of analogy with the Federally managed Gulf of Alaska Sablefish Longline Fishery. That fishery has had reported serious injury/mortalities of EDPS Steller sea lions. Although no such interactions have been reported in the Alaska waters fishery, these two fisheries operate in similar means (time, space, gear) and the Alaska fishery occurs well within the range of seasonal concentrations of foraging EDPS Steller sea lions, thus making it reasonable to conclude that such interactions may occur.

AK Commercial Passenger Fishing Vessel (Charter Boat) Fisheries

Fishing gear type: Sport fishing gear

Current category: Category III

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the PBR level (i.e., a remote likelihood or no known incidental mortality and serious injuries of marine mammals)

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Killer whale, stock unknown; Steller sea lion, Western U.S. and Steller sea lion, Eastern U.S.

Estimated number of current participants: All Alaska Sport Fish Charter Businesses and Guides providing guided sport fishing services for compensation must be licensed with the Alaska Department of Fish and Game. In 2010, there were 1,172 active saltwater charter vessels offering sport fish charter services in Alaska. Of the 1,172 saltwater vessels, 644 or 55% operated in Southeast Alaska and 528 or 45% operated on Southcentral Alaska. The Division of Sport Fish boundary between Southeast and Southcentral Alaska is at Cape Suckling; 59°59'30"N, 143° 53'00".

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: No details given. No logbook, observer, or stranding data available.

Estimated number of participants when originally listed: 1,243 (for all states: AK, WA, OR, and CA)

Past names, if any: None.

Gear description/method for fishing: Licensed guides must adhere to the same regulatory methods and means as nonguided private sport anglers. A licensed guide must not aid in the commission of any sport fish violation or permit the commission of a sport fishing violation by a client as outlined in AS 16.05 – AS 16.40 or any sport fish regulation adopted under AS 16.05 – AS 16.40.

Target species: Various species of salmon and groundfish and other miscellaneous sport species.

Spatial/temporal distribution of effort: In 2010, there were a total of 48,753 trips targeting guided salmon, bottomfish, or bottomfish/salmon combination trips statewide. Of the 48,753 trips, 27,821 or 57% took place in Southeast Alaska and 20,932 or 43% took place in Southcentral Alaska. Charter operators are required to indicate a Port of Offloading for each trip; defined as the port or community where clients and fish are offloaded. Based on 2010 logbook records, the most popular Port of

Offloading in Southeast Alaska was Sitka, followed by Ketchikan, Auke Bay (Juneau), Waterfall, and Craig, in descending order. In Southcentral Alaska, the busiest Port of Offloading was Homer, followed by Seward, Deep Creek, Anchor Point, and then Valdez.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Department of Fish and Game under allocation guidelines established by the Alaska Board of Fisheries for all species except halibut. Charter halibut fisheries are managed under allocation guidelines established by the North Pacific Fisheries Management Council and the International Pacific Halibut Commission. Charter halibut fisheries in IPHC Regulatory Areas 2C (southeast Alaska) and 3C (Southcentral Alaska) are managed as limited entry fisheries by the National Marine Fisheries Service. A logbook program operated by the Alaska Department of Fish and Game monitors participation and client effort and catch in these fisheries.

History of Changes on the List of Fisheries:

2009 LOF: Estimated number of participants/vessels updated to >7,000 (2,702 for AK only).

2006 LOF: The killer whale (stock unknown), Eastern DPS and Western DPS of the Steller sea lion added to the list of species incidentally killed/injured to update stocks associated with newly delineated (into more discrete fisheries according to area, gear, and target species to reflect fisheries as managed under the FMPs) fisheries in 2004.

2001 LOF: Estimated number of participants/vessels updated to >7,000 (1,107 for AK only).

1999 LOF: Estimated number of participants/vessels updated to >4,000.

1998 LOF: Estimated number of participants/vessels updated to >17,000 (16,276 for AK only).

1996 LOF: Added to the List of Fisheries as a Category III fishery as “AK, WA, OR, CA commercial fishing passenger vessel.”

APPENDIX 3. Post-Delisting Monitoring Plan for the Eastern Distinct Population Segment of Steller Sea Lion (*Eumetopias jubatus*).

Post-Delisting Monitoring Plan for the Eastern Distinct Population Segment of Steller Sea Lion (*Eumetopias jubatus*)

May 2013

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | NOAA Fisheries

Address questions about the monitoring plan to:
Protected Resources Division, NMFS Alaska Regional Office
PO Box 21668, Juneau, AK 99802-1668

Recommended Citation:
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Cover photo: Steller sea lion rookery at North Rock, Forrester Island Complex, Southeast Alaska on 24 June 2009, with 1,239 adult and juvenile Steller sea lions and 1,223 pups. Photographs were taken at an altitude of 700 feet under the authority of NMFS ESA/MMPA research permit 14326 issued to the National Marine Mammal Laboratory, NMFS Alaska Fisheries Science Center, Seattle, WA. Photo mosaic by K. Sweeney.

Table of Contents

I. BACKGROUND AND INTRODUCTION

This document provides a plan for monitoring the eastern Distinct Population Segment (DPS) of the Steller sea lion (*Eumetopias jubatus*) following the removal of the eastern DPS from the List of Endangered and Threatened Wildlife due to its recovery.

A. Listing History

The Steller sea lion inhabits the North Pacific Ocean from California north through Oregon, Washington, British Columbia (Canada), and Southeast Alaska; west through the Gulf of Alaska, Aleutian Islands, and Bering Sea in Alaska; and in eastern Russia and northern Japan. In 1990, the National Marine Fisheries Service (NMFS) (and the U.S. Fish and Wildlife Service [USFWS]) took emergency action to list the species as threatened range-wide under the Endangered Species Act (ESA), followed by actions to make the listing permanent (55 FR 12645, 55 FR 13488, 55 FR 17441, 55 FR 29792, 55 FR 49204, 55 FR 50005). That action followed a precipitous decline in abundance in the 1970s and 1980s, especially in portions of Alaska west of Cape Suckling (60°N, 144°W) and in parts of Russia. At that time, the population structure of the Steller sea lion in the North Pacific was unknown. NMFS completed the first Recovery Plan for Steller sea lions in 1992. This recovery plan covered the entire range of the species.

In 1997, two distinct population segments (DPSs) of the Steller sea lion (eastern and western, separated at 144°W) were recognized based on distinct and significant differences in genetics, morphometry and population trend (Dizon et al. 1992; Loughlin 1997; 62 FR 24345). Due to persistent decline, NMFS reclassified the western DPS as endangered (62 FR 24345; 62 FR 30772). NMFS maintained a listing status of threatened (62 FR 24345, 62 FR 30772) for the eastern DPS, citing continued concern for its status "...despite the fact that its current abundance may be stable". NMFS noted that the Recovery Team recommended that monitoring of the eastern DPS continue and delisting criteria be developed.

In 2001, NMFS assembled a new Recovery Team to assist it in revising the Recovery Plan. With this second Recovery Team's assistance, NMFS finalized a revised Recovery Plan in 2008 for both the eastern and western DPSs of Steller sea lion. This Recovery Plan identified recovery actions for the eastern DPS, including the initiation of a status review to determine if the DPS should be delisted and the development of a post-delisting monitoring plan (PDMP) which would guide monitoring activities for ten years post-delisting.

NMFS announced its initiation of a status review of the eastern DPS of Steller sea lions in June 2010 and requested information from the public. During the public comment period, NMFS was petitioned by the States of Alaska, Oregon, and Washington to delist this DPS. NMFS subsequently prepared a draft status review of the eastern DPS of Steller sea lion. That draft review found that the eastern DPS had satisfied the biological and listing factor criteria. NMFS also published a proposed rule to remove this DPS from the List of Endangered and Threatened Wildlife, developed a draft PDMP, and solicited public comment on these documents and the draft status review (77 FR 23209, April 18, 2012). NMFS is finalizing this PDMP to coincide with publication of a final rule to delist the eastern DPS.

B. Steller Sea Lion Protection and Monitoring under the MMPA and other Laws

In the United States, the eastern DPS of Steller sea lion is protected under the Marine Mammal Protection Act (MMPA), and it will continue to be protected under the MMPA following delisting. The MMPA established a moratorium on the taking (i.e., to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect) of marine mammals with certain exceptions (e.g., an exception for the non-wasteful harvest by coastal Alaska Natives for subsistence). Under the MMPA, Steller sea lions are currently classified as a strategic stock and designated as depleted throughout their range. Though this status is likely to change for the eastern DPS post-delisting, MMPA protections and evaluation requirements common to all marine mammals would remain in effect.

NMFS is required under section 117 of the MMPA to update Marine Mammal Stock Assessment Reports (SARs) annually for strategic stocks, and triennially for non-strategic stocks. SARs review the population status and trend, estimate mortality and serious injury rates due to anthropogenic causes, and describe other factors that may affect stock status (NMFS 2005). Thus, estimates of eastern DPS Steller sea lion population abundance and trends, as well as anthropogenic-caused mortality and serious injury rates, must be made at least triennially independent of post-delisting monitoring requirements of the ESA.

Under Section 101 of the MMPA, Congress directed NMFS to authorize the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing, which follows a separate process) within a specified geographic region. Before issuing such authorizations, NMFS must make specific findings regarding the potential impacts of the action (e.g., the takings must have a negligible impact on the species and must not have an unmitigable adverse impact on the availability of the species for subsistence), set forth measures to ensure that the taking has the least practicable adverse impact on the species and its habitat, set forth monitoring and reporting requirements, and, in the case of activities that may affect the availability of a species for taking by subsistence users, include peer review of proposed monitoring plans). Thus, in those cases where persons who engage in non-commercial fishing activities that may take Steller sea lions apply for incidental take authorizations, the MMPA permitting process provides a mechanism for NMFS to evaluate and to monitor the impacts occurring from such activities. NMFS anticipates that post-delisting, these kinds of activities will occur throughout the range and that there will continue to be applications and authorizations of incidental take with related evaluation, monitoring, and reporting. Additionally, NMFS requires evaluation, monitoring, and reporting related to Steller sea lion research activities via its permitting and funding of research.

Section 118 of the MMPA governs the taking of marine mammals incidental to commercial fishing operations. The goal of this section was to reduce the incidental mortality or serious injury of marine mammals occurring in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate within 7 years after its enactment. There are registration and reporting requirements related to these activities.

In addition to protections under the MMPA, certain protection and oversight are afforded on a site specific basis due to the fact that some Steller sea lion terrestrial and aquatic habitats are located within National Wildlife Refuges, National Parks, National Seashores, Marine

Sanctuaries, state parks, and state recreational areas. Protections related to these sites are discussed in more detail in the Status Review.

In Canada, Steller sea lions are conserved and managed under authority of the Fisheries Act (1985) and subsequent Marine Mammal Regulations (MMR 2011; available at: http://laws-lois.justice.gc.ca/eng/regulations/SOR-93-56/index.html). Except for people of First Nations, the MMR prohibits fishing for, or disturbance of, any marine mammal except as may be permitted by license. The Species At Risk Act (http://www.sararegistry.gc.ca/approach/act/default_e.cfm) provides additional management requirements to prevent species of special concern, such as the Steller sea lion, from becoming endangered or threatened. A Steller Sea Lion Management Plan was published in 2010 (Fisheries and Oceans Canada 2010). This plan calls for annual reporting by the Minister of the Environment on administration of the Act and for a report every 5 years on the status of wildlife species. It also calls for "continued development of standards and guidelines related to interactions with fisheries; reporting related to kills at aquaculture sites; and reporting related to entanglement." Reporting of rates of entrapment in finfish aquaculture installations is voluntary. Within Canada, many sea lion rookeries and haulouts are protected within Ecological Reserves, National Park Reserves, National or Provincial Parks, or within the Gwaii Haanas Nation Park Reserve and Haida Heritage Site. Abundance and trend aerial surveys are currently conducted every 4 years in British Columbia by Fisheries and Oceans Canada.

C. Post-Delisting Monitoring Requirements under the ESA

Section 4(g)(1) of the ESA requires that NMFS:

> "...implement a system in cooperation with the States to monitor effectively for not less than five years the status of all species which have recovered to the point at which the measures provided pursuant to this Act [the ESA] are no longer necessary...."

General guidance for monitoring plan development is provided by recommendations jointly developed by the U.S. Fish and Wildlife Service and NMFS (USFWS and NMFS 2008). This PDMP guidance clarified that:

> "The primary goal of PDM is to monitor the species to ensure the status does not deteriorate, and if a substantial decline in the species…or an increase in threats is detected, to take measures to halt the decline so that re-proposing it as a threatened or endangered species is not needed."

The PDMP guidance also indicated that:

> "Each PDM plan should provide a species-specific discussion of the circumstances that would trigger termination of PDM, intensification of PDM, initiation of a new status review, or emergency listing...Such decisions often require consideration and interpretation of multiple factors, including changes in threats and/or demographic trends. Therefore, this section of the PDM plan may not be limited to quantitative criteria, but also include qualitative considerations (such as indicators of changing threats) and guidance on how demographic data should be interpreted (for example, to separate a decline in productivity due to a recurring or new threat versus a decline due to expected

effects of density-dependence). The narrative may also include guidance on how multifaceted PDM results might be integrated to support biologically sound decision-making. In most cases, specification of these triggers or thresholds will be based on information and decision-making processes documented during the recovery planning and delisting processes."

"For species subject to natural cyclic trends or substantial environmental variation, the expected range and frequency of variation should have been well-documented during the recovery period and appropriately considered in the PDM plan. If a species may approach carrying capacity in some or all parts of its range during the PDM period, then biologists must anticipate the possibility that density-dependent factors may trigger declines in productivity and/or survival and provide measures to distinguish these from signals that the species is exhibiting a bonafide decline in its probability of persistence."

Insight and recommendations specific to the eastern DPS of Steller sea lions are also provided in the Steller Sea Lion Recovery Plan (NMFS 2008). Additionally, as part of development of the Recovery Plan, Goodman (2006) undertook an extinction risk analysis for the eastern DPS. Goodman (2006) determined that the most critical potential future conditions to monitor are: a) a northward extension of the area in which population density is reduced (northward from areas in California in which the counts of pups and/or non-pups did not increase following protection and/or in which the pattern of increase has been inconsistent, or very weak), and b) a decrease in counts of pups or non-pups for more years than might be attributable to chance census error. We have taken these findings into consideration in development of this PDMP.

NMFS developed this Steller sea lion post-delisting monitoring plan after soliciting input from State wildlife agencies (States), Native American Tribes and Alaska Native Organizations, Fisheries and Oceans Canada (DFO), and other interested groups and collaborators. NMFS solicited and received public and peer comment on this plan during a 60-day period (77 FR 23209). The Federal Register notices and other documents related to delisting the eastern DPS are posted on the NMFS web page: (http://www.alaskafisheries.noaa.gov/protectedresources/stellers).

NMFS is responsible for the successful implementation of this monitoring plan and for ensuring its adequacy under the ESA. NMFS, in cooperation with States, DFO, other federal agencies, non-governmental organizations, the Tribes, and other partners, will monitor the eastern DPS of Steller sea lion for ten years after delisting by continuing monitoring programs already in place and expanding the effort where needed to address concerns specific to this PDMP.

II. OBJECTIVES

In keeping with the broad goals discussed in the PDMP guidance (USFWS and NMFS 2008), the Steller Sea Lion Recovery Plan (NMFS 2008) and the related extinction risk analysis (Goodman 2006), and issues raised in the Status Review (NMFS 2013), this PDMP has three primary goals:

- Monitor the population to detect changes in trends in pup production and adult/juvenile (non-pup) counts, vital rates (survival and birth rates), and to continue to assess how movement across the western-eastern DPS boundary may be affecting non-pup counts in each DPS.
- Monitor residual or emerging threats, and identify new threats, that could affect the sustainability of the recovery of the eastern DPS.
- Following conclusions of Goodman (2006) and/or in response to issues raised in public comment, determine:
    - if there is a northward extension of the patterns observed in southern California where rookeries were abandoned, or in parts of central California, such as the Farallon Islands, where population increases either did not occur or occurred only slightly, and hence where population density is low or becoming lower;
    - if the breeding and feeding ranges of this species are continuing to shift northward; and
    - if range contraction is occurring.

With regards to the monitoring of population status and threats, the monitoring must be sufficient to allow NMFS to detect any problems or issues related to the three goals listed above, and, if necessary, to take action so that relisting the species as threatened or endangered is not needed (USFWS and NMFS 2008).

Count data will be available from all subareas within the eastern DPS (Southeast Alaska, British Columbia, Washington, Oregon and California), whereas vital rate studies are conducted in all regions except British Columbia (though observations are recorded of marked animals). Count data from subareas will be combined to examine trends across the range of the eastern DPS. In addition, NMFS will examine trends in regional areas, in rookery and haulout complexes, and at rookeries, as appropriate given knowledge of the dynamics of use of the particular site(s) to determine: 1) whether there is a northward extension of the poor population performance exhibited in parts of the range in California (see above), 2) if there is abandonment or substantial reductions in the use of terrestrial habitats, and 3) if the overall extent of the range is shrinking. NMFS will receive abundance (and potentially other) data collected by States, DFO, coastal tribes, and other agencies and partners along the US and Canadian Pacific coast, and will analyze these after each breeding season (summer) monitoring effort. If necessary, NMFS will propose adjustments to the sampling design to ensure comparability of the data over area and time.

The population monitoring component of this PDMP is designed to detect changes in abundance of the eastern DPS of Steller sea lion that might arise from a variety of threats including, but not limited to, entanglement in marine debris, incidental take in fisheries, disease, contaminants, predation, disturbance, illegal shooting, research, climate change and ocean acidification, and other degradation of important marine foraging habitats and terrestrial rookery and haul-out locations. While Section 4 of the ESA requires monitoring for not less than five years following delisting for all species that have been delisted due to recovery, NMFS (2008), based on input from the Recovery Team, recommended that monitoring occur for ten years to ensure that the eastern DPS of Steller sea lion remains in a recovered state. This longer period is necessary in part because of the underlying biology of the species and because of the statistical power needed to detect a change in the trajectory of the population. Based on the life tables from Calkins and

Pitcher (1982) and York (1994), the average age of Steller sea lion reproducing females is about 10 years (NMFS 2008). With regards to statistical power of the aerial surveys to detect changes in population trend indices, monitoring the eastern DPS population over a 10-year period gives a greater than 90% probability of detecting a 3% per year decline in pup production and an 80% probability of detecting a 6% per year decline in non-pup counts in the eastern DPS overall (Appendix A).

If these data or other substantial information indicate that the eastern DPS is experiencing significant decreases in pup production, non-pup counts, survival or birth rate, NMFS will initiate more intensive review or studies to determine the cause, and to determine whether to relist the species under ESA § 4.

III. IMPLEMENTATION

NMFS has the lead for planning, coordinating, and implementing this monitoring effort. A NMFS PDMP team comprised of a DPS Coordinator, Regional Coordinators from the NMFS Alaska, Northwest, and Southwest Regions, and monitoring collaborators was established to finalize and implement the monitoring plan (Appendix B). Additionally, as envisioned in the Services' Post-Delisting Monitoring Plan Guidance (USFWS and NMFS 2008), collaborators will be instrumental in implementation (Appendix C).

The role of the DPS Coordinator is to:

- convene the PDMP team to update the monitoring plan as needed;
- provide guidance to the Regional Coordinators;
- distribute the plan to all Regional Coordinators and collaborators;
- prepare interim and final reports;
- organize meetings as necessary to evaluate and plan monitoring efforts with collaborators;
- publish a Notice of Availability for the interim and final reports in the *Federal Register* and on appropriate web sites;
- provide copies of interim and final reports to all collaborators;
- make recommendations based on monitoring results;
- report each year to collaborators on the status of the species, report new significant information about threats, and report on the implementation of the monitoring plan, including highlighting any significant hurdles to implementation and/or changes in monitoring objectives, methods, or intensity;
- organize and submit regional budget requests within NMFS;
- seek partnerships with other agencies to implement the plan; and
- coordinate with the Regional Coordinators and others to obtain monitoring data from each region.

The role of Regional Coordinators is to:

- establish or maintain a network of cooperators who monitor Steller sea lions and threats to their recovery within their Region;

- work with regional staff to plan, implement, and analyze the surveys, and summarize monitoring results in cooperation with States and other cooperators;
- participate in established regional working group meetings, or establish a regional working group, as necessary, to assist in the planning and implementation of the monitoring surveys;
- coordinate with tribes on monitoring activities on or near tribal lands;
- seek or continue partnerships with tribes, governmental agencies and nongovernmental organizations to implement the plan;
- make recommendations to the DPS Coordinator and to the monitoring team during PDMP meetings based on survey and other monitoring results;
- coordinate the collection and compilation of regional survey results;
- provide monitoring results to the DPS Coordinator for inclusion into the interim and final reports by January 31 each year;
- ensure that monitoring data are collected using methods that meet the requirements of this monitoring plan;
- determine budget requirements to carry out monitoring in their Region and help secure potential funding;
- submit regional funding needs to the DPS Coordinator, and assist in distributing funds to the cooperators;
- coordinate with the permitting office regarding permits issued under the MMPA for activities in their region to ensure that monitoring requirements are consistent and that data acquired from related monitoring are provided to the coordinator; and
- provide information regarding human-related takes (for their region) to the DPS coordinator and provide such information to NMFS personnel preparing the Marine Mammal Stock Assessment Report for the eastern DPS.

Population and vital rates monitoring already occurs at selected index sites throughout the range of the eastern DPS (with the exception of vital rates in British Columbia). Consequently, the role of the Regional Coordinators will be largely to ensure that the plan is executed within their regions. Regional coordinators have been working with, and will continue to work with, all of the collaborators leading these efforts, both established and new.

NMFS (Appendix B) and collaborators in other agencies and entities (Appendix C) will, as resources are available, undertake key components of monitoring and will create and maintain a strong and adequate monitoring program.

IV. MONITORING METHODS

During the 10-year post-delisting monitoring period, NMFS will work with collaborators throughout the range of the eastern DPS to:

- Monitor population trends (counts of pups and non-pups)
- Update estimates of survival and birth rate (branded animal sightings)
- Assess the impact that sea lion movement across the eastern DPS-western DPS boundary may have on our trend estimates for each DPS (count, sighting and genetic data)

- Assess potential threats to continued recovery, including:
    - Entanglement in debris, such as packing bands, flashers, gangions, etc.
    - Incidental takes in fisheries
    - Direct takes (subsistence harvest)
    - Declines in abundance of important prey
    - Parasites, disease, contaminants and biotoxins
    - Predation, and
    - Degradation of terrestrial or marine habitats.
- Monitor diet
- Monitor range use patterns:
    - Determine whether evidence suggests (data are unlikely to be sufficient to determine this statistically) there is a northward extension of the patterns observed in southern California where rookeries were abandoned, or in parts of central California, such as the Farallon Islands, where population increase either did not occur or occurred only slightly, and hence where population density is low or becoming lower
    - Determine if there is abandonment or substantial reductions in the use of any terrestrial habitats for a period of 4 or more years
    - Evaluate whether geographic range shifts are occurring
    - Determine if the overall extent of the range is shrinking
    - Determine if new gaps in range use for breeding or feeding are developing

A. Population Trends

At least three complete eastern DPS surveys to assess pup production and count adults and juveniles (non-pups) will be conducted during the 10-year monitoring period. These surveys will be range-wide with regards to the eastern DPS. The proposed schedule of these range wide pup and non-pup survey years in the eastern DPS corresponds with a similar (though more frequent) schedule in the Alaskan western DPS. NMFS and collaborators will conduct surveys using high-resolution aerial photography in Southeast Alaska (NMFS, Alaska Fisheries Science Center [AFSC], National Marine Mammal Laboratory [NMML] and in California, Oregon, and Washington (Oregon Department of Fish and Wildlife [ODFW], Washington Department of Fish and Wildlife [WDFW] and NMFS, Southwest Fisheries Science Center [SWFSC] and AFSC-NMML).

Johnson (2011: see Appendix A of this document) evaluated the statistical power to detect an overall decline in the eastern DPS during a 10-year period based on the above survey schedule. This model was developed solely to estimate the statistical power likely to be achieved in detecting declines in the eastern DPS overall following delisting. Johnson (2011) found an estimated power of greater than 90% probability for detecting a reduction in growth rate of 3% per year in pup production, and an approximately 80% chance of detecting a 6% per year reduction for non-pups in the eastern DPS overall (Appendix A). Johnson (2011) clarified that "[A] 6% reduction" (from current growth rates) would result in growth rates of -1% to -4% within the various regions". This power is sufficient to detect, over the length of the monitoring period, a change in trend from an increasing to stable pup production in the eastern DPS overall (i.e., prior to a decline), and to detect for non-pups a change in trend from increasing to

decreasing counts. Based on non-pup counts, a "…sizeable reduction in the growth rate (to the point of decline) is necessary to detect it within the 10 year window" (Johnson 2011). The model also determined the statistical power to detect changes within management boundaries of cooperating States and Canada. The survey protocol has limited power to detect significant declines in regional pup production in all regions except Oregon. However, only small gains in power to detect both regional and range-wide eastern DPS pup and non-pup trends are gained by doubling the sampling frequency to every two years (Johnson 2011). Hence, it is not likely that we will have the ability to detect regional downward trends, even if they are relatively steep, using the aerial surveys.

DFO has proposed to continue to support aerial and vessel surveys every four years in British Columbia, and to consider additional rookery surveys every two years to monitor breeding populations (Fisheries and Oceans Canada 2010).

NMFS expects to implement the following protocol for aerial surveys, with potential adjustments if needed following further coordination among the monitoring agencies:

- Surveys should be conducted in late June through early July (e.g., 24 June through 10 July) throughout the range of the eastern DPS so as to obtain breeding season counts of pups and non-pups. All rookeries and major haulouts should be surveyed for pups, while all known rookeries and haulouts should be surveyed for non-pups, with trend monitored at a series of consistently surveyed terrestrial sites. NMFS will also consider incorporating new sites into the suite of sites that are monitored if they become occupied during the breeding season. Survey dates are somewhat flexible, but surveys should be undertaken at consistent times, and as simultaneously as possible throughout the range of this DPS, to obtain data that are comparable throughout the range and between years, and that could increase the potential for missing large numbers of animals or counting them at two different locations. After mid-July, adults and pups disperse from rookeries, making consistent counts of pups considerably more difficult.

- If possible, range wide surveys of the eastern DPS should be conducted late June-early July in 2013, 2017, and 2021 to match the schedule proposed by DFO in British Columbia

More intensive surveys may be undertaken at specific sites. Thus, NMFS, the States, or other collaborators may conduct additional aerial surveys of Steller sea lion distribution and abundance during the breeding season and at other times of the year to document seasonal use of haul-out areas. Other partners may continue to undertake more frequent land-based surveys to document patterns of seasonal use of specific sites. Such data from collaborators may be able to provide insight about site-specific trends based on continued monitoring at sites where there are long term data (e.g., annual non-pup count data from Oregon; data on reproduction and non-pup counts from federal partners and contractors at the Farallon Islands; pup data from Southeast Alaska).

Since the overall trend of Steller sea lions in the eastern DPS will be heavily influenced by counts in Southeast Alaska (and since this area is key to evaluating the degree of interchange

between the eastern and western DPS-see below), NMFS currently intends to conduct aerial surveys in every odd year, beginning in 2013 through 2021, in the SE Alaska portion of the range of the eastern DPS. Additionally, as recommended by the State of Alaska, NMFS will evaluate the feasibility and efficacy of undertaking several replicate surveys between Icy Strait and Prince William Sound during May and June in at least one year to enhance count calibration and to evaluate transboundary movements.

B. Survival and Birth Rates

ADFG branded 1,995 pups born on four rookeries in Southeast Alaska (Forrester, Hazy, White Sisters and Graves Rock) from 2001 through 2005, and has used their sighting histories through 2009 to estimate age-specific survival through age 8-years old (Hastings et al. *2011*). Estimated survivorship (through 2009) is consistent with a population that is increasing. In addition, ODFW and NMML branded 1,154 pups born on two rookeries in southern Oregon and northern California (Rogue Reef and St. George Reef) from 2001 through 2009. ODFW and NMML will make preliminary estimates of juvenile and young adult survival in 2013 for comparison with ADFG estimates from Southeast Alaska, as well as the NMML estimates from the western DPS (all include data from observations collected in British Columbia waters). ADFG, ODFW and NMML will continue to monitor and update survival estimates through 2021, as well as estimate reproductive rate of branded adult females based on sightings as these become available. This may involve the branding of new cohorts. NMML, Makah, and WDFW will continue to monitor trends in pup production at Washington sites. Working with tribal and state partners, NMFS will evaluate the feasibility, including cost, of the use of real time or other cameras in Oregon to monitor and update survival estimates through 2021, and to obtain estimates of the reproductive rate of branded females based on sightings. This method of monitoring would also potentially allow for assessment of harassment or other takes at terrestrial habitats in Oregon.

It is likely that evaluation of changes, if any, in vital rates, will not be possible until the end of the 10-year monitoring period. However, NMFS will review relevant data biennially and provide the information in the annual report.

C. Movement Across Western DPS-Eastern DPS Boundary

NMFS will continue to monitor the movement of juveniles and adults across the boundary between the western and eastern DPSs at 144°W. This movement has the potential to affect the estimation of status and trend in both DPSs. For example, some adult females born in the western DPS are now breeding on rookeries in northern southeast Alaska (Graves Rock and White Sisters). These are among the newest rookeries in the eastern DPS (since 1990; other new rookeries are in BC).

NMFS, ADFG, and possibly other partners, will monitor cross-boundary movement primarily through analysis of sightings of Steller sea lions that were born on rookeries in both DPSs and branded as pups on those rookeries, as well as sightings of those captured and branded as juveniles. Additionally, NMFS and its partners will evaluate cross-boundary movements through counts of non-pups on rookeries and haul-outs at multiple times during at least one breeding season. Because there are no recent marked pup cohorts from southeast Alaska or Seal Rocks (near Prince William Sound) rookeries, and thus, no young branded animals, replicate

surveys within the breeding season can aid in evaluating whether and when animals from southeast Alaska are traveling to Prince William Sound for seasonal food (or other) resources, and vice versa (Fritz and Gelatt 2011). Thus, aerial surveys in the Gulf of Alaska portion of the western DPS and in southeast Alaska are proposed for every odd year beginning in 2013 through 2021. In addition to a single survey pass of each site in these years, a replicate survey during at least one (and more if resources are available) of these years will be conducted in southeast Alaska (eastern DPS) and the eastern Gulf of Alaska (at least through the western tip of the Kenai Peninsula; western DPS). To address the extent to which adult females born in one DPS are giving birth on rookeries in the other, NMFS (with the assistance of the Alaska SeaLife Center) and ADFG will obtain genetic samples of pups on at least one occasion during the monitoring period from each of the following rookeries:

- Eastern DPS
    - White Sisters
    - Graves Rock
    - Biali Rock
- Western DPS
    - Seal Rocks
    - Wooded (Fish) Island
    - Chiswell Island

D. Threats

In the Status Review, NMFS (2013) reviewed each of the ESA listing factors and concluded that there are no current or known threats indicating that the eastern DPS of Steller sea lions is now, or likely to become, an endangered species within the foreseeable future throughout all or a significant portion of its range. The ESA listing factors are:

A. present or threatened destruction, modification, or curtailment of its habitat or range;
B. overutilization for commercial, recreational, scientific, or educational purposes;
C. disease or predation;
D. inadequacy of existing regulatory mechanisms; and
E. other natural or manmade factors affecting its continued existence.

During the monitoring period, NMFS will continue to collect information about potential and residual threats to aid in the understanding of population response in the event that either the status or trend of the eastern DPS changes. In the context of PDM, USFWS and NMFS (2008:2-2) defined residual threats as "…threats that, collectively, are sufficiently reduced and contained that the species no longer meets the definition of threatened or endangered." They can, however, still have adverse effects on Steller sea lions. NMFS will:

- Monitor for unusual mortality events, other strandings, and entanglements via marine mammal stranding networks and research activities, including, but not limited to events caused by impacts from fishing gear and other human related materials, disease outbreaks, illegal shooting, etc.--This will be done by NMFS in conjunction with our partners in the States, DFO, other federal agencies, and through cooperation, consultation

and communication with the various coastal tribe and Alaska Native organizations, The Marine Mammal Center (TMMC), Sausalito, California, and other members of the stranding network. Marine Mammal Stranding Networks within the range of the eastern DPS of Steller sea lion are coordinated through the NMFS Alaska, Northwest, and Southwest Regional Offices. Data on entanglement in fishing gear (e.g., net fragments, trolling gear, longline gear) or other marine debris (e.g., packing bands, debris from the Japanese tsunami, etc.) will be collected by NMFS, ODFW, ADFG, Tribes, and others during brand sighting surveys and opportunistically. Samples will be collected from carcasses for testing for disease agents, contaminants, health, age, and diet, as resources and the condition of the carcass permit. As possible, necropsies will be performed on Steller sea lions that are found dead to determine, if feasible, a cause of death. This monitoring directly addresses listing factors A, B, C, and E.

- Monitor incidental takes in fisheries and aquaculture operations.--NMFS will undertake monitoring through fishery observer programs and through the Marine Mammal Authorization Program (MMAP) for commercial fisheries without observer programs. Monitoring will also be accomplished in conjunction with our partners in the States and DFO through fishery observer and other programs. Tribal fisheries operate on the northern Washington coast and Strait of Juan de Fuca under treaty rights, and are exempt from observer programs. The Makah are committed to monitoring tribal fisheries and support for NMML and tribal partnerships to monitor these fisheries should continue. This monitoring directly addresses listing factors B, D, and E.
- Monitor intentional lethal takes.--In Alaska, NMFS will work with State subsistence entities and Alaska Native partners to re-establish and/or to establish new programs to monitor and estimate all takes related to subsistence harvest within the range of the eastern DPS. In the recent past, this monitoring was conducted by ADFG Division of Subsistence in cooperation with Alaska Native Organizations. However, most of these efforts ended in 2008 due to lack of funding. In addition, NMFS will coordinate with stranding networks, DFO, the states of Alaska, Washington, Oregon and California to monitor and estimate direct takes of Steller sea lions throughout the range. Working with tribal and state partners, NMFS will evaluate the feasibility, including cost, of the use of real time and other cameras in Oregon to monitor disturbance and direct takes of Steller sea lions at key habitats. This monitoring directly addresses listing factors B, D, and E.
- Monitor impacts of research activities.--This will be done by NMFS in conjunction with our collaborators in DFO, the States, the tribes, and other research entities. The DPS coordinator will, on a triennial basis, review and synthesize information from permit reports submitted by Steller sea lion research permittees to the permit office to evaluate the overall levels of death, injury, and behavioral harassment that results from all research on the eastern DPS. This information will be summarized in the annual report. NMFS will determine if there are steps that need to be taken to reduce the overall level of research take. This directly addresses listing factors B, D and E.
- Monitor for disease, contaminants, and health.--NMFS, in collaboration with partners in the States, DFO, universities and other research and animal response entities (e.g., the North Pacific Marine Mammal Consortium, The Marine Mammal Center, etc.), other agencies, and various tribes and Alaska Native organizations, will regularly (2-3 times during the 10-year monitoring period) monitor the eastern DPS for disease, contaminants, and to evaluate health.

- Contingent on funding availability, NMFS will conduct sampling for key contaminants (especially those with known potential to affect reproduction, immune system function, or survival), disease agents, and health indices, at or near the time of delisting (to establish a baseline), again in 2017 or 2018, and at the end of the monitoring period in 2022. The priorities for this sampling in each state will be developed by the Regional coordinators, in consultation with their regional collaborators and the DPS coordinator. However, at a minimum, a standard disease panel should be run as well as testing for emerging diseases, including phocine distemper virus and Otarine herpesvirus-3. ADFG will monitor the presence of hookworm infections of pups on mature rookeries (e.g., Lowrie Island) in southeast Alaska, while the stranding network, the Marine Mammal Center, and NMFS (NWFSC) will provide information on any possible influence of domoic acid poisoning from harmful algal blooms, novel diseases, and other noteworthy findings from stranded Steller sea lions in their area. Ideally, samples from stranded animals, subsistence harvested animals, and animals captured as part of directed research efforts will be utilized in this monitoring effort. This directly addresses listing factors C and E.
- Monitor the protection and condition of important terrestrial habitat (rookery and haulout sites).--Steller sea lions breed, give birth, nurse their young, rest, socialize, and embark on foraging trips from terrestrial habitats. They are highly vulnerable to injury or death if disturbed on their terrestrial habitats, especially on rookeries. Chronic disturbance of Steller sea lions on their terrestrial sites could lead to less obvious health impacts or, in severe cases, to abandonment of the habitat. Additionally, the conservation value of such sites can be impacted by human activities near the site, and in some cases, such as pollution, at sites distant from the habitat. This monitoring will be done by NMFS in conjunction with our partners in the States, DFO, and through collaboration with the various coastal tribes and other federal and private partners throughout the range. Some of this monitoring will be accomplished via reviews of human activities, such as those documented through enforcement actions, those proposed or permitted by incidental harassment authorizations, etc. Additionally, working with other federal, state, tribal, and other partners, NMFS will, in the first year post de-listing, identify priorities and protocols for such monitoring to ensure that threats to habitat do not threaten the long-term viability of the species. At least every 3 years during this 10-year period, beginning by 2014, NMFS will query partners, and will review and summarize reports on the kinds and levels of human activities with the potential to cause disturbance or degradation of terrestrial habitats or aquatic habitats near terrestrial habitats. This monitoring directly addresses listing factor A and D.
- Monitor the abundance, distribution and protection of important prey species, including prey removal levels in related aquatic habitats.-- As the eastern DPS continues to increase in numbers, it may reach and/or possibly exceed carrying capacity in certain locations and nutritional stress could affect population dynamics. Alternatively, nutritional stress could develop due to competition with fisheries, effects of climate change, etc. Data are lacking for most locations for Steller sea lion prey species that are not commercially harvested. However, as many Steller sea lion prey species are harvested in commercial and recreational fisheries, the abundance and overall health of the related fish stocks are already monitored by NMFS, state, DFO, or tribal entities, and allowable and actual harvest levels are also, in some cases, set and/or monitored by these entities. At least

every 3 years during this 10-year period, beginning in 2014, NMFS will review and summarize available reports on the abundance, health, and harvest levels of the primary Steller sea lion prey species throughout the range of the eastern DPS. This directly addresses listing factor A.

- Monitor human activities near important terrestrial and aquatic habitats.--At least every 3 years during this 10-year period, NMFS will query partners, and review available documents, to determine the current and projected levels of human activities near important terrestrial and aquatic habitats. This directly addresses listing factor A.
- Monitor predator presence and interaction.--Studies of the abundance, distribution, and potential diet of transient killer whales in Southeast Alaska and British Columbia will be conducted by NMFS and DFO during the monitoring period. In addition, information may be obtained from focused studies and/or opportunistic observations of great white (or other) shark attacks on Steller sea lions, particularly at rookeries (e.g. Farallon Islands) and major haulouts. This monitoring addresses listing factor C.
- Monitor the emerging potential threat of climate warming and ocean acidification.-- NMFS recognizes that climate warming and ocean acidification potentially pose long term threats to this species, but acknowledges that at the time of delisting, the likely impacts are uncertain both with respect to magnitude and kind. As part of post-delisting monitoring, NMFS will, in collaboration with regional collaborators and other interested entities, review midway through this monitoring period (2018) the recent literature and other information on the known impacts of these two factors on Steller sea lion prey species and associated marine ecosystems throughout the range of this species to determine whether the best available information indicates directed studies or monitoring are needed and to determine whether information indicates that the threat from these factors is fundamentally different in kind or magnitude than known at the time of delisting. This directly addresses listing factor A and E.

E. Diet

Studies of the diet of Steller sea lions have been undertaken at multiple locations throughout the range of the eastern DPS (e.g., Trites et al. 2007 and Sigler et al. 2009). Evidence indicates they are opportunistic foragers which can switch prey as prey abundance changes over time, may move to new foraging locations to prey on seasonally abundant prey, and can subsist on species thought to be of relatively lower nutritional value if they also eat more nutritious prey (Sigler et al. 2009). Thus, it is likely that over the ten-year period of monitoring, the relative frequencies of various prey items in the diet may vary. Even so, potential future changes in prey assemblages throughout the range of the eastern DPS because of climate change, ocean acidification, fisheries, or other changes to marine ecosystems could affect Steller sea lion range, cause density shifts, or possibly cause changes in trend during the monitoring period. Thus, NMFS will work with collaborators, especially those in the California Current portion of the range, to identify priorities for such studies at particular sites. NMFS will also work with its partners to implement studies to update knowledge of prey use throughout the range, particularly in California where relatively little is known about current diet.

F. Range Use Patterns

As part of its evaluation of pup and non-pup count data, NMFS will specifically examine these data to:

- determine whether current patterns of recovery and strong population performance in most of the range continue;
- determine whether evidence suggests or indicates the pattern of low density, slight or no increase, and/or decrease in non-pup numbers and/or low reproductive rate seen at present, or within the recent past, in parts of California may be occurring in other regions to the north;
- determine if there is abandonment or substantial reductions in the use of any terrestrial habitats for a period of 4 or more years,
- evaluate whether further geographic range shift is occurring;
- determine if the overall extent of the range is shrinking; and
- determine if new gaps in range use for breeding or feeding are developing.

This monitoring addresses listing factor A and is specifically responsive to recommendations made in the extinction risk analysis for this species (Goodman 2006).

V. DATA EVALUATION

A. Review of Monitoring Data Relative to 'Response Triggers'

NMFS, in cooperation with the States, tribes, and other collaborators, will evaluate the monitoring results to determine whether a more detailed analysis of the status of the eastern DPS of Steller sea lion, changes to the monitoring protocol, or both, is necessary. After each monitoring period, Regional Coordinators will work with the States, and other collaborators as appropriate, to compile the monitoring results for their respective monitoring region, evaluate the results, and prepare a written assessment. This assessment will include a summary of the monitoring data, state whether any of the parameters fell below the "response triggers" shown below, determine whether the data collection protocols are functioning as anticipated or whether any changes are needed, and include an initial determination of any threats that may warrant further evaluation. In addition, NMFS will analyze and summarize regional data it receives from States and other cooperators in the years between formal surveys.

In response to any significant issues, NMFS could:

- increase the sensitivity of the status and trend monitoring protocol to detect DPS-wide or regional declines in any of the parameters by, for example, increasing survey frequency;
- design research that would determine causes of changes in population trend, or declines in pup production or vital rates;
- work with States, tribes, or other entities to exercise their regulatory authorities to alleviate known or suspected threats;

- utilize existing regulatory authorities under the MMPA to protect the species and/or its habitat;
- extend the PDM period;
- conduct regional or DPS-wide status assessment(s) to evaluate the significance of threats to the eastern DPS of Steller sea lion; or
- evaluate relisting the eastern DPS of Steller sea lion under the ESA.

Environmental factors (e.g., El Niño-Southern Oscillation events) might cause temporary declines in pup production, juvenile survival, or both, particularly in the Washington-Oregon-California portion of the range, and in more than one monitoring season. Also, it is possible that there might be a natural reduction in productivity, and a decline in population growth rate as regional populations (particularly those in southeast Alaska and British Columbia) reach carrying capacity. This may already be occurring at the older, larger rookeries in southeast Alaska (Forrester Complex and Hazy Island) where growth in pup production since 1990 has been less than at the newer, smaller rookeries to the north (White Sisters, Graves Rock and Biali; Pitcher et al. 2007; NMML, unpublished). Should declines be noted either eastern DPS-wide or regionally, available information on natural causes (e.g., pup mortality caused by hookworm infection) as well as anthropogenic factors will be evaluated. Any relisting decision would be made by evaluating the status of the eastern DPS of Steller sea lion relative to the ESA's five listing factors [ESA § 4(a)(1).

B. Response Triggers

The "response triggers" listed below will, in addition to other factors described above, prompt additional evaluation and appropriate response by the NMFS team of coordinators and collaborators (Appendix B), in consultation with Regional Collaborators and international, national or regional experts, as necessary. A trigger will prompt more detailed review of existing information which may lead to more detailed data analysis, recommended changes in monitoring intensity or kind, and/or recommended changes in management. The NMFS team will evaluate these triggers within each monitoring region and for all regions combined at the end of the 10-year monitoring period and at more frequent intervals as data become available:

- a decline of 3% per year in pup production or 6% per year in non-pup counts for the overall eastern DPS of Steller sea lions;
- a reduction in the estimated rate of survival of Steller sea lions based on marked animal studies in southeast Alaska, Oregon, and California, or new estimates of birth rate which indicate that the eastern DPS is responding to a new threat, an increase in a previously identified threat, and/or is at carrying capacity;
- evidence suggesting or indicating that the pattern of low density, tepid or no increase in non-pup numbers, decrease in non-pup numbers, and/or low reproductive rate (e.g., as observed at the Farallon Islands) seen recently in parts of southern and central California, is occurring in areas of north of there;
- evidence that there is abandonment or substantial reductions in the use of any terrestrial habitats for a period of 4 or more years;

- results of a population viability analysis indicating that the eastern DPS as a whole has declined such that it could be considered a candidate for relisting under the ESA; or
- results from threats monitoring that indicate that a new threat has emerged, the strength of an existing threat has increased, and/or that the cumulative impacts from threats is likely greater than previously understood, such that it (they) may pose a threat to local or range-wide reproduction or survival.

VI. REPORTS

Under Section 117 of the MMPA, NMFS is required to update Marine Mammal Stock Assessment Reports (SARs) annually for strategic stocks. For non-strategic stocks, NMFS reviews the reports every three years, or when new information becomes available. If the review shows that the status of the stock has changed or can be assessed more accurately, NMFS revises the report in consultation with the relevant Scientific Review Group and after public review and comment. The SARS report for the eastern DPS (referred to as a "stock" under the MMPA) will continue to provide information regarding: a description of the stock's geographic range; a "minimum population estimate"; current population trends; current and maximum net productivity rates, "Potential Biological Removal" (PBR) levels; status of the stock; and estimates of annual human-caused mortality and serious injury by source.

NMFS also produces reports of counts obtained from aerial surveys which are available to the public through the web (www.afsc.noaa.gov/nmml/alaska/). These reports contain descriptions of the geographic survey area, methods, and results of count estimates by haul-out, rookery, and area.

As noted in the Post-Delisting Monitoring Plan Guidance (USFWS and NMFS 2008:4-3):

> "Effective PDM requires timely evaluation of data and responsiveness to observed trends. PDM data should be assessed at pre-determined intervals to determine whether the data collection protocols are functioning as anticipated and whether any changes in species protection are needed."

Therefore, NMFS will issue a report with abundance data summaries and analyses after each monitoring season. These will be available on the NMFS Alaska Region website by March of the year following the survey. Reports will also suggest ways to improve sampling protocols or other aspects of the plan design if necessary. Reports might also be produced between years, and may contain summaries of results from other types of monitoring, as NMFS will annually request data collected by States and cooperators, for regional and population-wide analyses of population health. NMFS is sensitive to investigator concerns about ensuring reports do not preclude publication of findings in peer review literature and these reports will not do so.

Each report will also comment on the status of the eastern DPS of Steller sea lion relative to the need for possible relisting. This PDMP has been devised to allow detection of population declines as well as increases in the magnitude of threats with reasonable certainty and precision.

Statistical power will increase with successive monitoring seasons, as data from these seasons will likely be combined into larger sample sizes.

If changes in population counts or threat magnitudes become large enough to cause concern among the group of DPS and Regional Coordinators or if concerns are raised by NMFS Collaborators (Appendix B), then NMFS will consult with all regional collaborators (Appendix C) and any other identified partners, and consider taking action as appropriate.

At the end of the 10-year monitoring period, NMFS will prepare a final monitoring report that summarizes monitoring results and provides a final conclusion with regard to the following potential outcomes, as outlined in the PDMP guidance (USFWS and NMFS 2008:4.3):

- *PDM indicates that the species remains secure without ESA protections.* If the species appears to remain secure (e.g., its extinction risk has remained low, its demographic characteristics remain healthy, no population-level threats have emerged, and the species does not meet the definition of either a threatened or an endangered species), conclusion of PDM is appropriate. However, as noted in the PDMP guidance (USFWS and NMFS 2008), there may be circumstances in which monitoring will continue, even after PDM is concluded, regardless of the PDM outcome. This is the case for the eastern DPS of Steller sea lion, which, under various provisions of the Marine Mammal Protection Act, will continue to be monitored following the PDM period and its stock status will be reported regularly in Marine Mammal Stock Assessment Reports.
- PDM indicates that the species may be less secure than anticipated at the time of delisting, but information does not indicate that the species meets the definition of threatened or endangered. Conditions that may indicate that the species could be less secure than anticipated at the time of delisting include, but are not limited to: if the level of residual threats has increased; new population-level threats are emerging; information indicates that population performance is not as good as it was at the time of delisting; the population has begun to decline (but not at a rate that would indicate the listing of the species may be warranted); and/or the range has contracted. At a minimum, the duration of the PDM period will be extended. Depending on specific circumstances, it may be appropriate to intensify PDM (e.g., by adding parameters or by increasing the frequency of sampling) to increase the probability of detecting any future declines. It may be appropriate to initiate programs to determine the causes of unanticipated declines and/or implement additional conservation measures under existing regulatory authorities (other than the ESA).
- PDM yields substantial information indicating threats are causing a decline in the species' status since delisting, such that listing the species as threatened or endangered may be warranted. In this instance, following the guidance in USFWS and NMFS (2008), and in addition to activities discussed in the previous paragraph, NMFS would initiate a formal status review to: assess changes in threats to the eastern DPS; assess changes in its abundance, productivity, survival, and distribution; and determine whether relisting is appropriate.

- *PDM documents a decline in the species' probability of persistence, such that the species once again meets the definition of a threatened or endangered species under the Act*. As indicated in the PDMP guidance, in the event that PDM reveals that the eastern DPS of Steller sea lion again meets the definition of a threatened (i.e., likely to become endangered in the foreseeable future throughout all or a significant portion of its range) or endangered species, then NMFS would take steps to promptly propose the species for relisting under the ESA in accordance with procedures in section 4(b)(5). Likewise, if the best available information indicates an emergency that poses a significant risk to the well-being of this species, NMFS would exercise its emergency listing authority under section 4(b)(7) accordingly.

NMFS will publish the final monitoring report in the *Federal Register*.

VII. FUNDING

Post-delisting monitoring is a cooperative effort between: NMFS; other Federal agencies; State, tribal, and foreign governments; and non-governmental partners. Funding of post-delisting monitoring presents a challenge for all partners committed to ensuring the continued viability of the Steller sea lion following removal of ESA protections. To the extent feasible, NMFS intends to budget for post-delisting monitoring efforts through the annual appropriations process. Nonetheless, nothing in this PDMP should be construed as a commitment or requirement that any Federal agency will obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation.

VIII. ACKNOWLEDGMENTS

This monitoring plan was developed by NMFS in cooperation with State wildlife agencies, DFO, tribal entities, and other interested groups and collaborators. The first draft of the document was completed by NMFS National Marine Mammal Laboratory staff with review and input from States and other partners. Comments on previous drafts received from these groups and from numerous organizations and individuals during peer review and public comment strengthened this plan. NMFS Alaska Region staff revised the plan following public and peer review comment and finalized it following review and input by a team of staff from other NMFS offices and from regional collaborators. We also acknowledge the U.S. Fish and Wildlife Service, whose monitoring plan for the American Peregrine Falcon served as a template for the first draft of this plan (U.S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 pp.).

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APPENDICES

Appendix A: Power to detect growth rate reduction in the eastern distinct population segment of Steller sea lion following removal from the list of threatened and endangered species under the ESA

MEMORANDUM FOR: Brian Fadely
CC: Lowell Fritz**,** Tom Gelatt
FROM: Devin Johnson
SUBJECT: Power for detecting growth rate reduction in Steller sea lion EDPS stock following ESA delisting
DATE: June 22, 2011

Summary. A geometric Brownian motion model was fitted to the eastern (EDPS) Steller sea lion stock abundance survey data from the 2008 recovery plan. Following model fit, the estimated parameters were used to simulate a hypothetical population in each EDPS region (SEAK, BC, OR, and CA) under various amounts of growth reduction due to delisting. Three sampling schedules were used (every year, every 2 years and every 4 years) within a 10 year window of post-delisting observation. The power to detect a reduction was assessed for both pups and non-pups in the stock as a whole and also for pups in each region separately. There seems to be sufficient power (~80%) to detect a 3% reduction in growth rate for the EDPS as a whole for pups, while a 6% reduction in growth rates is required to reach the same power for non-pups.

1. Methods

1.1. *Data*

The data used are those described in Section I.E. (Eastern DPS Status and Trend) of the 2008 revision of "Recovery Plan for The Steller Sea Lion" (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/recovery/sslrpfinalrev030408.pdf) augmented with the 2009 survey data from the southeast Alaska, California, and Oregon regions, as well as 2006 data for British Columbia.

1.2. *Abundance model*

In each region (SEAK, BC, OR, CA) a geometric Brownian motion (GDM) model was fitted. The GBM model is described by the stochastic differential equation

$$dN_t = \mu N_t dt + \sigma N_t dW_t,$$

where N_t is the population size at time t, μ is the growth parameter, σ is a volatility parameter, and W_t is a Brownian motion process. The resulting solution given an initial population of size N_0 is

Photo by Lauri A. Jemison, Alaska Department of Fish and Game. Research conducted under NOAA Permit No. 358-1769.

$$N_t = N_0 e^{(\mu-\sigma^2/2)t+\sigma W_t}.$$

The expected value of N_t is $N_0 e^{\mu t}$, so, $\lambda = e^{\mu}$ is the annual growth rate.

1.3. *Statistical inference*

In order to estimate parameters for the GBM model we make use of the following relationship

$$Y_{t+1} = \ln N_{t+1} - \ln N_t \sim Gau\left(\left(\mu - \frac{\sigma^2}{2}\right)\Delta_t,\ \sigma^2\Delta_t\right),$$

where $Gau(\cdot,\cdot)$ represents a normal distribution and Δ_t is the time difference between N_{t+1} and N_t. In addition, all the Y are independent. So, the negative log-likelihood is given by

$$\ell(\boldsymbol{\mu}, \boldsymbol{\sigma}; \mathbf{y}) = \sum_r \sum_t \left[\ln \sigma_r + \frac{\left\{y_{r,t} - (\mu_{r,t} - \sigma_{r,t}^2/2)\Delta_{r,t}\right\}^2}{2\sigma_{r,t}^2\Delta_{r,t}}\right],$$

where $y_{r,t}$ are the observed values of Y_t. The log-likelihood can then be maximized with respect to the $\boldsymbol{\mu}$ and $\boldsymbol{\sigma}$ parameters. The model was fit first in order to obtain μ and σ for each region which were used as baseline levels for future data simulation. Thus, the models fitted were $\mu_{r,t} = \mu_r$ and $\sigma_{r,t} = \sigma_r$ for r= 1,…,4.

In order to estimate power for detecting declines in growth rate, data were simulated for future surveys in each region. The growth rate was reduced by several percentage values from 1% to 10% (i.e., for 5% reduction, $\lambda_{\text{delist}} = 0.95\lambda$). At 10% reduction in growth rate, all of the regions would be severely declining (i.e., for a current 3% growth, a 10% reduction results in a new growth rate of -7%, 0.9*1.03 = 0.93). To assess the power to detect this stock-wide effect, one would fit a model with separate μ for each region and a "delist" covariate for all surveys after 2012. In terms of the model parameters the fitted model was

$$\mu_{r,t} = \mu_r + \mu_{delist} I(t > 2012)$$

and

$$\sigma_{r,t} = \sigma_r,$$

Where I(t>2012) is an indicator function for year > 2012 and $\mu_{delist} = \ln(1 - \%reduction)$. Even though there are separate growth parameters in each region, with 1 parameter, we can test for a significant global stock-wide reduction in growth rate. Data was simulated for survey schedules of every 1, 2, and 4 years with every region conducting a survey in 2012 (last pre-delisting survey). The BC region schedule was kept at a constant 4 year schedule. As mentioned before, declines were simulated for 1-10% growth rate reductions in intervals of 1%. For each of the 30 scenarios I simulated 1000 data sets, analyzed them with the GBM model with a delisting effect (i.e., year > 2012) and recorded whether there was a significantly (one–tailed) negative

effect that was detected . The estimated power is the proportion of detected effects. The procedure was repeated for both the pup and non-pup surveys as well as for each region on its own for the pup surveys.

2. Results

2.1 *Pup production*

The model output is presented below.

```
Pup Geometric Brownian Motion Fit

Models:
--------
Drift   ~ region - 1
Volatility   ~ region - 1


              Mu Est. St. Err.   |Z| Prob. > |Z|
mu.regionBC     0.050    0.022 2.318       0.020
mu.regionCA     0.051    0.046 1.108       0.268
mu.regionOR     0.031    0.006 5.199       0.000
mu.regionSEAK   0.042    0.012 3.541       0.000


                Sigma Est. St. Err.    |Z| Prob. > |Z|
sigma.regionBC       -2.072    0.236  8.790           0
sigma.regionCA       -1.805    0.267  6.753           0
sigma.regionOR       -3.647    0.408  8.933           0
sigma.regionSEAK     -2.726    0.224 12.189           0


AIC = -26.883
```

The estimated growth rate in each of the regions for the time span of the current pup survey data is 5.1% (i.e., 100*exp{0.05}) for BC, 5.2% for CA, 3.1% for OR, and 4.3% for SEAK. The analysis of power for a stock-wide model of pup production is illustrated in Figure 1. There is an estimated power of >90% for detecting a stock-wide reduction in growth of 3% for each sampling schedule. A 3% reduction would result in growth rates of approximately 1.02 for BC and CA, 1.0 for OR, and 1.01 for SEAK. Thus, there seems to be sufficient power to detect a reduction I growth before the stock begins to decline. The results for each individual region are presented in Figures 2-5. The figures illustrate with the exception of OR, detecting significant declines in growth rate in each individual region has very little power using a 10 year window.

2.2 *Non pup trends*

The fitted GBM model for nonpup trends is presented below. Notice the generally larger process variance as was expected. The fitted growth rates are as follows: 3.8% for BC, 2.1% for CA, 5.8% for OR, and 2.2% for SEAK.

```
Nonpup Geometric Brownian Motion Fit

Models:
--------
Drift   ~ region - 1
Volatility   ~ region - 1


              Mu Est. St. Err.   |Z| Prob. > |Z|
mu.regionBC     0.037    0.014 2.648       0.008
mu.regionCA     0.021    0.073 0.280       0.779
mu.regionOR     0.056    0.033 1.668       0.095
mu.regionSEAK   0.022    0.045 0.483       0.629


                Sigma Est. St. Err.    |Z| Prob. > |Z|
sigma.regionBC       -2.509    0.236 10.645           0
sigma.regionCA       -1.357    0.250  5.428           0
sigma.regionOR       -1.798    0.147 12.194           0
sigma.regionSEAK     -1.588    0.204  7.780           0


AIC = -17.015
```

Figure 6 provides the results of the power analysis. There is an approximately 80% chance of detecting a reduction in growth of approximately 6%. A 6% reduction would result in growth rates of -1% to -4% within the various regions. Thus a sizable reduction in the growth rate (to the point of decline) is necessary to detect it within the 10 year window. It was surprising that there was very little additional gain in using a yearly sampling schedule versus every 4 years. In order to examine this effect in more detail, I looked at the Information matrix for the delist model. The Information matrix for a parameter vector is defined as

$$I(\theta) = -E\left[\frac{\partial^2}{\partial\theta^2}\log f(X;\theta)\right],$$

where *f* is the likelihood function. The Information for the single parameter μ_{delist} is given by

$$I(\mu_{delist}) = \sum_{r=1}^{4} \frac{\left\lfloor\frac{10}{s}\right\rfloor s}{\sigma_r^2},$$

where $\lfloor x \rfloor$represents the integer part of $x$and $s$is the schedule (e.g., s = 1, 2, or 4) . The details are left out, but straightforward differentiation of the previously presented negative log-likelihood will give the result. The quantity $\lfloor 10/s \rfloor$ is the number of added samples for each region after delisting. Thus, for s = 4 versus s = 1, there are only 20% ($= \lfloor 10/4 \rfloor/10$) of the samples, but we retain 80% ($= 4 * \lfloor 10/4 \rfloor/10$)of the information for estimating μ_{delist}. This result is intuitive after examination. In a regression setting the best placement of samples for estimating a simple linear trend $a + bx$ for x in [L, U] is to put half of the samples at L and half at U. The same holds here as we are essentially estimating a trend. The yearly schedule places many points in the middle of the 10 year range where they are not as useful. Power is not a direct function of information, but the simple analysis shows that intuition about sample size and power is not always as straightforward as it seems, especially in this case.

FIGURES FOR STOCK-WIDE ANALYSIS

Figure 1. Stock-wide analysis of pup trend power

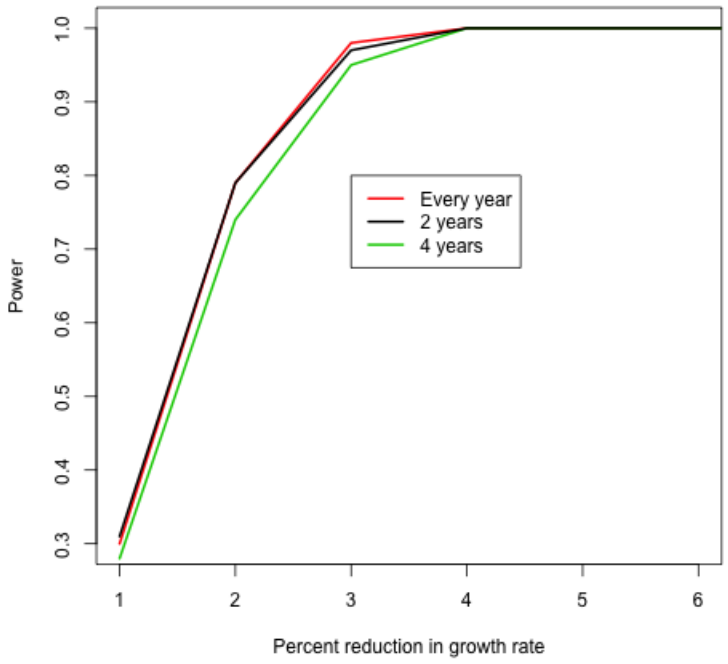
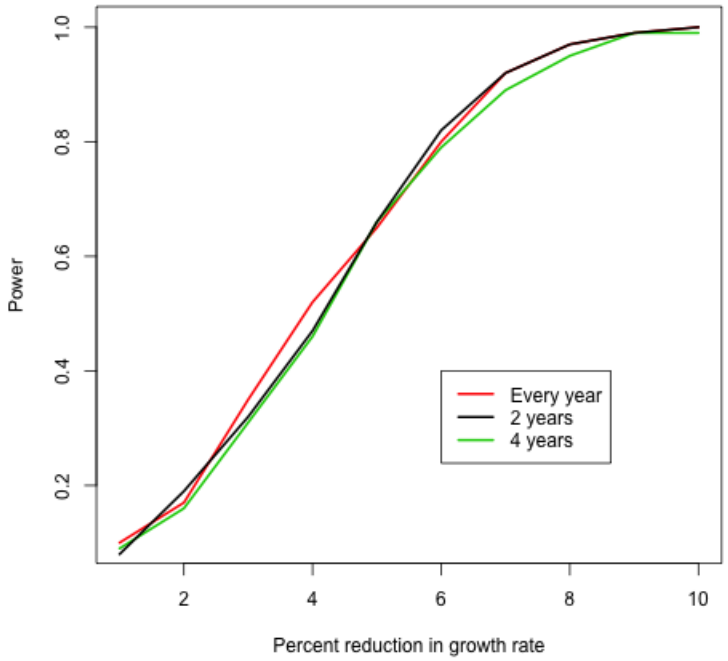


Figure 6. Stock-wide analysis of nonpup trend power



FIGURES FOR REGION BASED ANALYSIS OF PUP TRENDS

The pink line represents the current estimate of growth rate from the GBM model fit (1.051 for BC, 1.052 for CA, 1.031 for OR, and 1.043 for SEAK). The blue line represents stable growth. For BC only the 4 year schedule was used as this is their declared intention. The power represents the probability of detecting a significant reduction in growth rate following delisting.

Figure 2. Analysis of SEAK pup trend power

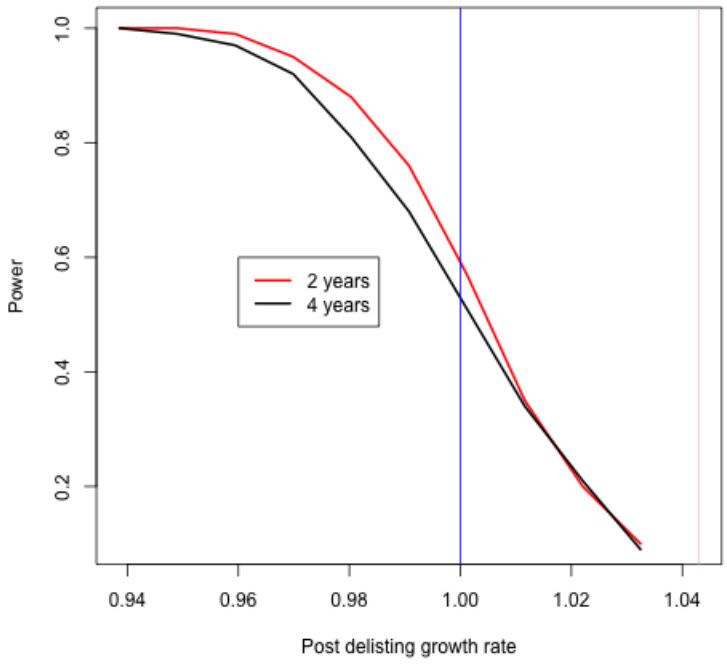


Figure 3. Analysis of BC pup trend power

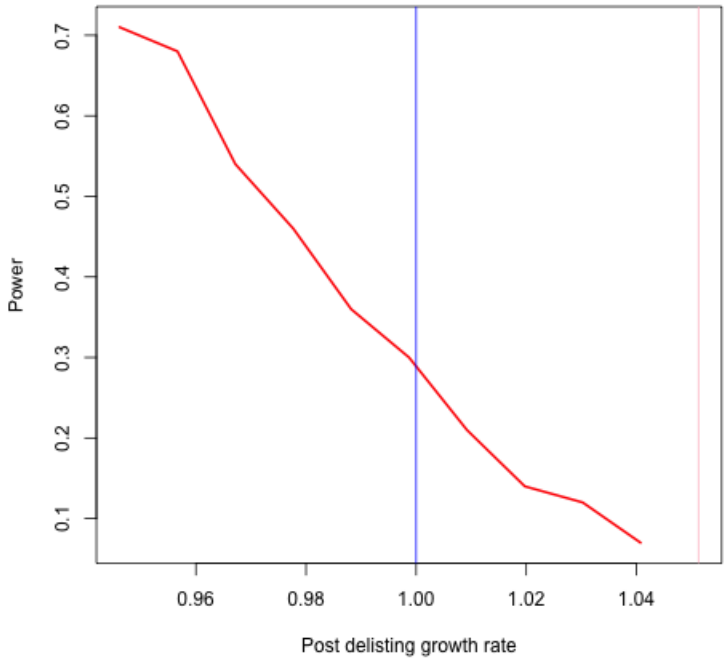


Figure 4. Analysis of CA pup trend power

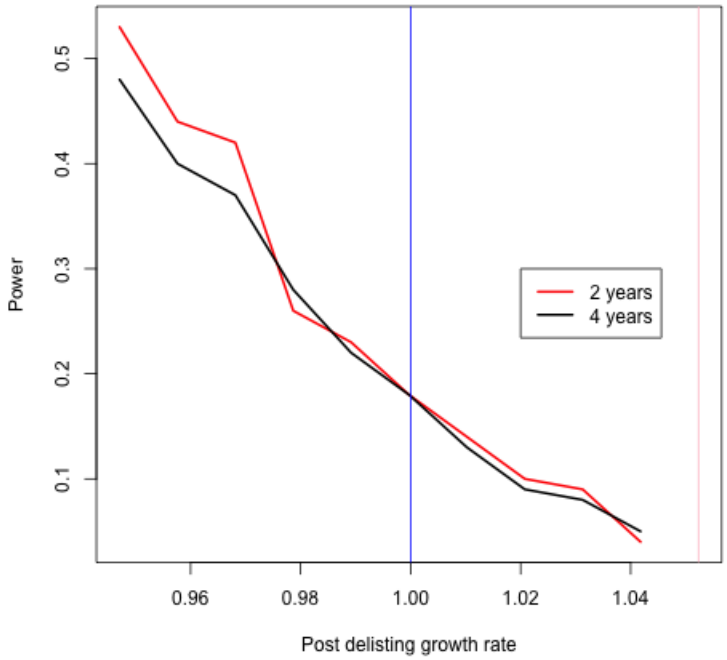


Figure 5. Analysis of OR pup trend power

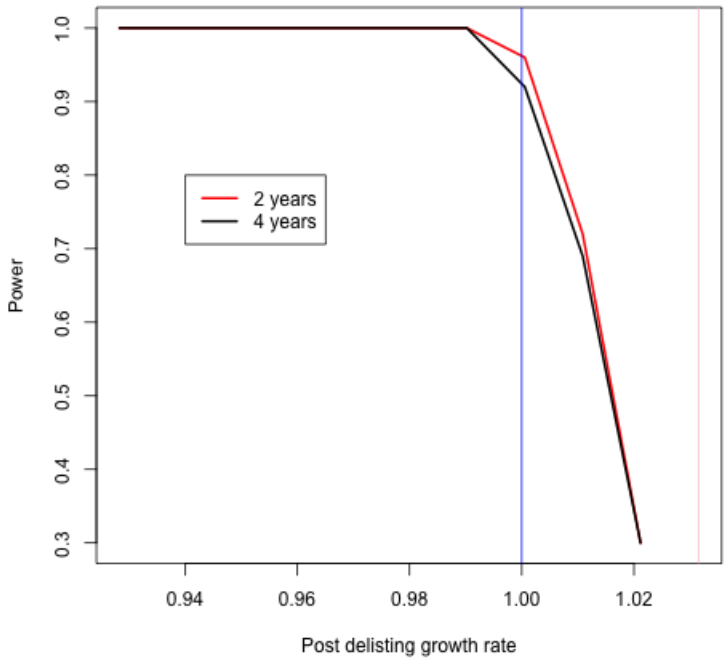


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Photo by Lauri A. Jemison, Alaska Department of Fish and Game. Research conducted under NOAA Permit No. 358-1769.