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

JUN 26 2002

TO: All Interested Government Agencies and Public Groups

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

TITLE: Environmental Assessment on the Effects of NMFS Permitted Scientific Research Activities on Threatened and Endangered Steller Sea Lions

LOCATION: Range of Steller sea lions from California to Alaska

SUMMARY: The National Marine Fisheries Service is proposing to issue scientific research permits to collect the information necessary to promote the recovery of Steller sea lions and provide appropriate management of fisheries and other human activities that may affect Steller sea lions.

RESPONSIBLE OFFICIAL: William T. Hogarth
Assistant Administrator for Fisheries
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 713-2332

The environmental review process has led us to conclude the proposed action will not have a significant impact on the human environment. Therefore, an Environmental Impact Statement was not prepared. A copy of the Environmental Assessment and Finding of No Significant Impact is enclosed for your information. Please send any comments to the responsible official named above. Also, please send one copy of your comments to me in Room 6121, NOAA/SP, U.S. Department of Commerce, Washington, D.C. 20230.

Sincerely,

James P. Burgess, III
NEPA Coordinator

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

THE DIRECTOR

JUN 21 2002

MEMORANDUM FOR: James P. Burgess, III
Acting Director
Office of Policy and Strategic Planning

FROM: William T. Hogarth, Ph.D.
Assistant Administrator
for Fisheries

SUBJECT: Environmental Assessment on the Effects of NMFS Permitted Scientific Research Activities on Threatened and Endangered Steller Sea Lions

Based on the subject environmental assessment, I have determined that no significant environmental impacts will result from this action. I request your concurrence in this determination by signing below. Please return this memorandum for our files.

1. I concur. James P. Burgess III 6/27/02
Date

2. I do not concur. _____.
Date

Attachments

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

ENVIRONMENTAL ASSESSMENT

ON THE EFFECTS OF NMFS PERMITTED SCIENTIFIC RESEARCH ACTIVITIES ON THREATENED AND ENDANGERED STELLER SEA LIONS

June 2002

Lead Agency: National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Responsible Official Dr. William Hogarth
Assistant Administrator for Fisheries

For Further Information Contact: Office of Protected Resources
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 713-2332

Abstract: The National Marine Fisheries Service (NMFS), Office of Protected Resources, proposes to issue five new scientific research permits, and major amendments to two existing scientific research permits for takes of Steller sea lions (*Eumetopias jubatus*) in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.). The objective of the proposed action is to collect information on the ecology and biology of threatened and endangered Steller sea lions that would improve understanding of management needs for recovering the species to the point that it can be removed from ESA listing. The permitted research under the preferred action alternative would exceed the categorical exclusion (National Environmental Policy Act (NEPA); 42 U.S.C. 4321 et seq.) from the need to prepare an EA or EIS in that 1) it involves controversial techniques; 2) the proposed activities involve unknown or highly uncertain risks; 3) and the potential for an adverse effect on an endangered and threatened species because of the significant increase in research activity in recent years, which is largely related to recent funding opportunities, warranted a further environmental review to determine whether significant environmental impacts could result from issuance of the proposed scientific research permits and permit amendments. Therefore, this document evaluates the relevant effects of a variety of scientific research activities on Steller sea lions under several permitting alternatives. The analyses considered special mitigation measures addressing duration of research, developing a monitoring plan, limiting accidental mortality, and ensuring research coordination. With these mitigation measures in place, issuing the permits as requested would not have a significant effect on the human environment.

TABLE OF CONTENTS

ENVIRONMENTAL ASSESSMENT
ON THE EFFECTS OF NMFS PERMITTED SCIENTIFIC RESEARCH ACTIVITIES ON THREATENED AND ENDANGERED STELLER SEA LIONS

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 Description of Action

The National Marine Fisheries Service (NMFS) proposes to issue five new scientific research permits and major amendments to two existing scientific research permits for takes[1] of Steller sea lions in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.). Applications for scientific research and enhancement permits were received from the Aleutians East Borough (AEB: File No. 1010-1641), Dr. Glenn VanBlaricom (File No. 1016-1651), Dr. Randall Davis (File No. 800-1664), the Alaska SeaLife Center (ASLC: File No. 881-1668) and the Oregon Department of Fish and Wildlife (ODFW: File No. 434-1669). Four of the five applicants for new permits have requested that the special exception permits be granted for the maximum period allowed by regulations, which is five years. The fifth applicant has requested a three-year permit. The subject permits to be amended are held by the National Marine Mammal Laboratory, Alaska Fisheries Science Center (NMML: Permit No. 782-1532; expires December 31, 2004) and the Alaska Department of Fish and Game (ADF&G: Permit No. 358-1564-01; expires June 30, 2005). The Holders of Permits No. 782-1532 and 358-1564 have requested that the amendments be granted for the duration of the permits.

The applicant for File No. 1010-1641, the AEB, requests authorization for a five-year permit to: harass Steller sea lions in Alaska during aerial and vessel surveys of Steller sea lion rookeries and haulouts; collect scat samples from Steller sea lion rookeries and haulouts; and place observers on Steller sea lion rookeries and haulouts. The purpose of the research proposed by AEB is to provide additional information on seasonal prey consumption by Steller sea lions through analysis of scat collected at rookeries and haulouts along the Alaska Peninsula and Eastern Aleutian Islands, and to improve the accuracy and precision of population indices through expanded aerial and vessel surveys in the western Gulf of Alaska. Accurate abundance estimates, including variances and confidence intervals, are needed for making management decisions related to fisheries, and for recovering the species to the point that it can be removed from ESA listing

The applicant for File No. 1016-1651, Dr. VanBlaricom, requests authorization for a three-year permit to collect blubber biopsy samples from Steller sea lions on rookeries, haulouts and in the water in the Aleutian Islands, Gulf of Alaska, and Southeast Alaska using biopsy darts fired from rifles or cross-bows, and take Steller sea lions by harassment from aerial surveys in

[1] Under the MMPA, "take" is defined as to "harass, hunt, capture, collect or kill, or attempt to harass, hunt, capture, collect or kill any marine mammal." "Harass" is further defined as "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild [Level B harassment]." [16 U.S.C. 1362(18)(A)] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Southeast Alaska. The purposes of the research proposed by Dr. VanBlaricom are to evaluate the prey selection in free-ranging Steller sea lions for both western and eastern populations through an assessment of the presence of fatty acid signatures from ephemeral, high-quality prey in Steller sea lion blubber, and to investigate the distribution and abundance of sea lions in relation to temporal and spatial distributions of prey. Because nutritional stress has been identified as a possible factor in the current decline of the Steller sea lion population, the Final Recovery Plan for Steller Sea Lions (Steller Sea Lion Recovery Team 1992) has identified the need to investigate feeding ecology and factors affecting energetic status of Steller sea lions, to describe foods consumed by Steller sea lions, and to assess the significance of various prey in the diet of Steller sea lions.

The applicant for File No. 800-1664, Dr. Davis, requests authorization for a five-year permit to capture, hot-brand, flipper tag, collect blood and tissue samples from, and attach scientific instruments to adult female and juvenile Steller sea lions in the Gulf of Alaska and Aleutian Islands, and incidentally harass Steller sea lions of all ages during these activities. The purpose of the research proposed by Dr. Davis is to study the hunting behavior and three-dimensional movements of Steller sea lions. The results would be used, in conjunction with data on satellite remote sensing of hydrographic features, and on the abundance, distribution, and composition of prey at spatial and temporal scales, to address questions about Steller sea lion prey preference, predator/prey relationships, and ecological attributes of foraging habitat.

The applicant for File No. 881-1668, the ASLC, requests authorization for a five year permit to remotely monitor, capture, hot-brand, flipper tag, collect blood and tissue samples from, attach external scientific instruments to, implant scientific instruments in, hold in captivity for up to three months, and conduct controlled feeding and endocrinology experiments on pups and juvenile Steller sea lions throughout their range in Alaska. The overall purpose of the research proposed by ASLC is to collect information on the health status (e.g., morphometrics, body composition, immunology, epidemiology, endocrinology, viral serology), physiology (e.g., vitamin requirements, stress responses to capture, handling, and captivity), life history (e.g., ontogenetic and annual cycles, population dynamics), foraging behavior and habitat use of Steller sea lions. The results of these studies would be used to address various objectives in the Final Recovery Plan and assist in the recovery of Steller sea lions. NMFS is not proposing to authorize the implant of tags and associated temporary captivity at this time. Pending further information from ASLC on validation of the tags, NMFS will evaluate the proposal and, if necessary, prepare a supplemental NEPA document.

The applicant for File No. 434-1669, the ODFW, requests authorization for a five year permit to remotely monitor, capture, hot-brand, flipper tag, collect blood and tissue samples from, and attach external scientific instruments to threatened Steller sea lion pups and juveniles in Washington, Oregon and California. The proposed permit represents an administrative shift of lead research authority for the field work conducted in the Pacific Northwest from NMML to ODFW. Permit No. 782-1532 would be amended to subtract takes related to pup counts and branding in this region, and the corresponding number added to a permit issued to ODFW. The purpose of the proposed research is the same as that described below for Permit No. 782-1532.

Permit No. 782-1532 currently authorizes NMML to harass Steller sea lions throughout their range (California, Oregon, Washington, and Alaska) during biennial aerial surveys; to capture, restrain (chemically and physically), hot-brand, tag, and attach satellite and VHF (very high frequency) transmitters to Steller sea lions; to take tissue and blood samples from Steller sea lions; to collect scat from Steller sea lion rookeries and haulouts; and to set up remote monitoring stations on rookeries and haulouts to conduct behavioral studies on Steller sea lions. In addition to these actions, the proposed amendment to Permit No. 782-1532 would allow NMML to harass

Steller sea lions during annual aerial surveys; to increase the number of Steller sea lions harassed during monthly aerial surveys in the Gulf of Alaska, Aleutian Islands, and Southeast Alaska from 15,000 to 35,000 annually; to increase the number of animals harassed during scat collection from 4,000 to 15,000 annually; to take additional tissue (muscle biopsy, tooth extraction, pulled vibrissae) and blood samples from Steller sea lions; to hot-brand additional Steller sea lions; to administer deuterated water and Evans blue dye to Steller sea lions; to use isoflurane gas to restrain Steller sea lions; to insert electrodes subcutaneously for biolelectric impedence analysis; and to attach Underwater Timed Picture Recorders in conjunction with the VHF or PTT transmitters already being used under the existing permit. The additional sampling and marking procedures would be performed on Steller sea lions already authorized to be captured and would not increase the total number of animals being handled under this permit. The purpose of the research proposed by the applicant is to continue monitoring the status of the Alaskan Steller sea lion population and to identify causes of the population decline so as to provide for the population(s) recovery. This research represents continued implementation of the Final Recovery Plan for Steller Sea Lions, specifically (1) the need to identify habitat requirements and protect areas of special biological significance; (2) identify management stocks, (3) monitor status and trends of sea lions; (4) monitor health, condition, and vital parameters; and (5) investigate feeding ecology and factors affecting energetic status.

Permit No. 358-1564-01 currently authorizes ADF&G to harass Steller sea lions in Alaska during biennial aerial surveys; to capture, restrain (chemically and physically), hot-brand, tag, and attach satellite transmitters to Steller sea lions; to take tissue and blood samples from Steller sea lions; to collect scat from Steller sea lion rookeries and haulouts; to collect carcasses and parts of carcasses; to receive samples from Steller sea lions taken by subsistence harvest; to administer deuterated water to Steller sea lions; and to set up remote monitoring stations on rookeries and haulouts to conduct behavioral studies on Steller sea lions. The proposed amendment to Permit No. 358-1564-01 would allow ADF&G to harass Steller sea lions during annual aerial surveys and perform the following additional procedures on Steller sea lions already authorized to be captured (i.e., there would be no increase in the number of animals handled under this permit): to take additional tissue and blood samples from Steller sea lions; to inject Evans blue dye into Steller sea lions; to insert electrodes subcutaneously for bioelectric impedence analysis; to capture individual Steller sea lions an additional 2 times per year (for a total of 4 times per animal per year); to attach VHF transmitters to an additional 100 pups and 30 juveniles; and to attach satellite and VHF transmitters to an additional 20 Steller sea lions per year. The purpose of the research proposed by the applicant is to continue monitoring the status of the Alaskan Steller sea lion population and to identify causes of the population decline so as to provide for the population's recovery. This research represents continued implementation of the Final Recovery Plan for Steller Sea Lions, specifically (1) the need to identify habitat requirements and protect areas of special biological significance; (2) identify management stocks, (3) monitor status and trends of sea lions; (4) monitor health, condition, and vital parameters; and (5) investigate feeding ecology and factors affecting energetic status (Steller Sea Lion Recovery Team 1992).

It is anticipated that additional applications for scientific research permits may be submitted in 2002, based on grants funded in 2001, and additional Congressional appropriations in 2002. If warranted, a supplemental Environmental Assessment will be prepared as additional applications are received.

1.1.1 Background

Steller sea lions (*Eumetopias jubatus*) were listed as threatened under the Endangered Species Act (ESA) in 1990 under an emergency rule, because the numbers of Steller sea lions observed on rookeries in Alaska had declined by 63% since 1985 and by 82% since 1960. A final rule was published on November 26, 1990 and the final listing became effective on December 4, 1990. Steller sea lions were determined to be threatened, i.e., likely to become an endangered species within the forseeable future throughout all or a significant portion of their range (where endangered is defined as in danger of extinction throughout all or a significant portion of their range) and in immediate need of implementation of the protective measures of the ESA, due to the large and precipitous nature of the population decline. Management actions included monitoring of incidental take in fisheries and establishment of a Recovery Team to provide recommendations on conservation measures that would promote recovery of the species to a level appropriate to justify removal from ESA listing (a Recovery Plan was published in 1992). Protective regulations promulgated at the time of the listing have included prohibiting shooting at or near sea lions, establishing buffer zones of three nautical miles around principal Steller sea lion rookeries where no vessels are allowed to operate (except by special permission), and establishing an incidental kill quota. In 1997, Steller sea lions were reclassified as two distinct population segments under the ESA, and the segment of the population of Steller sea lions west of 144°W longitude was reclassified as endangered, while the threatened listing was maintained for the remainder of the population in the United States. The reclassifications were primarily due to information that indicated two genetically differentiated population segments, a continued decline in abundance trends of the western population segment, and population viability analysis models that predicted a 65-100% probability of extinction for the western population from Kenai Peninsula to Kiska Island within 100 years if the trends in the western population continued. The cause of the continued decline is unknown, but the prevalent theory is that considerable evidence from studies in the 1970s and 1980s supports the hypothesis that nutritional stress resulting from a change in the abundance and/or distribution of prey species caused by some combination of commercial fisheries activities and environmental changes (Alaska Sea Grant 1993; Loughlin 1998) resulted in reductions in the rate of recruitment or reproductive success. This theory still cannot be rule out although recent behavioral and physiological research in the 1990s does not directly support the hypothesis (Alaska Sea Grant 2001). Because commercial fisheries may compete with Steller sea lions for prey, either directly or indirectly, fishery management plans and federal regulations have recently been designed to reduce the potential for adverse effects of fisheries on Steller sea lion populations. However, the effectiveness of these plans and regulations is uncertain, as is the exact nature of the effect of fisheries on sea lions.

The Final Recovery Plan for Steller Sea Lions recognized that the factors that caused the decline were poorly understood and indicated an urgent need to identify actions that are most likely to stop the population decline, while continuing ongoing research and developing new programs designed to improve understanding of Steller sea lion management needs. The Final Recovery Plan identified administrative, management and research priorities needed to promote conservation of the Steller sea lion. Among the highest priority management actions were monitoring the status and trends of sea lions of sea lion abundance throughout their range, and monitoring incidental and subsistence takes. The highest priority administrative actions were focused on regulating fisheries (i.e., areas, seasons, operations, catches), identifying and designating critical habitat, recommending a maximum allowable take and reducing incidental take. Research needs considered most critical to conservation and management were to develop survey procedures, determine food requirements, and determine feeding areas and strategies. Somewhat lower priority was given to such things as determining stock identity, determining seasonal use patterns, collecting and sampling animals, determining pup production and mortality, marking and monitoring pups and females, measuring and modeling the effects of

fisheries on sea lion prey, collecting and analyzing scat and stomach contents, and characterizing prey availability. Lowest priority was assigned to tasks such as evaluating mortality by non-human predators, mapping rookeries and haulouts, and investigating entanglement in debris. Although these and other tasks were not identified as first priorities, they were considered important in conservation and recovery of the Steller sea lion, although not of immediate importance relative to the first level priorities. A number of the highest priority tasks have been accomplished (e.g., designating critical habitat, recommending a maximum allowable take) while others are ongoing (e.g., monitoring status and trends, determining feeding areas and strategies). Some of the lower priority tasks have also been accomplished, including determining stock identity, while others are ongoing, such as marking and monitoring pups and collecting and analyzing scat samples. Since the Recovery Plan was finalized, Steller sea lions have been classified as two distinct population segments, with different trends of abundance. A new Recovery Team has recently been convened to draft a revised Recovery Plan that reflects the change in listing status of the Steller sea lion. The Recovery Team will be recommending management actions needed to recover Steller sea lions and identifying research needs for the conservation and management of threatened and endangered Steller sea lions.

Due in part to the research efforts focused on Steller sea lions prior to and since they were listed under the ESA, there is now a large body of information on a variety of aspects of Steller sea lion biology and ecology. Information also exists on the biology, ecology, and management of other pinnipeds and mammals that is relevant or applicable to the Steller sea lion issues. This information needs to be analyzed both in the context of how it can immediately be applied to conservation of sea lions, and in identifying information gaps that are critical or essential in conservation of the Steller sea lion.

1.1.2 Purpose and Need

The primary purpose of the proposed permits is to authorize takes of threatened and endangered Steller sea lions for scientific research related to better understanding the cause(s) of the population decline in order to develop conservation measures to ensure sea lion recovery and to obtain sufficient information to make appropriate conservation decisions related to fishery management and other human activities in the range of Steller sea lions.

The need for the proposed action arises from several sources. First, NMFS has a responsibility to implement both the MMPA and ESA to protect, conserve, and recover threatened and endangered marine mammals under its jurisdiction, which includes Steller sea lions. The MMPA and ESA prohibit takes of threatened and endangered marine mammals during the moratoriums with only a few very specific exceptions, including native subsistence harvest, incidental to commercial fishing operations, and for scientific research/scientific purposes. Joint MMPA/ESA scientific research permits are the major exception to the moratoriums. Permit issuance criteria require that research activities are consistent with the purposes and polices of these acts and will not have an adverse impact on the species or stock. A second reason for the proposed action is the desire for additional information on the biology and ecology of Steller sea lions, particularly as it relates to the potential for adverse effects of commercial groundfish fisheries on sea lions and adverse modification of their habitat. NMFS has a responsibility to ensure that fishing activities do not jeopardize the continued existence of Steller sea lions or adversely modify their critical habitat.

A Biological Opinion released by NMFS on November 30, 2000 concluded that certain

groundfish fisheries conducted in the Bering Sea/Aleutian Islands and the Gulf of Alaska jeopardize the continued existence of the endangered western population of Steller sea lions and adversely modifies its critical habitat. Significant federal resources have recently been dedicated to studying the biology and ecology of threatened and endangered Steller sea lions in order to collect information that could be used for management and recovery of the population, including fisheries management measures. Approximately 80 million dollars has been appropriated over the past two years to study these issues, with Congressional direction to perform research into the cause of the Steller sea lion decline and to develop conservation and protective measures to ensure sea lion recovery.[1] In addition to funds provided to the State of Alaska, the Alaska SeaLife Center, the University of Alaska, the North Pacific Marine Mammal Consortium, and various agencies within the Department of Commerce, funds were appropriated to the Secretary of Commerce to "develop and implement a coordinated, comprehensive research and recovery program for the Steller sea lion." The Steller Sea Lion Research Initiative (SSLRI) made available a portion of these funds to assist eligible individuals and groups in carrying out research into the cause of the decline and to develop conservation and protective measure to ensure recovery of the species. The secondary objective of the SSLRI is that research products contribute immediate, short-term information relevant to adaptive fishery management strategies in the Bering Sea/Aleutian Islands and the Gulf of Alaska groundfish fisheries. Eleven areas of research priority were developed to address a set of six primary research topics that characterize the principal hypotheses surrounding the decline of Steller sea lions.

Among these primary research topics, increased predation and disease are not considered likely causes of the decline, but they may be impeding recovery of a depressed population, as would be expected with any additional sources of mortality or stress that affect reproduction and survival. Changes in environmental conditions in Steller sea lion habitat that may be part of a larger pattern of climate fluctuation, and indirect effects of fisheries that may have resulted in reductions in prey abundance or changes in prey distribution at scales relevant to foraging sea lions, are presently considered the principal hypotheses surrounding the decline. In an ecosystem under stress from environmental change, superimposing the effects of large-scale human disturbance (as from a major commercial fishery) could result in the declines observed since the 1970s in not only Steller sea lions, but other marine mammals and sea bird populations as well.

1.1.3 Objectives

The objective of the proposed action is to authorize takes of threatened and endangered Steller sea lions for scientific purposes to allow the collection of information on their ecology and biology that would improve understanding of management needs for recovering the species to the point that it can be removed from ESA listing and that would improve NMFS' ability to make appropriate fishery management decisions..

1.2 Other EA/EIS that influence scope of this EA

An Environmental Assessment (EA) was prepared in 1993 by the National Marine Mammal Laboratory (NMML) and the Office of Protected Resources, NMFS, on the effects of branding pinnipeds in Washington, Oregon and California. The EA was prepared in response to comments received concerning two applications for permits to hot-brand harbor seals and Steller sea lions. The EA included a review of techniques for marking pinnipeds and an assessment of the consequences of each technique. The alternatives presented in the EA were: (1) non-issuance of authorization to permanently mark; (2) issuance of authorization to permanently mark using techniques other than branding; (3) issuance of authorization to brand; and (4) issuance of authorization to brand with conditions. The preferred alternative was issuance of authorization to hot brand with specific conditions to mitigate the effects, including monitoring of the short- and long-term effects of hot-branding on these two species of pinnipeds.

This alternative was preferred for a number of reasons. First, it was determined that a method of permanently marking pinnipeds in a way that allowed reliable identification of individuals was needed for effective monitoring of the status and health of harbor seal and Steller sea lion populations in California, Washington, and Oregon. Although natural marks and plastic flipper tags have been used for identifying individual animals of a variety of species , these alternatives were not considered suitable for this purpose because natural marks may not be consistently identified by researchers, and flipper tags, in addition to being difficult to read from a distance, are not considered permanent markings. The use of tattooing and toe-clipping or web punching as methods of permanent marking were not considered suitable for the study objectives because such marks are not visible from a distance and require frequent recapture of the individuals (and associated disturbance of other animals on a rookery or haulout site) for confirmation of identity. Freeze branding was not considered a viable alternative to hot-branding because: (1) freeze brands require longer contact time with the animal which could result in more stress; (2) animals would have to be anesthetized to obtain legible brands, and the use of anesthesia was cautioned against because of the potential for overdose and overheating; (3) the equipment needed for freeze-branding was considered too cumbersome and logistically difficult in the field; and (4) the unpigmented skin produced by a freeze-brand could be difficult to distinguish from the light pelage of harbor seals and Steller sea lions.

A Finding of No Significant Impact (FONSI) was signed by the Acting Assistant Administrator for Fisheries on July 16, 1993. The scope of the EA, however, neither included Steller sea lions in Alaska nor could it have considered the potential cumulative effects of the significant increase in scientific research activities that are currently permitted and have been proposed since 2000. In addition, the status of Steller sea lions has changed significantly since the time the EA was prepared. The species was divided into two populations and the western population was listed as endangered in 1997, and this population continues to decline at an average rate of 5% per year (Sease and Taylor 2001), with an 18% decline in pups counted from 1997 to 1998. Thus, NMFS believes that it should reassess the effects of the increased scope of the research activities on Steller sea lions.

In November 2001, a Supplemental Environmental Impact Statement (SEIS) was prepared to evaluate Steller sea lion protective measures in the federal groundfish fisheries off Alaska (NMFS 2001). The SEIS evaluated alternatives to mitigate potential adverse effects resulting from competition for fish between Steller sea lions and commercial fisheries, which had been identified as jeopardizing the continued existence of Steller sea lions and adversely modifying their critical habitat (NMFS 2001). This issue is controversial because environmental groups have argued that fisheries compete with Steller sea lions for prey, and this competition

has reduced the survival of Steller sea lions, resulting in continued population declines. Conversely, members of the fishing community maintain that the fishing industry is not responsible for the Steller sea lion population decline, and argue that other factors, such as climate change and predation by killer whales, are to blame. The lack of scientific evidence directly linking fisheries with effects on Steller sea lions, combined with ESA requirements relative to burden of proof have heightened the controversy. The issues to be resolved in the SEIS included the implications of the three nautical mile no-transit zones that effectively close some Alaska State waters to directed fishing for groundfish, and the design and execution of some experimental research programs intended to investigate the interactions between fisheries and Steller sea lions. NMFS identified a preferred alternative that involved application of different types of management measures by area and fishery. The management measures included fishery-specific closed areas around rookeries and haulouts, as well as season and catch apportionments. Uncertainty about the nature of the effects of fisheries on Steller sea lions, and the effectiveness and socioeconomic impacts of conservation measures intended to minimize the potential for adverse impacts, remain an issue of controversy that has heightened the sense of need for continued and additional research on the causes of the decline of Steller sea lions.

1.3 Decision and other agencies involved in this analysis

The Director, Office of Protected Resources, NMFS (Office Director) must decide whether allowing the proposed amendments to the subject permits, and authorizing the new permits, is consistent with the purposes and policies of the MMPA, ESA and their implementing regulations, including making certain the permitted activities will not operate to the disadvantage of an endangered species. In considering the proposed action and alternatives, the following factors must also be considered: 1) will the anticipated results of the proposed action contribute significantly to fulfilling the objective of understanding management needs for recovering threatened and endangered Steller sea lions: 2) what are the potential cumulative impacts on Steller sea lions and the human environment of the proposed action; and 3) can the objective be achieved using the proposed techniques without significant adverse impacts?

In reviewing the requested amendments to the subject permits, the Office Director has consulted with the Marine Mammal Commission (MMC), pursuant to 50 CFR 216.33 (d)(2). The MMC has provided comments on the proposed actions and has expressed concerns that the proposed multi-year activities could have adverse effects on both individual Steller sea lions and sea lion populations (See Appendix A). The extensive research described in the existing permits, together with additional research requested in the proposed amendments, and other research [funded under the SSLRI] needs to be assessed to determine whether they pose a significant factor affecting the status of the species. The MMC further stated that [it] is not clear [to them] whether all of the planned research is essential, or whether the potential merits outweigh the cumulative or combined risks. Based on these comments, and its implementing regulations under the ESA and MMPA, NMFS recognizes the need to examine the proposed research and the possibility that the proposed research, in combination with other activities, may have short or long-term direct or indirect effects on the human environment as required under NEPA.

1.4 Scoping Summary

Upon receipt of a valid and complete application for a scientific research permit, the Office Director publishes a notice of receipt in the *Federal Register* that summarizes the application, including: the purpose of the request, the species and number of marine mammals; the type and manner of special exception activity proposed; the location in which the marine

mammals will be taken; and the requested period of the permit (50 CFR 216.33 (d)(1)). This notice also lists where the application will be available for review and invites all interested parties to submit written comments concerning the application within 30 days of the date of the notice. Concurrent with publication of this notice, the Office Director forwards a copy of the complete application to the MMC for comment (50 CFR 216.33 (d)(2)). The application is also forwarded to NMFS Regional Offices and Science Centers in the area where the proposed research would occur, and independent scientific experts, as appropriate (50 CFR 216.33 (d)(3)). The provisions of 50 CFR 216.33(d) and (e) governing notice of receipt, review, and decision apply to all proposed major amendments.

Issuance of scientific research permits is among a category of actions that are exempted (categorically excluded) from further environmental review and requirements to prepare environmental review documents, except under extraordinary circumstances. The regulations governing issuance of special exception permits for scientific research (50 C.F.R. 216.33) require an initial determination as to whether the use of the categorical exclusion is appropriate. In other words, if an initial evaluation establishes that a prior NEPA analysis for the "same action" demonstrated that the action would not have significant impacts on the quality of the human environment, where determining whether the proposed action is the "same" as a prior action may include the nature of the action, the geographic area of the action, the species affected, the size of the area, etc., then preparation of an EA or EIS is not required. When a proposed action that would otherwise be categorically excluded involves a geographic area with unique characteristics, is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an EA or EIS is required.

On November 2, 1999, a notice of receipt of an application for a scientific research permit from NMML, Alaska Fisheries Science Center, was published (64 FR 59163). Based on the information presented in the application, NMFS made an initial determination that the proposed activity was categorically excluded from the need to prepare an EA or EIS. No public comments were received regarding this application and the MMC recommended approval provided that the NMFS ensure that activities to be conducted under the permit, and those of other permit holders who might be carrying out research on the same species in the same areas, are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals. On June 8, 2001, a notice of receipt of an application for an amendment to NMML Permit No. 782-1532 was published (66 FR 30885). No public comments were received regarding this request. However, in their comments on both this amendment request, and the request to amend Permit No. 358-1564-01, the MMC expressed concerns as outlined above in Section 1.3.

On February 11, 2000, a notice of receipt of an application for a scientific research permit from the Alaska Department of Fish and Game (ADF&G) was published (65 FR 6997). Based on the information presented in the application, the Service made an initial determination that the proposed activity was categorically excluded from the need to prepare an EA or EIS. No public comments were received regarding this application and the MMC recommended approval provided that the NMFS ensure that activities to be conducted under the permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals. On July 5, 2001, a notice of receipt of an application for a major amendment to ADF&G's Permit No. 358-1564-01 was published (66 FR 35412). No public comments were received regarding this request, but the MMC did express concerns, as outlined above in Section

1.3.

Pursuant to permit application review procedures (50 CFR 216.33(c)), the Office Director made a determination at the time of initial review that the activities proposed in an application for a scientific research permit from the Aleutians East Borough were categorically excluded from the need to prepare an EA or EIS. A notice of receipt of the application was published on August 22, 2001 (65 FR 44120). No public comments were received regarding this application. The MMC recommended approval of the requested permit provided that NMFS, Office of Protected Resources, Division of Permits, Conservation and Education, ensure that activities to be conducted under the permit, and those of other permit holders who might be carrying out research on the same species in the same areas, are coordinated and, as possible, data and samples are shared, to avoid unnecessarily duplicative research and unnecessary disturbance of animals. The MMC also recommended that NMFS be satisfied that the proposed research, in combination with other multi-year research activities, will not result in adverse cumulative effects on individual Steller sea lions and/or sea lion populations. In addition, the MMC referred to the specific concerns regarding cumulative effects of research, as provided in their comments on the proposed amendments to Permits No. 782-1532 and 358-1564-01, outlined above.

A Notice of Receipt of the applications from Dr. VanBlaricom (File No. 1016-1651), Dr. Davis (File No. 800-1664), the ASLC (File No. 881-1668), and the ODFW (File No. 434-1669) were not published in the Federal Register because NMFS determined, during the application review, that the nature of their current and proposed research on Steller sea lions warranted preparation of an EA. Under such circumstances the regulations governing the review of applications for marine mammal scientific research permits (50 CFR 216.33) provide that the Office Director will make an initial determination under NEPA as to whether the proposed activity is categorically excluded from the preparation of further environmental documentation, or to prepare an EA or EIS if the proposed activity is not categorically excluded from such requirements. Upon receipt of a valid, complete application, and the preparation of any NEPA documentation that has been determined initially to be required, the Office Director will publish a notice of receipt in the Federal Register. Therefore, these two applications (File No. 1016-1651 and 800-1664) are available for public comment and review (including review by the MMC) concurrent with this document.

The proposed action would authorize takes of endangered and threatened Steller sea lions for research activities throughout their range in the United States, from California through the Aleutian Islands in Alaska. The geographic area of the proposed action encompasses designated state and national wildlife refuges and parks, which were established for the restoration, preservation, and protection of wildlife and wildlands habitat, including endangered and threatened species of birds and mammals and their habitats. The effectiveness of fishery management plans and federal regulations designed to reduce the potential for adverse effects of fisheries on Steller sea lion populations is uncertain, as is the exact nature of the effect of fisheries on sea lions. A lack of scientific evidence directly linking fisheries with effects on Steller sea lions and the socioeconomic impacts of conservation measures intended to minimize the potential for adverse impacts mean that continued and additional research on the causes of the decline of Steller sea lions is crucial. While there is information on the potential effects on individual animals of many of the various research techniques proposed, there has been no analysis of the synergistic effects, on individuals, populations, or species, of the proposed combinations of research techniques. There have been no previous NEPA analyses that considered the potential cumulative effects of a scientific research program of this magnitude on a threatened or endangered species that is also affected by other human activities on a large scale. Therefore, NMFS is concerned that the cumulative level of potential takes from the proposed and permitted research may exceed the categorical exclusion (NAO 216-6) for the need to prepare an EA or EIS. This is also being examined in this document.

Therefore, the scope of this document reviews four specific issues. First, the use of hot-branding to permanently mark animals has been and continues to be a subject of public controversy, including animal welfare organizations. Since 1987, NMFS has issued numerous permits authorizing hot-branding of pinnipeds (including California sea lions, Steller sea lions, harbor seals, and northern elephant seals). In 1993, when NMFS proposed to issue permits authorizing hot-branding of harbor seals and Steller sea lions, NMFS received substantial comments from the Animal Welfare Institute, the Humane Society of the United States, the Animal Legal Defense Fund, the Marine Mammal Center, Earth Island Institute, People for the Ethical Treatment of Animals, the Animal Protection Institute of America, and Dr. David Lavigne, University of Guelph, Ontario, Canada. The majority of comments received related primarily to concern about the humaneness of the technique, i.e., the degree of pain, suffering, and stress that results from hot branding. In 2000, when NMFS published a notice of receipt of an application for research on harbor seals that included a proposal for hot-branding (65 FR 35903, June 6, 2000), the Animal Protection Institute requested that NMFS deny permission to hot brand harbor seals, stating that the technique was cruel, excessive and unnecessary, and suggesting that freeze-branding was a more humane alternative. NMFS also received comments in 2001 from the Animal Welfare Institute protesting the current hot-branding of young Steller sea lions.

A second issue that needs to be assessed is the potential for the proposed action to adversely impact a threatened or endangered species. One of the criteria for determining significance of a proposed action is whether the action threatens to violate federal state, or local law, or other legal requirements for the protection of the environment, which holds federal agencies to a broader standard than minimum compliance. Because Steller sea lions are listed as threatened and endangered under the ESA and protected under the MMPA, the NEPA process requires that the proposed action is not likely to jeopardize the continued existence of an endangered species or result in the destruction or adverse modification of its critical habitat, and will not disadvantage the affected species or stock. Thus, consistent with the purposes and policies of the MMPA and ESA and their implementing regulations, NMFS must assess: (1) the risks to individual sea lions from some of the proposed techniques, such as remote blubber biopsy sampling, as a result of the synergistic, cumulative impacts from all research activities conducted on each sea lion, as well as from the disturbance related to research; (2) the potential for significant cumulative effects on the populations as a whole, also resulting from the synergistic effects of separate procedures must be evaluated. The population level impact of these potential adverse effects are unknown; and (3) the potential for a significant adverse effect on threatened and endangered Steller sea lions due to the large geographic extent of the proposed research (throughout the species' range in North America, focused primarily in Alaska), the percentage of the total population that would be disturbed and/or handled, and intrusive research on young animals (newborn pups to juveniles). Therefore, the purpose of this document is to review the potential effects of a variety of scientific research activities on Steller sea lions and the environment.

1.5 Federal Permits, Licenses, and Entitlements Necessary to Implementation of the Action

The MMPA generally prohibits any person from taking marine mammals in U.S. waters and prohibits U.S. citizens from taking marine mammals on the high seas. Section 104 of the MMPA allows for issuance of permits to take marine mammals for the purposes of scientific research or to enhance the survival or recovery of a species or stock. These permits must specify the number and species of animals that can be taken, and designate the manner period, and locations in which the takes may occur.

Further, Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Permits to take ESA-listed species for scientific purposes (or for the purpose of enhancing the propagation or survival of the species) may be granted pursuant to Section 10 of the ESA and in accordance with the issuance criteria specified at 50 CFR 222.308(c). The intent of the issuance criteria (which represent the restrictions placed upon the Secretary′ s discretion to issue permits) is to ensure that any such activities represent the most practicable and realistic opportunity to encourage the development of the species. Further, these permits, when exercised, shall not operate to the disadvantage of the listed species.

Some of the proposed research would occur within the boundaries of state or national wildlife refuges or parks. For example, the Alaska Maritime National Wildlife Refuge encompasses coastline, islands, reefs, etc. extending from southeast Alaska on the border of British Columbia to Cape Lisburne on the Chukchi Sea. Some islands within the refuge have restricted access in order to protect wildlife (including seabirds, Steller sea lions, and other mammals), and special use permits must be obtained from the U.S. Fish and Wildlife Service. Military clearance is required for access to Adak, Shemya, Amchitka, and Attu Islands in the Aleutian Chain.

1.5.1 Brief overview of process for obtaining a NMFS Scientific Research Permit under MMPA and ESA

Persons seeking a special exception permit for scientific research must submit an application to NMFS. The applicant must describe the species to be taken, the manner and duration of the takes, the qualifications of the researchers to conduct the proposed activities, as well as provide justification for such taking. Upon receipt, applications are reviewed for completeness and compliance with regulations specified at 50 CFR 216.33. At this time, an initial determination is made as to whether the proposed activity is categorically excluded from the need to prepare an EA or EIS. A Notice of Receipt of complete applications must be published in the Federal Register. This Notice invites interested parties to submit written comments concerning the application within 30 days of the date of the Notice. At the same time, the application is forwarded to the MMC and other reviewers for comment. In addition, if endangered species are likely to be affected by the proposed activities, the Permits Division must consult with NMFS, Endangered Species Division (or the U.S. Fish and Wildlife Service if species under their jurisdiction are involved). At the close of the comment period, the applicant may need to respond to requests for additional information or clarification from reviewers. If the categorical exclusion for the need to prepare and EA/EIS does not apply, appropriate environmental documentation must be prepared. If all concerns can be satisfactorily addressed and the proposed activity is determined to be in compliance with all relevant issuance criteria (see sections 1.5.2 and 1.5.3), the Office Director will issue a permit.

1.5.2 MMPA regulations regarding issuance of SRPs

The regulations promulgated at 50 CFR 216.33(c)(2)(v)(A-B), 216.34, and 216.41(b) specify criteria to be considered by the Office Director in reviewing applications and making a decision regarding issuance of a permit or an amendment to a permit. Specifically, 216.33(c) requires that the Office Director (A) make an initial determination under NEPA as to whether the proposed activity is categorically excluded from preparation of further environmental documentation, or whether the preparation of an EA or EIS is appropriate or necessary; and (B) prepare an EA or EIS if an initial determination is made that the activity proposed is not categorically excluded from such requirements. The permit issuance criteria listed at 216.34 require that the applicant demonstrate that:

> (1) The proposed activity is humane and does not present any unnecessary risks to the health and welfare of marine mammals.
>
> (2) The proposed activity is consistent with all restrictions set forth at 216.35 and any purpose-specific restrictions as appropriate set forth at 216.41, 216.42, and 216.43.
>
> (3) The proposed activity, if it involves endangered or threatened marine mammals, will be conducted consistent with the purposes and policies set forth in section 2 of the ESA.
>
> (4) The proposed activity by itself or in combination with other activities, will not likely have a significant adverse impact on the species or stock.
>
> (5) The applicant's expertise, facilities, and resources are adequate to accomplish successfully the objectives and activities stated in the application.
>
> (6) If a live animal will be held captive or transported, the applicant′ s qualifications, facilities, and resources are adequate for the proper care and maintenance of the marine mammal.
>
> (7) Any requested import or export will not likely result in the taking of marine mammals or marine mammal parts, beyond those authorized by the permit.

In addition to these requirements, the issuance criteria at 216.41(b) require that applicants for permits for scientific research must demonstrate that:

> (1) The proposed activity furthers a *bona fide* scientific or enhancement purpose.
>
> (2) If the lethal taking of marine mammals is proposed:
>
> (a) Non-lethal methods for conducting the research are not feasible; and
> (b) For depleted, endangered, or threatened species, the results will directly benefit that species or stock, or will fulfill a critically important research need.
>
> (3) Any permanent removal of a marine mammal from the wild is consistent with any applicable quota established by the Office Director.
>
> (4) The proposed research will not likely have significant adverse effects on any other component of the marine ecosystem of which the affected species or stock is a part.
>
> (5) For species or stocks designated or proposed to be designated as depleted, or listed or

proposed to be listed as endangered or threatened:
(a) The proposed research cannot be accomplished using a species or stock that is designated or proposed to be designated as depleted, or listed or proposed to be listed as threatened or endangered;
(b) The proposed research, by itself or in combination with other activities will not likely have a long-term direct or indirect adverse impact on the species or stock;
(c) The proposed research will either:
(i) Contribute to fulfilling a research need or objective identified in a species recovery or conservation plan, or if there is no conservation or recovery plan in place, a research need or objective identified by the Office Director in stock assessments established under Section 117 of the MMPA;
(ii) Contribute significantly to understanding the basic biology or ecology of the species or stock, or to identifying, evaluating, or resolving conservation problems for the species or stock; or
(iii) Contribute significantly to fulfilling a critically important research need.

1.5.3 ESA regulations regarding issuance of SRPs

In addition to all the above issuance criteria under the MMPA, the issuance criteria specified at 50 CFR 222.308(c) must also be considered in making a decision to issue a permit for takes of Steller sea lions for scientific research and enhancement purposes, because Steller sea lions are listed as endangered and threatened under the ESA. Thus, NMFS, in determining whether to issue permits and amendments to take endangered and threatened species must consider the following:

(1) Whether the permit was applied for in good faith;

(2) Whether the permit, if granted and exercised, will not operate to the disadvantage of the endangered species;

(3) Whether the permit would be consistent with the purposes and policy set forth in section 2 of the ESA;

(4) Whether the permit would further a *bona fide* and necessary or desirable scientific purpose or enhance the propagation or survival of the endangered species, taking into account the benefits anticipated to be derived on behalf of the endangered species;

(5) The status of the population of the requested species and the effects of the proposed action on the population, both direct and indirect;

(6) Whether alternative non-endangered species or population stocks can and should be used;

(7) Whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application;

(8) Opinions or views of scientists or other persons or organizations knowledgeable about

the species which is the subject of the application or of other matters germane to the application; and

(9) How the applicant's needs, program, and facilities compare and relate to proposed and ongoing projects and programs.

Under section 7 of the ESA, NMFS is required to determine whether issuance of a permit may affect listed species or critical habitat. Unless it is determined that issuance of a permit is not likely to adversely affect listed species or adversely modify critical habitat, the Permits Division must formally consult with the Endangered Species Division. In requesting this consultation, the Permits Division is required to provide the best scientific and commercial data available for an adequate review of the effects of the proposed permit on listed species and critical habitat (50 CFR 402.14). Although the ESA does not define harassment, it has been defined in Biological Opinions prepared during consultations on issuance or marine mammal research permits, as injury to an individual animal or population of animals resulting from a human action that disrupts one or more behavioral patterns that are essential to an individual animal's life history or to the animals contribution to a population, or both. Particular attention is given to the potential for injuries that may manifest themselves as an animal that fails to feed successfully, breed successfully (which can result from feeding failure), or complete its life history because of changes in its behavioral patterns.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs of, and any related mitigation for, each alternative.

2.1 General Considerations

Steller sea lions are listed as threatened (eastern population) and endangered (western population) under the ESA; more specific information on the status of both populations and the life history of Steller sea lions in general is provided in Section 3.1. Although evidence suggests the eastern population of Steller sea lions is either stable or increasing throughout its range in Alaska, the western population is declining in most of its range, and the population abundance is at approximately 25% of the size in the 1970s. As discussed in Chapter 1, substantial resources have recently been dedicated to investigating the cause of the continued decline and identifying conservation measures that can be taken to recover the species to a level where it can be removed from listing under the ESA. These investigations can be split into two general categories for the purposes of research permitting criteria: (1) research based on data that can be collected without need of a permit because it does not involve intrusive procedures or disturbance (i.e., takes), and (2) research based on data that can only be obtained by disturbance or intrusive research procedures, which require a permit because they involve handling or otherwise disturbing (taking) animals. For example, details of the distribution and behavior (e.g. diving patterns, diet composition) of Steller sea lions at sea are important in understanding the potential effects of fisheries on the population. The utility of simple, observational studies for discerning foraging patterns in marine mammals is limited, but telemetry instruments attached to sea lions can provide details on location, dive depth and duration, and, in some cases, prey ingestion events. Similarly, observational studies can provide information on the presence or absence of lactating females on a rookery (and on the amount of time a pup spends suckling), which can be used to infer foraging intervals and durations. However, only telemetry studies can provide details on habitat use (where the animals go to feed and how long they spend diving to capture prey) that can be used in making management decisions about where to allow fisheries activity. Further, observational studies cannot reveal detailed information on the health and body condition of animals, which may be related to nutritional stress. Physical examination by a qualified expert, and blood and tissue samples, are needed for collection of these data. Information about population structure (degree of genetic mixing or isolation) and dispersal rates requires genetic analyses of tissue samples.

An important consideration in determining whether to authorize these proposed research activities by permit, is whether the information expected to be gained will contribute to fulfilling a research need or objective identified in the Final Recovery Plan for Steller sea lions or will contribute significantly to identifying, evaluating, or resolving conservation problems for Steller sea lions. The primary purpose of the Final Recovery Plan for Steller Sea Lions, written in 1992, was to propose a set of actions that would minimize any human-induced activities that may be detrimental to the survival or recovery of the population. The immediate objectives of the Plan were to identify factors that are limiting the population, actions necessary to stop the population decline, and actions necessary to allow the population to increase. The Plan identifies the specific management actions that must be taken to ensure that the species recovers to the point that it can be removed from ESA listing, and recommends general and specific research programs intended to collect data that would improve understanding of management needs for recovering Steller sea lions. These recommendations include research to identify habitat

requirements and areas of special biological significance, identify management stocks, monitor status and trends of sea lion abundance and distribution, monitor health, condition, and vital parameters, assess and minimize causes of mortality, and investigate feeding ecology and factors affecting energetic status. Within each of these broad information categories, the Recovery Plan recommends specific research activities, such as the use of telemetry instruments for delineating habitat use and movement patterns, aerial surveys for documenting trends in abundance, and non-lethal sampling methods (e.g. blood and tissue sampling of restrained sea lions) to monitor blood chemistry parameters.

During 1997-1999, the Steller Sea Lion Recovery Team conducted four peer-reviewed workshops to review research implemented under the Recovery Plan. The Recovery Team identified four subject areas to be dealt with in the workshops: land-based observational studies of behavior; telemetry studies; physiological studies; and feeding ecology studies. The review panel for the first workshop, on behavior and rookery studies, stated that research on behavior should be formulated to test hypotheses, either about the causes of the declines or should be designed to provide basic information that could be useful in promoting recovery (NMFS 1997a). The panel felt that the concept that there are areas of population decline and stability may be dated and suggested that behavior studies need not be associated with such a scenario. The panel found that the behavior studies had failed to calibrate behavior with characteristics of Steller sea lions that should affect survival, and stated that behavior characteristics measured must be related to something that is important to the animals (e.g., growth rate), otherwise there is no way to evaluate the behavioral results with respect to limiting factors in the population. The panel felt that all behavior studies (e.g., age-specific recruitment patterns, reproductive performance, and survival probability) would have benefited from knowing the histories of the animals studied and recommended permanent marking of individuals. They felt hot brands were the most economically feasible technique for this marking, and recommended a major branding effort supported by consistent, intensive, all-season resight effort for several years. The panel also felt it was important to conduct a study on the effects of the branding (both the disturbance caused by the branding and the brands themselves) to anticipate its effects on data collected, and to use current population models to determine the sample size needed to evaluate the decline. Given the hypothesis that juvenile survival and recruitment is a factor in the decline, the panel recommended more studies on this age class, especially focusing on the time of weaning and timing of mortality. Finally, the review panel questioned the applicability of some studies to recovery of the species and whether the Permit Division should give permits for work that does not fit into the overall recovery plan framework.

The discussion of the second peer-reviewed workshop, on telemetry studies, concluded that the ability to determine feeding areas and cycles of Steller sea lions using telemetry was limited by the size of the tags, the ability to capture animals, problems with tag attachment, and limited ability to identity when and where animals are successfully feeding (NMFS 1997b). A variety of new and developmental technologies were discussed, including use of implantable tags. It was recommended that the effectiveness of implant methods be demonstrated using a properly designed experiment with an adequate sample size, and that a feasibility test could be performed using carcasses of California sea lions, elephant seals, and Steller sea lion pups. A large-scale, long-term branding program was suggested as a low-technology approach for understanding weaning and survival, but it would require a long-term commitment. There was concern about the amount of disturbance to rookeries associated with branding activities: the Recovery Team had already recommended limiting pup counts/branding to no more than every other year at any rookery to minimize disturbance. Although researchers have reported observing no adverse effects (i.e., no evidence of branding mortality was cited) following repeated branding events at Forrester Island (southeast Alaska), it was stated that disturbance effects may be substantial in some situations. As with the review panel for the behavior workshop, this review

panel expressed concern about the potential problems associated with the focus on comparisons between stable and declining populations. The panel was also concerned that the results of telemetry studies had not been associated with anything that would affect survival probability and that there appeared to be a lack of integration of the various research programs and disciplines, such that it was not clear how the studies fit together. In addition to recommending continuation of telemetry studies of at-sea behavioral ecology and supporting development of improved techniques for capture and instrument technologies, the panel recommended development of a strategic plan and study designs to "integrate the various research projects into a cohesive approach for determining what factors are affecting sea lion populations and their potential recovery." Finally, the review panel recommended coordination to ensure consistency in collection and analysis of data.

The executive summary from the third workshop, on physiology, states that the review panel found that research needed to be directed away from identifying the cause of the decline and towards aiding the recovery of the species using "bold, expeditious, and integrative solutions" (NMFS 1999a). The review panel had several areas of concern regarding the existing physiological research program: (1) poor coordination between research projects leading to the absence of adequate synthesis; (2) unidentified or unreasonable project goals; and (3) general lack of research planning to reasonably address population recovery issues. The panel felt that many of these problems were exacerbated by the distribution of congressional funds to multiple entities and recognized the need for clear program oversight and a competitive, peer-reviewed proposal process to improve the quality of the research program. The panel called for immediate development of a 3-5 year operational strategic plan to be peer reviewed before and after its implementation and found that improved coordination between academic, government, and private institutions, as well as accountability of the research program were imperative if the physiological research was to contribute significantly to the recovery of the Steller sea lion.

The review panel for the final workshop, on feeding ecology studies, concluded that while research to date had made progress toward developing an understanding of the basic biology of Steller sea lions, hypotheses regarding the decline had not been successfully tested, and recommended development of a strategic quantitative model of the energetics, life history, and population dynamics of Steller sea lions (NMFS 1999b). While the panel acknowledged the conceptual (e.g., laying out the possible causes for the decline or factors that might influence recovery), design (e.g., sample sizes, replication, and an hypothetical framework), and technical constraints plaguing research, they felt that data being generated was not being assembled into a unifying framework. The review panel also recommended taking advantage of fishery exclusion zone experiments and other examples of adaptive management to test the hypothesis of fishery impact, while continuing to monitor diets of Steller sea lions using scat and stomach contents analyses and other applicable research techniques (e.g., fatty acid analysis) focusing on the sites where and seasons when Steller sea lions appear to be most vulnerable. Finally, the review panel recommended discontinuing hydroacoustic and bottom/midwater trawl survey programs in their present form because (1) these surveys did not correspond well to the spatial and temporal scales of Steller sea lion foraging behavior (i.e., samples collected near rookeries during short windows at one time of the year should not be relied upon to provide meaningful information on prey availability to Steller sea lions during the extended period they are on rookeries); (2) productivity near rookeries may not be relevant if juvenile and adult Steller sea lions do not forage there; and (3) prey distribution and Steller sea lion foraging activity are both dynamic.

Additional recommendations for research directions were made in the Biological Opinion on the Bering Sea/Aleutian Island and Gulf of Alaska groundfish fisheries (NMFS 2000). Among the Conservation Recommendations, it was recommended that: (1) additional research be

conducted on the extent to which Steller sea lions utilize foraging habitat outside the current critical habitat limits; (2) programs to assess the effectiveness of Reasonable and Prudent Measures in Opinion be expanded; and (3) the role of fisheries in sea lion population dynamics, including the relative contribution of the fisheries among other factors that may be contributing to the sea lion decline, be evaluated.

The Recovery Plan acknowledges that certain types of research activities, including capturing animals for attaching telemetry instruments or obtaining blood samples, are intrusive and cause disturbance. The Recovery Plan, therefore, recommends that such intrusive studies be conducted in conjunction with other activities, and that factors such as possible injury and mortality associated with disturbance and handling be considered when planning and conducting studies. The Recovery Plan encourages use of mitigation measures to minimize the impacts of research and recommends development of alternative, less intrusive, techniques for collecting data.

2.1.1 Research techniques

The following is a description of the research techniques that are being used and/or proposed to collect data on the biology, ecology, and physiology of Steller sea lions, as well as common mitigation measures.

Aerial surveys: The purpose of aerial surveys is to obtain photographs in which the number of animals present on a rookery or haulout are counted. This information is used to estimate the abundance of animals. The protocol currently employed by NMML and ADF&G for aerial surveys involves flying over rookeries and haul out sites at slow air speeds (100-150 knots), low altitudes (150-200 m), and close offshore (500 m), to take 35-mm color photographs and a back-up high-resolution 8mm video or digital for the purpose of counting non-pups present. Aerial surveys are currently flown in alternating years, during June and July (breeding season) to photograph non-pups. The surveys typically include a single pass over each site, with additional passes made only when the photographers have reason to believe they may have missed part of the site. Replicate surveys on separate days are occasionally conducted to develop an estimate of the survey variance. Such estimates require multiple surveys at individual sites. The surveys are conducted between 1000 and 1600 hrs, as determined by the sun's position. The June-July and August-May surveys are currently flown every other year at individual sites, and NMML and ADF&G alternate years on rookeries so that no rookery is disturbed more than once per year in June/July by this activity.

Vessel surveys: For the purposes of resighting sea lions tagged and branded by other permit holders and for collecting behavioral observations, vessels approach sea lion rookeries and haulouts within 200 meters. No vessel would be within close proximity to a rookery or haulout for this activity for more than 2-3 days at a time.

Ground counts: Techniques for counting pups from aerial photographs are under development, but are as yet inadequate for counting pups reliably range wide or for providing results comparable to previous pup counts. Consequently, personnel go ashore at rookeries during June and July, or approach closely in vessels, to count young pups. Whenever possible, pups are counted from vessels, overlooks or other vantage points to minimize disturbance of rookeries. However, when these methods are unsuitable for accurate counts, personnel come ashore at rookeries to count pups in what are also called drive counts. Typically, all, or the majority of, adult and juvenile animals are intentionally driven or spooked from the rookery into the water or water's edge, in order to facilitate counting pups. After all or the majority of non-

pups have retreated or entered the water, two or more biologists walk across the rookery, making independent counts of live and dead pups on the beach and in the water. Researchers occupy the rookery for ≤ 2 hours for counting, except when a number of pups are captured for weighing, measuring, and collection of tissue samples. In these instances, time on the rookery is limited to ≤ 5 hours by existing permit conditions. These counts are currently limited to no more than once every other year per rookery to reduce the potential adverse effects of disturbance. NMML and ADF&G alternate years on rookeries so that no single rookery is disturbed more than once per breeding season by this activity.

Permit Nos. 782-1532 and 358-1564-01 require researchers to wait until the end of the pupping season, after mother-pup bonds are well established (see Mitigation Measures below), before conducting this activity. The timing of these activities, as indicated in the applications, permits, and annual reports, is intended to coincide with the end of pupping season to ensure minimal disturbance of breeding activities, and especially mothers with pups.

Scat collection: Personnel go ashore on rookeries and haulouts to collect scat (fecal) samples for dietary studies, which can result in harassment and displacement of sea lions on rookeries and haulouts. Although blubber, whiskers, and other tissue samples are used in analyses of diet and feeding ecology, collection of these samples requires capture and restraint of animals. While not without limitations and biases (Bigg and Fawcett 1985; Antonelis et al. 1987; Harvey 1989; Pierce et al. 1993), scat collection provides a mechanism for broad estimates of the recent prey consumed by large numbers of sea lions without the potential adverse effects associated with capture and restraint. Scat samples are also analyzed for levels of hormones associated with stress and reproduction, thereby providing an estimate of the status of animals on the rookery without capture and handling. Scat collection typically coincides with ground counts or other rookery and haul-out activities, to minimize the amount of disturbance.

Behavioral and Demographic Observations and Remote Monitoring: Field teams are stationed at locations in Alaska during the breeding season to conduct daily counts of sea lions by class (e.g., pups, juveniles, adult females, territorial males, etc.), conduct studies of attendance patterns of branded, tagged, and naturally-marked animals, record the presence of tagged and branded animals, and record observations of entangled or injured sea lions and the presence of other marine mammals and boat or air traffic. Remote monitoring stations equipped to collect any or all of still photographs, video images, VHF telemetry signals, and sonic transmitters, are set up on selected islands to collect similar data on seasonal movements and changes in abundance of sea lions. One objective of the observations and monitoring is to provide information on the sex and age structure of the population to complement that collected during ground counts, aerial surveys and capture activities. A second objective is to re-sight branded animals for studies of vital statistics. Observations are made from cliffs or other vantage points above rookeries and does not result in any takes. Establishing and servicing remote monitoring stations may result in harassment of some animals: these takes are included in the tasks for ground counts and capture/sampling activities.

Capture and restraint: It is usually necessary to restrain an animal in order to collect specimens, perform an examination, or attach instruments. Animals captured are subjected to some or all of the following procedures: morphometric measurements (e.g., mass, length, girth), blood collection, attachment of scientific instruments, anesthesia, hot-branding, flipper-tagging, skin and blubber biopsy, tooth extraction, and administration of deuterium oxide (isotopically-labeled water). On the rookery, very young pups are caught and picked up by researchers, while capture of older/larger animals usually requires the use of a net or injectible immobilizing agent (administered by a dart). The injectible immobilizing agent used for subduing older animals is

Telazol (tiletamine-zolazepam; 2mg/kg). Animals in the water are captured using a hoop net, rope lasso or floating platform trap. The lasso and floating traps allow sampling of a portion of the population previously inaccessible to researchers, including the juvenile age class of most interest in studies of the decline. The platform traps proposed by the ASLC would consist of a buoy with a 12-foot square platform for a haul-out surface and a 6-foot high steel cage perimeter, similar to traps that have been used to capture California sea lions in Washington (under Permits No. 835 and 782-1446). Sea lions that are captured in these traps are transferred to and restrained in stainless steel squeeze cages that restrict the animal's movement without the need for immobilizing drugs.

Pups are restrained for handling and processing by hand, in a hoop net, or with inhalation (through a mask over their nose) of isoflurane gas. Older animals are maintained on gas anesthesia for biological sampling and instrument attachment through an endotracheal tube (intubated) for administering isoflurane. Older animals may be restrained with inhalation of isoflurane, as well as in a fabric restraining wrap or by wrapping in a restraining net or with the use of Valium (5ml per 100kg mass at 5mg/ml concentration) for sedation.

Blood collection: Blood samples are collected from pups and juveniles of both sexes for a variety of analyses ranging from basic health assessment (including basic hematology and serum chemistry panels, disease status, and body composition), to studies to estimate blood volume as it relates to dive capacity. Although most blood characteristics are influenced by all types of stressors, including the stress associated with chase, capture, physical restraint, and chemical immobilization (Kirkpatrick 1980), some studies have correlated differences in blood chemistries to individual health in relationship to disease or environmental conditions when the effects of the stress associated with chase/capture/restraint were considered (Fadely 1997; Zenteno-Savin et al. 1997; Rea et al. 1998).

Blood collection in wild pinnipeds requires restraint, either physical or chemical. Smaller pups can be physically restrained by one to two researchers kneeling over or beside the animal to hold it stationary. Restraint of larger sea lions (i.e., over 75 kg) is facilitated by use of Valium, or, if other, lengthy physiological procedures are to be performed, with gas anesthesia. The most common site for blood collection in Steller sea lions is the caudal gluteal vein, which is near the animal's tail (near the iliac crest), just to either side of the spine. To locate this vein, the animal must be restrained symmetrically, lying on its stomach with foreflippers tucked against the body and hindflippers straight out behind the animal. The caudal gluteal vein is not particularly large, especially in young pups, and can be difficult to locate beneath the fur, especially if the animal is not properly restrained and immobilized. Blood can also be collected from the interdigital veins of the hind flipper, which can be easier to locate due to the absence of hair and blubber layer on the flippers. However, the caudal gluteal vein is preferred because it may be very difficult to obtain blood from the interdigital veins under cold and wet conditions when the sea lion is experiencing vasoconstriction (reduced blood flow) in its extremities.

Blood sampling is often performed in conjunction with other sampling procedures such as flipper tagging, hot branding, administration of deuterium oxide, tooth extraction, enemas, and skin and blubber biopsy.

Muscle biopsy: Neither permit currently authorizes muscle biopsy. According to the applications to amend Permits No. 358-1564-01 and 782-1532, muscle biopsies would be used to analyze myoglobin content and fiber type. These measurements will permit calculation of muscle oxygen stores, which, in combination with estimates of blood volume (using Evans blue dye, as described below), can be used to estimate the aerobic dive capacity, which is a measure of

diving ability. Determining how aerobic dive capacity changes with developmental stage from pup to juvenile is used in interpreting foraging behavior derived from telemetry data. The procedure for obtaining a muscle biopsy, as described in the applications, involves injecting local anesthesia (2-ml Xylocaine) subcutaneously and intramuscularly at the sampling site or the use of general anesthesia (isoflurane gas). The applicants propose to clean the site with Betadine, make a 6-7 mm incision with a scalpel blade, and insert a closed 5-mm muscle biopsy canula needle into the incision. The needle would be pushed through the fascia into the muscle layer to a depth of 1-cm, opened, and pressure applied to force muscle into the needle. The needle would then be closed and withdrawn and pressure applied to the wound to staunch any bleeding. The wound will be left open (no sutures or other method will be used to close the wound) to allow any abscesses that may form from infection to drain.

Skin and blubber biopsy: Skin and blubber biopsies approximately 5-to 7-mm in diameter are taken from restrained animals and used for analyses of fatty acids or stable isotope, as one component of feeding ecology studies, as well as for other physiological studies. For skin samples alone, NMML uses a 7-mm diameter ear-tag punch designed for livestock, which , when pushed through the flipper with lever action, cleanly removes a small plug of skin from the flipper. ADF&G uses a commercial ear-notching punch, designed for marking hogs and other livestock, that removes a small V-shaped tissue sample from the trailing edge of the flipper. ADF&G reports that the V-notch wounds are similar in appearance to naturally-occurring wounds. NMML states that it intends to move towards replacing their round punch with the V-shaped punch. Blubber samples are obtained from a dorsal site near the pelvis using a 7-mm diameter biopsy punch. The protocol followed by ADF&G is to prepare the biopsy site by trimming fur from a small patch, and scrubbing the area with pads soaked in dilute Betadine and then pads soaked in alcohol using sterile technique (i.e., starting at the center of the sample site and moving outward). A small, 1-2 cm, incision is made in the skin prior to application of the biopsy punch to accommodate the needle while producing a smaller entry wound than would otherwise occur from the needle directly. The biopsy punch is then applied in a rotating action to cut into the blubber layer to obtain a core. The core is then grasped by sterile forceps, elevated, and cut away by sterile scissors or scalpel blade. Any blood flow from the biopsy site is staunched with direct pressure with a sterile pad. Because absolute sterility of technique cannot be assured in the field, the wound will be left open (no sutures or other method will be used to close the wound) to allow any abscesses that may form from infection to drain. Permit No. 782-1532 authorizes injection of Lidocaine around the biopsy site as a local anesthetic and to reduce bleeding. NMML states that they adopt this technique when appropriate. Both NMML and ADF&G have biologists and veterinarians with extensive experience in performing these techniques.

Under Permit No. 782-1532, blubber biopsies can also be collected from free-ranging or unrestrained animals using a pneumatically-propelled dart fired from a CO_2-charged rifle. The biopsy dart fired from the rifle is designed to collect a 0.6 cm diameter by 2-4 cm long sample of fur, skin, and blubber. The force with which the dart strikes the animal is determined by the power setting on the pneumatic rifle, the distance from the animal, and wind conditions. The blubber samples would be analyzed for fatty acid profiles to evaluate the relative contribution of prey to blubber stores. As requested in the application for a permit from Dr. VanBlaricom (File No. 1016-1651), darts would be fired from cross-bows and animals would either be approached from the water via a small (<6 m) vessel, or stalked to within about 15 m on land. The dart that would be used by Dr. VanBlaricom is designed to remove a 0.6 cm diameter by 3.5 to 4.5 cm long sample of fur, skin, and blubber.

Fecal loops and culture swabs: Samples of fluids and tissues are collected for a variety

of analyses including determination of the presence of parasites and viral or bacterial infections. The applications state that sterilized fecal loops will be used to collect fecal samples for determination of parasites, disease, and hormone concentrations. In addition, sterile rayon-tipped bacterial culture swabs will be used to collect samples from dermal lesions, or from ocular, rectal, and/or vaginal areas, as appropriate, from any handled pups exhibiting external signs of disease. This procedure is usually performed in conjunction with capture, gas anesthesia, flipper tagging, hot branding, administration of deuterium oxide, blood collection, tooth extraction, enemas, skin, blubber, and muscle biopsy.

Tooth extraction: Teeth are extracted in order to estimate the age of animals captured by sectioning the tooth in a laboratory and counting incremental growth layers. An animal's size at a given age is one of the most useful measures of condition, and is important in measures of weaning status. Age of pups up to one year can be estimated based on the season of capture, teeth eruption pattern, and general animal size. However, these techniques are not precise for sea lions older than one year because of the overlap in size. Extraction of one 2nd pre-molar tooth from the right side of the mouth, using a scalpel to loosen attachments and then extracting the tooth with a dental elevator, is accomplished under general anesthesia. If animals are recaptured in subsequent years, additional teeth will not be pulled.

Collecting vibrissae, hair and nails: Vibrissae, hair, and nails are collected for analysis of stable isotopes to determine the trophic level at which an animal has been feeding over time. Vibrissae can be collected either by clipping close to the skin, or by pulling out at the root. For hair samples, an area approximately $3cm^2$ is clipped close to the skin. The tip of a nail from each foreflipper is clipped. The stable isotope ratios of Steller sea lion vibrissae have been shown to have regular, oscillating patterns of 1-3 cm, and changes in the ratio can occur in less than 1 cm (Hirons et al. 1998). Thus, clipped whiskers can provide incomplete records of the sea lion's dietary history, whereas a pulled whisker provides a complete record. Neither permit currently authorizes pulling of whiskers.

Bioelectric Impedence Analysis (BIA): Neither permit currently authorizes this technique. BIA is a method for measuring body composition by measuring the conductivity across electrodes placed on the skin, or inserted subcutaneously (under the skin). The advantage of this technique is that estimates of body composition can be obtained in a few minutes, compared to the two or more hours needed when using deuterated water methods. This technique, which has been used with varying degrees of precision in a variety of marine mammals (Gales et al. 1994; Arnould 1995; Bowen et al. 1998; Bowen et al. 1999; Castellini 2001), requires development of a mathematical model that compares body composition obtained from another method (e.g., deuterated water) with conductance measures from BIA. The purpose of this proposed procedure is to expand the data used in creating such a model for Steller sea lions. The procedure, as described in the application, would be to insert four 1.5-inch 20-gauge needles subcutaneously (two just behind the skull and two near the tail), attach leads to a BIA unit, and measure the rate of current between them. A small current is sent from the BIA unit through one set of electrodes in order to measure the conductivity of the body. The electrodes are removed following the reading and then the measurements are repeated 2-5 times for precision, meaning the electrodes are re-inserted into the individual animal for each new reading.

Evans blue dye: Neither permit currently authorizes this technique. The purpose of this proposed procedure is to determine blood volume. This measure will be used in combination with determination of muscle myoglobin (see muscle biopsy above) to estimate the aerobic dive capacity, which will provide a better understanding of when young sea lions become physiologically able to access various prey resources. Understanding how the aerobic dive

capacity changes during development from pup to juvenile is considered important in interpreting foraging behavior. Following collection of a 7-ml blood sample, a 3-5 ml dose of Evans blue dye would be administered intravenously. Additional 7-ml blood samples would be collected every 5-7 minutes, for 20-30 minutes, for a total of 35 ml of blood per animal for this study.

Flipper tagging: For both permits, plastic (Allflex) tags bearing unique alphanumeric codes may be affixed to any animal captured, including pups as young as one week old, for future identification of individual animals. These type of tags are commonly used in livestock, where they are attached through the upper or front edge of the ear, near the base of the ear where the cartilage is thicker and the tag less likely to pull out, using special pliers in a process similar to ear piercing. In sea lions, these tags are affixed to the trailing edge of each foreflipper, through the loose skin near the area where the flipper meets the body. In most cases, each animal receives two tags, one per foreflipper, to optimize the chance of recognizing the animal if only one flipper is visible, and to minimize the chance of losing the ability to identify the animal should one tag be lost. Flipper tags are subjected to extreme physical abuse and are prone to high loss rates. Under ideal conditions, they can be expected to last four to six months. However, studies in captive pinnipeds suggest that tags last 1-2 years (Dierauf 1990). The tags are brightly colored to optimize visibility and, under optimal conditions, can be read from up to one-half mile away using optical aids (e.g., binoculars and digital cameras). As described previously, the skin punch obtained from flipper-tagged animals may be retained for genetic analyses.

Because blood and tissue samples are frequently collected from animals at the time of tagging, the tagging is often performed with animals under gas anesthesia.

Hot branding: Determination of Steller sea lion vital rates,such as age-specific survival, age at first reproduction, and natality rates can only be obtained if individual sea lins can be identified throughout their life. Though NMML and ADFG are currently investigating alternative marking methods, long term identification is only possible at this time for Steller sea lions by permanently marking with a brand, and hot-branding is the most practical technique to obtain an adequate sample size while minimizing trauma to individual sea lins and disturbance to rookeries. Studies on seasonal movements, site fidelity and dispersal are also facilitated by the ability to identify individuals in a population. Personnel come ashore at rookeries to permanently mark pups <six weeks old, except those pups with a fresh umbilicus (i.e., < about 5 days old) late June to early July. In the process, the majority of juvenile and adult animals are driven from the rookery as described for ground counts above, and pups are corralled for processing. Hot-branding of pinnipeds involves the use of steel branding irons heated to about 500°F in a portable, propane-fired forge, applied to the shoulder of the animal. The total area affected by hot-branding is a small percentage of the animal′s skin surface (less than 2% for a one-week old pup measuring 95 cm standard length and 65 cm axillary girth). Each animal receives a single three- or four-digit brand, where each digit is approximately 5 cm wide and 8 cm high, and the individual digits are placed 4-5 cm apart. Each brand requires about one minute to complete, exclusive of preparation and anesthesia. To date, resighting efforts have occurred during cruises in May, August, and November of 2000 and 2001 at two of the 40+ rookery/haul-out sites in Alaska, and brand resighting is also a routine part of field protocol whenever research teams go ashore at a rookery or haul-out site.

In older animals this procedure is performed in conjunction with capture, anesthesia, blood collection, tooth extraction, skin and blubber sampling and biopsies, and attachment of scientific instrumentation. A review of past and recent studies of techniques for permanently marking pinnipeds indicates that hot-branding is still the optimal choice among currently available methods.

Attachment of scientific instruments (e.g. VHF and SLTDR tags): VHF transmitters and satellite-linked time depth recorders (SLTDR) are used to collect data on attendance and movement patterns and foraging behavior. Instrument packages are usually attached to pinnipeds by gluing to the hair with a fast-drying epoxy adhesive. The length of instrument attachment is dependent on the timing of molting, because the instrument will be shed as the hair is molted. The currently authorized (in Permits No. 782-1532 and 358-1564-01) VHF and SLTDR packages weigh < 300 g with a cross-sectional area of 10 cm^2. Animals fitted with scientific instruments would also be subjected to any or all of the following: gas anesthesia, hot-branding, flipper tagging, skin and blubber biopsy, blood collection, tooth extraction and administration of deuterium oxide.

Permit No. 358-1564-01 also authorizes development of a collar for longer-term attachment of instruments. NMFS has received no reports on this experimental project yet. The effectiveness of the collar design, and its effects on the animal, would be tested first on captive Steller sea lions, and then deployed on wild sea lions in the Southeast Alaska region. Although captive situations are not likely to be representative of the hazards posed to animals wearing collars in the wild, and captive animals may not behave the same as their wild counterparts, this is the best method for examining the fit of the collar and the response of Steller sea lions to it. Initially, any collar deployed on wild animals would contain corrosible links that would allow the collar to fall off after a period of time.

Deuterated water: Deuterium labeled water can be used to quantify water (and milk) influx, determine total body water, and estimate body composition in free-ranging animals. Isotopic measurements of energy expenditure and/or food consumption utilize similar protocols (Costa 1987). An initial blood sample must be taken to determine the animal's natural isotopic background concentration. An accurate measurement of the animal's mass is also needed. A measured amount (1 g D_2O per kg body mass) of isotope is administered and a second blood sample is taken following isotope equilibration. The time period necessary for isotopic equilibration varies with the size and feeding state of the animal, and can range from 1 to 3 hours. Thus animals must be held for the duration of the equilibration period, or recaptured for collection of the post-equilibration sample. Due to the limited sensitivity of infrared spectrophotometers used to measure the deuterium isotope, it is typically necessary to inject large volumes of labeled water (e.g. 1 g kg^{-1} for total body water determinations) to achieve high blood deuterium levels. Blood samples of 0.5 ml or more are required for analysis. Alternatively, lower isotope enrichment (0.01 to 0.04 g kg^{-1}) can be used if samples are to be analyzed by the more expensive gas isotope ratio mass spectroscopy.

Ultrasound: Portable sector and linear ray ultrasound equipment can be used to non-invasively obtain two-dimensional visualization of many internal organs and to estimate blubber thickness. As part of measuring body condition, portable ultrasound would be used to measure blubber thickness of all animals captured under a permit issued to the ASLC. Animals must be either physically or chemically restrained to accomplish this procedure. It is not usually necessary to shave the hair as long as the coat is kept wet and generous amounts of coupling gel (a non-toxic substance) are used to maintain an adequate coupling. Blubber would be measured from multiple sites using application of water or alcohol to the fur and slight pressure of the instrument.

Lidocaine (Xylocaine): Lidocaine is a local anesthetic used to "numb" an area of the body prior to procedures such as biopsy or suturing. The procedure is to inject 1cc of a 2% lidocaine solution in a rosette around the biopsy site as a local anesthetic.

Betadine (povidone-iodine): Betadine, an iodophor with a wide range of antimicrobial activity, is suitable for skin disinfection prior to surgery and venipuncture. Betadine may also be used as a topical antiseptic prior to and following blubber and muscle biopsy.

Valium (Diazepam): Valium is a benzodiazepine with anticonvulsant and sedative effects, used to restrain animals during tagging, and collection of blood and tissue samples.

Enemas: The purpose of using enemas is to collect the contents of the digestive tract for analyses of an animal's diet. As described by the holders of Permits No. 782-1532 and 358-1564-01: A clean, lubricated enema tube is inserted into the rectum and 1-2 liters of warm water are gently applied to flush feces from the lower digestive tract. Animals will likely be anesthetized with isoflurane gas during the procedure, as it would be conducted in conjunction with capture, restraint, flipper-tagging, enemas, blood and tissue sample collection, and hot-branding activities.

Stomach intubation: Neither of the existing permits currently authorize this procedure. Although the application to amend Permit No. 358-1564-01 (ADF&G) refers to the procedure as lavage, it is more correctly intubation, as no washing would occur. The researchers would like to use stomach intubation as an alternative to enemas for collecting diet samples because the rate of prey digestion varies with prey type and some items may be too degraded during digestion for analysis from samples obtained via enemas. The stomach intubation would also be used to test for the presence of and obtain a sample of milk. As described in the application, the procedure is to insert a stomach tube into the mouth and throat of anesthetized animals and gently guide the tube down through the esophagus. The applicant states that gentle suction will result in any stomach fluids [wicking] up the tube, which is then pinched, extracted, and the stomach contents drained into sample containers.

Accidental Mortality: Neither of the existing permits authorize intentional lethal takes of Steller sea lions. However, in acknowledgement of the fact that there is an inherent risk of serious injury and mortality associated with certain of the above research activities on wild animals, both permits allow for a limited number of research-related unintentional, or accidental, mortalities. The number of accidental mortalities allowed is based on the permit holders estimate of the potential for such mortalities. Consistent with the broad definitions of "take" under the MMPA, ESA, and the implementing regulations of these acts, this permit condition has been interpreted by the Permits Division to include any mortality resulting from the actions or presence of the researchers while conducting permit-authorized activities. This has included, but is not limited to: deaths of pinniped pups by starvation following abandonment resulting from disturbance to a rookery, or the research-related death of a lactating female; deaths of marine mammals due to adverse reactions to anesthetics or other chemical agents; deaths of marine mammals caused or precipitated by infections resulting from intrusive research procedures; deaths of animals due to capture myopathy resulting from the stress of capture and handling; and deaths of animals due to serious injuries sustained in attempts to escape or evade capture or in response to stampedes or aggressive social interactions caused by research activities.

2.1.2 Commonly employed mitigation measures

There are a number of measures that are considered "good practice" and that are commonly followed by qualified, experienced personnel to minimize the potential risks associated with various of the above procedures. Consistent with the issuance criteria requiring personnel authorized to take marine mammals under a permit to have qualifications commensurate with their duties, only qualified, experienced personnel (e.g., veterinarians, biologists, physiologists) with sufficient experience in the specific intrusive techniques would be allowed to perform intrusive procedures including blood sampling, biopsy, tooth pulling, stomach intubation, enemas, fecal loops/culture swabs, administering anesthesia or other drugs, attachment of flipper tags, application of brands, and remote biopsy sampling. Thus, research assistants would not use endangered Steller sea lions in the wild to gain training in intrusive procedures due to the inherent risks to the animals associated with these procedures, even when performed by a qualified, experienced person.

In addition to the standard permit conditions described in the next section, the applicants have stated they will implement the following measures to minimize the potential adverse effects associated with the proposed additional take activities.

For aerial surveys: Survey planes approach from a kilometer or more offshore and without banking, which is believed to reduces the incidence of hauled out animals entering the water prior to the survey photographs, because the animals would only be within hearing range of the plane for 1-2 minutes.

For capture and restraint: To avoid respiratory distress, ischemia (restricted blood flow), or nerve damage, it is considered important that animals be properly positioned, i.e. ventrally recumbent, during anesthesia (Dierauf 1990). Respiration and pCO_2 are monitored and oxygen administered, as needed to avoid prolonged breath holding during gas anesthesia, which can result in cardiac hypoxia (lack of oxygen to the heart muscle). Qualified personnel (i.e., experienced veterinarians, biologists or other highly trained personnel) are prepared to control or assist ventilations when using Valium, isoflurane, or Tiletamine. The animal's body temperature is closely monitored and steps taken to avoid hypo- and hyperthermia (e.g. cooling with water or covering to keep warm, as necessary). In addition, any animal showing signs of distress while being handled are released immediately and closely monitored. Some of the personnel listed as CIs on the permits have extensive experience in sedating and intubating Steller sea lions and/or other pinnipeds in the field. An emergency kit with equipment and supplies for responding to complications or emergencies would be readily available. Drug doses are calculated on the basis of the researcher's best estimate of an animal's lean body mass and metabolic rate. As required by the permits, these procedures would performed or directly supervised by qualified personnel.

To reduce the risk of unintentional injection of drugs by projectile syringe (darts) into blubber, intravenously, or into vital organs, the length of the needle used is appropriate for the size of the animal and its blubber thickness. In addition, care is taken in darting animals to avoid accidental drownings of animals that either flee into the water prior to induction or slump into pools of water at induction.

For intrusive sampling procedures (i.e., blood collection, biopsy, tooth pulling, fecal loops/culture swabs, enemas, stomach intubation, BIA): To the maximum extent practical, the animal is restrained on a smooth surface. An attending veterinarian(s) or other qualified personnel are present during these procedure to monitor the physiologic state of each animal (e.g., by monitoring respiratory rate and character, heart rate, body temperature, and behavioral

response to handling and sampling procedures). Animals that are physically restrained but continue to struggle or show signs of stress are released immediately to minimize the risk that continued stress would lead to capture myopathy. The volume of blood taken from individual animals would not exceed 10 ml blood per kg body mass, either as a single blood draw or over the course of several days. Sterile, disposable needles, biopsy punches, etc., are used to minimize the risk of infection and cross-contamination. Where disposable equipment is not available (i.e., enema and stomach tubes, flipper punch, dental elevators) liquid chemical sterilants are used with adequate contact times (as indicated on the product label) to affect proper sterilization, and instruments are rinsed with sterile water or saline before use on animals. Care is taken to avoid contact of equipment disinfectants with an animal's skin, and disinfectant agents are changed periodically to avoid growth of resistant strains of microorganisms. Only experienced, qualified personnel (veterinarians, biologists) who know how to properly pass a stomach tube to avoid introduction of liquid into the trachea.[2]would attempt this procedure. Because proper cold sterilization takes some time, researchers would bring an adequate number of stomach tubes to ensure all tubes are properly sterilized between animals, or that there is one tube per animal. The applicant states that the tubes would be washed, disinfected, rinsed, and shaken or spun dry between animals.

For flipper tagging: It is common for researchers to take care to avoid placing the tag so low as to have the animal walking on it or so high as to have it irritating the animal's flank area (Dierauf 1990).

For hot-branding: The application for Permit No. 358-1564-01 states that pups that are very young or in poor physical condition (e.g. under 20kg) will not be branded. NMML (Permit No. 782-1532) state that they mark all pups present, even clinically ill pups, to avoid biasing their data.[3] It is worth noting that Steller sea lions are the largest member of the otariid family, and newborn Steller sea lion pups weigh 15-20 kg. Both applicants use isoflurane gas during branding, both as a temporary anesthetic and to ensure that animals lie still for optimal brand quality.

For attachment of scientific instruments: When epoxy hardener is mixed with resin catalyst, heat is generated, and the mix can cause thermal burns. Therefore, care is used in adjusting the proportions of epoxy hardener and resin catalyst to prevent a "hot" mix and the minimum practical amount of epoxy is used to prevent burning the animal. The weight and dimensions of the instrument package relative to the animal's size and mass, and duration of attachment, are important considerations in choosing a tag. Tag size and placement are selected that will not interfere significantly with an animal's ability to forage or conduct other vital functions.

For behavioral/demographic observations and remote monitoring: To minimize the potential for disturbance caused by the placement of observers on rookeries and haulouts or for set-up and maintenance of remote monitoring stations, researchers either access the locations

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[2] The proper procedure is to first estimate the length of the stomach tube necessary by measuring the distance to the stomach along the outside of the animal's body. The tube should be smoothly inserted into the mouth, down the left side of the animal's throat, into the stomach. If the animal cannot vocalize, the tube has been inserted into the trachea. To further verify that the tube is in the stomach, a small amount of air should be blown down the tube while listening for gurgling either through the tube or via a stethoscope placed on the left abdominal wall. Dierauf, L.A. 1990. Pinniped husbandry. *In* L.A. Dierauf (editor). CRC Handbook of Marine Mammal Medicine: Health, Disease, and Rehabilitation. CRC Press, Inc. Boca Raton, FL

[3] T. Loughlin (NMML), personal communication during conference call between the Permits Division and NMML on July 26, 2001.

concurrent with other research activities, or from points or by means that would not disturb sea lions (e.g. approaching from the other side of the island, where no animals are hauled out) to the maximum extent practicable.

For remote blubber biopsy: The applicants for File No. 1016-1651 do not have previous experience with this technique and state that they are conducting further development of it by testing equipment on pinniped carcasses to ensure appropriate penetration of the darts. The applicants also state they are practicing shooting at stationary targets (i.e., carcasses) to ensure accuracy, and no Steller sea lions would be biopsied until the researcher's accuracy with the rifle and crossbow is within 20 cm of the target 95% of the time. Based on the recommendations of a veterinarian, the applicants state they will take the following measures to minimize the potential adverse effects of this procedure: maintain a sharp biopsy edge; use dart tips only once between sharpening; sterilize instruments by soaking in a cold sterile solution (e.g., Cetylcide) for at least 15 minutes; rinsing instruments with sterile water immediately prior to use; targeting the shoulder and back of the sea lions to reduce the risk of the dart penetrating deeper than the blubber layer.

2.1.3 Existing Mitigation Measures in NMFS Permits

In addition to measures identified by researchers in their applications and otherwise considered good practice (Section 2.1.2), all NMFS marine mammal research permits contain conditions intended to minimize the potential adverse effects of the research activities on the animals. These conditions are specific to the type of research authorized and the species involved. The conditions are based on information in the literature, and from the researchers themselves, about the effects of particular research techniques and the responses of animals to the activities.

Permits for research on pinnipeds contain the following general conditions for minimizing the potential negative effects of research: (1) caution must be exercised when approaching mother-pup pairs, and efforts to approach and handle a particular animal or mother-pup pair must be terminated if there is any evidence that the activities may be life-threatening or interfering with the animals vital functions; (2) in the event of accidental mortality in excess of that authorized, research activities shall be suspended until the protocol and handling procedures have been reviewed and, if necessary, revised to the satisfaction of the NMFS, so as to ensure that the risk of additional mortality is minimized; (3) in the event that a female dies or is seriously injured as a result of the activities, the orphaned pup shall be humanely provided for (i.e. salvaged by placing in a Stranding facility for eventual release, or, if salvage is not possible, euthanized) and pups that are humanely euthanized shall count against the total number of animals authorized for accidental mortality.

For minimizing the impacts of pup counts, capture and handling activities, Steller sea lion scientific research permits contain the following conditions: (1) researchers will not survey or capture pups until the end of the pupping season (late June or early July), after mother-pup bonds are well established; (2) researchers will minimize the time that they occupy the rookery ($\leq$ 2 hours for counting, $\leq$ 5 hours if capturing pups); (3) researchers will use biologists experienced in herding to slowly move adults out of the way and experienced in capture techniques to complete the activities as quickly as possible; (4) researchers shall process pups in small groups (10-20), allow animals to rest before handling, and release animals showing signs of distress; (5) researchers shall restrain pups by hand, without using either a restraint board or drugs and minimize handling time; and (6) researchers shall allow only personnel highly experienced and

well-trained in the use of branding techniques to brand pups.

To minimize the potential negative effects of sampling activities in general, pinniped scientific research permits contain the following standard conditions: (1) researchers shall select target animals far enough away from other animals to minimize the possibility of having other sea lions interfere with the target animals; and (2) clean darts, enemas, and all needles thoroughly between uses, and sterilize them with alcohol or betadine immediately prior to use.

All NMFS scientific research permits contain these general conditions to ensure research coordination and minimize the potential for unnecessarily duplicative research: (1) the Permit Holder must coordinate research authorized with other researchers conducting the same or similar studies on the same species and in the same locations; and (2) prior to each field season, the Permit Holder must notify the appropriate Regional Administrator at least two weeks in advance, and such notification shall include the dates and specific locations of the research.

2.1.4. Special Mitigation Measures for this Action

To ensure that the Proposed Action does not effect an endangered or threatened species the following mitigation measures are to be implemented as a condition of authorizing the permits requested.

Duration: There is insufficient information for a reliable evaluation of the synergistic effects of these repeated procedures on individual sea lions; however, NMFS has already determined that allowing most of these procedures to be performed on 2,400 sea lions for an additional 2 years (the existing permits expire in December 2004 and June 2005) would not have a significant effect on Steller sea lions. Consequently, as a mitigating measure, NMFS is authorizing additional take or procedures only for the duration of the existing permits. This restricted duration will limit the impact (potential lethal or sublethal effects) only to the animals that will be handled through June 2005.

Monitoring: A recommendation from MMC and others is to implement a monitoring program that would provide information to evaluate the effects of the research activities on survival and health of Steller sea lions, particularly to obtain re-sights of branded individuals. Research protocols include such monitoring. The effort spent in subsequent resighting of permanently marked animals is a critical component of any survival study. Assuming survival rates are equal over the range and that at least 600 pups are branded, survival can be estimated with a coefficient of variation of less than 0.125. In the areas where branding activities have taken place, resighting efforts have already occurred during dedicated resighting-effort cruises (in May, August, and November), during other research cruises in February, March, April, June, July, and September, and from field camp observations at Marmot and Forrester Islands in 2000 and 2001. Additional field camps will be established at Ugamak, Fish, and White Sisters Islands in 2002. Five research activities include cruises dedicated to brand resight effort; for 14 other activities, brand resighting is one of several primary objectives (in combination with pup surveys, juvenile captures, scat collection, etc.). Brand resighting is a routine part of field protocol whenever research teams go ashore at a rookery or haul-out site. In fact, the only activities that will not include brand resight effort are the 29 aerial survey activities.

Accidental mortality: The upper limit for accidental mortality under the status quo is 10 Steller sea lions per year, and the proposed action would increase this limit to 51 sea lions per year. If all accidental mortality was restricted to the eastern stock of Steller sea lions, proposed authorization for accidental mortality would have a negligible impact on the stock. On the other

hand, if all of this authorized take was applied to the western stock, such a level of mortality would exceed negligible impact. Consequently, NMFS has established an upper limit to the average annual mortality that can be applied to the western stock at a level that would cause insignificant impact. If accidental mortality in the western stock reached 10 sea lions (about 5% of the stock's PBR) then researchers would be required to consult with one another to identify research practices that would prevent accidental mortality in the western stock to exceed 20 sea lions (10% of the stock's PBR). With this mitigation measure in place, accidental mortality would not have a significant adverse impact on the Steller sea lion population.

Research coordination: The NMFS Alaska Region has employed a Coordinator for the Steller Sea Lion Recovery Program to ensure that research conducted by NMFS, and other organizations, is consistent with the priorities identified in The Final Recovery Plan for Steller Sea Lions to conduct research on those actions that are most likely to stop the population decline, while continuing ongoing research and developing new programs designed to improve understanding of Steller sea lion management needs. Among the highest priority management actions were monitoring the status and trends of sea lions of sea lion abundance throughout their range, and monitoring incidental and subsistence takes. The highest priority administrative actions were focused on regulating fisheries (i.e., areas, seasons, operations, catches), identifying and designating critical habitat, recommending a maximum allowable take and reducing incidental take. Research needs considered most critical to conservation and management were to develop survey procedures, determine food requirements, and determine feeding areas and strategies. Since the Recovery Plan was finalized, Steller sea lions have been classified as two distinct population segments, with the result that there is now a different focus on each population. Most of the management focus is now on the western population whereas the research focus is split with much of the invasive, and new research being focused on the eastern population. Also a new Recovery Team has recently been convened to draft a revised Recovery Plan that reflects the change in listing status of the Steller sea lion and to review research priorities that will take into account the status of each population and the priority research that remains to be completed to address management needs.. The Recovery Team will be recommending management actions needed to recover Steller sea lions and identifying research needs for the conservation and management of threatened and endangered Steller sea lions.

Due in part to the research efforts focused on Steller sea lions since 2000 and an order of magnitude increase in research funding, there is now, or there will be in a few years, a large body of information on a variety of aspects of Steller sea lion biology and ecology. The Alaska Fisheries Science Center (AFSC), NMFS, has a full-time research coordinator role that will ensure that the researchers perform research that is bona fide, that is not duplicative except where duplicative samples would be considered appropriate and necessary to address that particular issue, and to ensure that communication exists between researchers such that the research is conducted to benefit the conservation of the species.

During the next 2 years (the life of these permits), this coordinated effort will improve. The focus of the research as directed by the outcome of the Recovery Team deliberations will also provide a more focused and coordinated effort for the next 5-10 year period. Therefore, an objective of the Steller Sea Lion Recovery and research programs will be to ensure that the permit issuance criteria listed at 216.34 are met and that the research is (1) humane and does not present any unnecessary risks to the health and welfare of Steller sea lions, (2) the activity is consistent with all restrictions set forth at 216.35 and any purpose-specific restrictions as appropriate set forth at 216.41, 216.42, and 216.43, (3) the activity will be conducted consistent with the purposes and policies set forth in section 2 of the ESA, and (4) the applicant's expertise, facilities, and resources are adequate to accomplish successfully the objectives and activities stated in the application. In addition to these requirements, the AKR and AFSC will ensure that

the criteria at 216.41(b) are met including that (1) the proposed activity furthers a *bona fide* scientific or enhancement purpose (during this past year, SLLRI proposals were reviewed by a panel of approximately 50 AFSC/AKR/FPR biologists to ensure that the best science was funded); (2) that the results will directly benefit that species or stock, or will fulfill a critically important research need; (3) the research will not likely have significant adverse effects on any other component of the marine ecosystem of which the affected species or stock is a part, and that the research will accomodate all of the following ESA objectives: to (i) contribute to fulfilling a research need or objective identified in the current and revised Steller Sea Lion Recovery Plan; (ii) contribute significantly to understanding the basic biology or ecology of the Steller sea lion; and (iii) contribute significantly to fulfilling a critically important research need.

2.2 Alternatives

There is wide range of possible combinations of proposed research activities that could be considered. One alternative to the proposed action is the "No Action" alternative, which is the baseline for the rest of the analyses. No action does not mean there will be no environmental consequences, because the existing environment is not static, and because under no action, present activities will continue even though no new permit actions would occur. The Proposed Action is Alternative 2 and represents all of the research proposed in applications for permits and permit amendments for research on Steller sea lions received and considered complete at the time this document was prepared, in addition to the conditions of the no action, or status quo, alternative. A third alternative to the proposed action considered represents a range of research activities between Alternative 1 and the Proposed Action, and includes continued population monitoring through aerial surveys and pup counts, and much of the other research in the proposed action, but shifts the focus away from the endangered western population to the eastern population.

2.2.1 Alternative 1: Status Quo - No Amendments or New Permits

Under this alternative, which is the "no action" alternative, no amendments to existing permits or new permits for scientific research on Steller sea lions would be issued. However, all takes of Steller sea lions presently authorized under permits held by NMML (Permit No. 782-1532) and ADF&G (Permit No. 358-1564-01) would continue until the permits expire in December 2004 and June 2005, respectively. These two permits currently authorize takes of Steller sea lions throughout their range in the U.S. (including California, Oregon, and Alaska) by a variety of research activities involving both level A and level B harassment, as defined under the MMPA. A summary of the numbers of sea lions authorized to be taken under these two permits and a description of the takes under each activity authorized under this alternative is provided in Chapter 4.1-Effects of Alternative 1.

On November 2, 1999, a notice of receipt of an application for a scientific research permit from NMML, Alaska Fisheries Science Center, was published (64 FR 59163). On February 11, 2000, a notice of receipt of an application for a scientific research permit from the Alaska Department of Fish and Game (ADF&G) was published (65 FR 6997). These two permit request are the "status quo". Based on the information presented in the application, NMFS made a determination that the proposed activity was categorically excluded from the need to prepare an EA or EIS.

2.2.2 Alternative 2: Issue new and amend existing permits to allow all additional takes as requested by applicants (with standard permit conditions for mitigating measures and special mitigation measures for these permits)

This is the Proposed Action. Under this alternative, in addition to the takes described under Alternative 1, Permits No. 782-1532 (NMML) and 358-1564-01 (ADF&G) would be amended to include additional types of takes per animal and increases in the numbers of animals taken. In addition, the number of takes authorized for certain activities would be further increased by issuance of the proposed permits to the AEB, Dr. VanBlaricom, Dr. Davis, the ASLC, and ODFW.

A summary of the numbers of sea lions authorized to be taken under the permits issued under Alternative 2, as compared to Alternative 1, is provided in Chapter 4.2 - Effects of Alternative 2, A schedule of the time and location of proposed research activities by NMML, ADF&G, Aleutians East Borough, and Dr. VanBlaricom is in Appendix B.

2.2.3 Alternative 3 - Re-allocation of Intrusive Research Alternative

Under this alternative, takes from non-intrusive research (aerial surveys) and essential population monitoring (pup counts) would be allowed as with Alternative 1-Status Quo, and Alternative 2- the Preferred Action. However, the only research of an intrusive nature that would be permitted for the western (endangered) population would be that directly related to conservation and management needs, such as collection of genetic samples for determination of population structure or blood samples for health assessment. All other intrusive research would be restricted to the eastern (threatened) population, or a non-ESA listed surrogate species, such as California sea lions. The decision as to whether intrusive research should be performed on the western population, eastern population, or a surrogate species, would be related to how the proposed research would fit into the overall Steller sea lion recovery plan framework or is otherwise related to something that is important to the recovery of the species. Thus, consistent with the issuance criteria under the MMPA and ESA, as outlined in Sections 1.5.2 and 1.5.3, which require that research be conducted consistent with the purposes and policies set forth in section 2 of the ESA, proposed intrusive research that would contribute significantly to identifying, evaluating, or resolving conservation problems for the species or stock would be allowed on both the eastern and western stocks. Intrusive research that would contribute to fulfilling a research need or objective identified in the Recovery Plan would begin with the eastern stock until the potential negative effects are known to be negligible. This includes testing new techniques and equipment, some of which would also be re-directed to surrogate species prior to authorization on Steller sea lions. Intrusive research that would contribute significantly to understanding the basic biology or ecology of the species (and is therefore not likely to vary among populations or stocks), or contribute significantly to fulfilling a critically important research need not directly related to conservation and management, would be limited to the eastern stock and/or surrogate species. Until a new Recovery Plan is released, research permits would be granted based on goals identified in the current Recovery Plan, and in consideration of the research objectives identified by the peer-reviewed workshops, conservation measures in the Biological Opinion on the Alaska groundfish fishery (NMFS 2000), and in consultation with the Marine Mammal Commission and other experts consulted during the permit application review process.

A summary of the numbers of sea lions authorized to be taken by permit by Steller sea lion population, and thus affected under this alternative, is provided in Chapter 4.3-Effects of Alternative 3. All mitigation measures identified under the previous alternatives would be required for activities under this alternative. In addition, the timing, frequency, or location of some takes would be re-distributed according to the criteria described for this alternative.

2.3 Alternatives Considered and Eliminated from the Detailed Study

One alternative considered but rejected would have suspended existing research permits and denied future applications for a specified time period. The result of this alternative would have been not to allow takes of Steller sea lions for scientific research. The result of a alternative would have been a moratorium on all such takes and it would have removed the potential adverse effects of scientific research for a period of time. However, in the absence of at least some degree of population monitoring, it would be difficult to obtain data that could be used in evaluating whether or how other activities, such as commercial fishing, predation, disease, or environmental fluctuations are affecting the population.

Another alternative considered, but rejected, would also have effectively been a moratorium on intrusive research on Steller sea lions in the wild, and the existing permits held by NMML and ADF&G would be amended to suspend authorization for takes of an intrusive nature, and new permits, including those requested by Dr. VanBlaricom and Dr. Davis, would not have authorized intrusive research. This option would have effectively limited research to activities such as behavioral observations and aerial or vessel surveys that do not have the potential to injure Steller sea lions or Steller sea lion stocks in the wild, and a limited amount of level A harassment from pup counts on rookeries that could not be surveyed from vessels, observation points, or aerial surveys. Under this alternative, all takes would have been only from harassment by aerial and vessel survey and ground counts of pups on rookeries. There would be no takes from capture and sampling activities, and all scat collection would occur incidental to ground counts or on vacant haulouts. The number of Steller sea lion taken, and the frequency and distribution of takes by aerial and vessel under this alternative would be the same as under the Proposed Action alternative. The number of sea lions harassed during ground counts of pups on rookeries during breeding season would also be the same as described for Alternative 2-Status Quo action. Placing observers and establishing or servicing remote monitoring equipment would not result in additional takes, because these activities would either occur incidental to ground counts, or access would be accomplished from routes that would not disturb sea lions. All mitigation measures identified under the previous alternatives would have been required for activities under both of these alternatives.

In both of the above cases, these alternatives were not considered further because (1) they would not include the full range of information on the ecology and biology of threatened and endangered Steller sea lions necessary to promote the recover of Steller sea lions; and (2) they would not have met the objectives of the research program envisioned by Congress. These alternatives would not have provided the physiological information necessary to investigate foraging strategies, evaluate competition due to fisheries and other predators, or health assessments of the two populations of Steller sea lions.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the alternatives are discussed in Chapter 4.

The action area being considered encompasses the entire range of Steller sea lions in California, Washington, Oregon, and Alaska, including the eastern (threatened) and western (endangered) populations. This area includes both state waters and the United States Exclusive Economic Zone off the coasts of California, Washington, Oregon, and Alaska. However, as most of the proposed action would focus on animals located on or near rookeries and haulouts, the action area could be further defined as all known rookeries, haulouts, and waters immediately surrounding these areas. Some of the proposed research would occur within the Alaska Maritime National Wildlife Refuge, which includes over 3,000 islands, islets, rocks, pinnacles, and headlands from northwest Alaska into the Bering Sea and along 4,800 miles of Alaska's coastline and the Aleutian chain. Most of the refuge (2.64 million acres) is designated as wilderness and has the most diverse wildlife species of all the refuges in Alaska, including between 15 to 30 million birds (80% of all Alaska seabirds, including species of puffins, kittiwakes, murres, petrels, auklets, murrelets, and gulls) representing about 55 species. In addition to Steller sea lions, marine mammals such as harbor seals, walrus, sea otters, polar bears, and whales are also common within the refuge. Other animals within the refuge include bald eagles, peregrine falcons, bears, caribou, musk oxen, river otters, and foxes. Further, the refuge contains many Aleut archeological sites as well as remnants of the only World War II battles fought on U.S. soil. Military clearance is required to visit some islands of the Aleutian Chain (Adak, Shemya, Amchitka, and Attu).

A detailed description of the distribution, population status and trends, and life history of Steller sea lions is contained within the Final Supplemental Environmental Impact Statement on Steller Sea Lion Protective Measures in the Federal Groundfish Fisheries Off Alaska (NMFS 2001) and in the Fisheries Management Plan Biological Opinion (NMFS 2000). The following is a brief summary of the relevant details.

The estimated minimum population of Steller sea lions is 69,434, which includes animals in California, Washington, Oregon, and British Columbia. This represents a total of 30,403 sea lions in the eastern population, of which 5,991 are pups, and 39,031 sea lions in the western population, of which 9,373 are pups (NMML 2000). The rate of decline in the western stock averages 5% per year but has not been uniform: in the eastern Gulf of Alaska the rate of decline is 10.52% per year while in the eastern Aleutian Islands, the rate is 1.75% per year (Loughlin and York, in press). Conversely, trend counts indicate the size of the eastern stock has increased at an average rate of 5.9% per year between 1979 and 1997 (Calkins et al. 1999).

Steller sea lion males are typically sexually mature at three to seven years, but are not usually large enough to compete for females until they are nine to 11 years old (Pitcher and Calkins 1981; Gisiner 1985). Females, which tend to be less than one-third the size of males at maturity, are sexually mature at three to six years. Male Steller sea lions rarely live beyond their mid-teens, while females may live up to 30 years old. Adult males and females congregate at rookeries in the spring of each year, where most adult females will give birth and be mated. Females give birth to a single pup between mid-May and mid-July, with the highest frequency of births occurring during mid-June (Calkins and Pitcher 1982; Merrick 1987; Chumbley et al.

1997). Newborn pups weigh about 20 to 30 kg and, although they are somewhat precocious compared to terrestrial mammals, are not yet able to swim or maneuver well on land. Behavioral observations and analyses using allometric relationships indicate that the majority of Steller sea lion pups are weaned at 11 months old (or when they have reached a mass equivalent to 1/3 of maternal mass), or just prior to their mother giving birth to a new pup (Pitcher and Calkins 1981; Lee et al. 1991). The transition to nutritional independence (i.e. weaning) is believed to be a gradual process during which pups begin to develop foraging skills and supplement milk from their mother with prey items captured in the water. Pups probably do not begin making true foraging dives, where prey is captured and consumed, until near weaning, but they may begin playing in the water near their rookery at a much younger age. However, pups are not adept swimmers until they are at least 2 months old (Sandegren 1970). There is little information on the behavior of Steller sea lions during the period between weaning and when they have become sexually mature and return to a rookery to reproduce. It has been hypothesized that the overall decline of the Steller sea lion population is consistent with a 10-20% annual decrease in juvenile survival.

3.1 Past, Present, and Reasonably Foreseeable Future Actions Affecting the Present Condition of the Population/Habitat

The baseline for this document includes the past and present impacts of state, Federal, private, and other human actions or activities in the action area, and anticipated impacts of proposed Federal actions. The details of the wide variety of human activities and natural phenomena that may affect the resources within the action area are documented in detail in Biological Opinions prepared on the effects of groundfish fisheries in the Bering Sea and Gulf of Alaska (NMFS 2000) and Environmental Impact Statements completed under NEPA (NMFS 2001). In brief, the human-related activities that are occurring, that have occurred in the past, or that are reasonably foreseeable in the future, include commercial fisheries, commercial and subsistence harvest, oil and gas exploration, and scientific research, and have been assessed in those previous documents which are incorporated by reference.

3.1.1 Historical Commercial Harvest and Intentional Takes

An experimental commercial harvest contracted by the Bureau of Commercial Fisheries resulted in the killing of 630 adult male Steller sea lions in Alaskan waters. Between 1963 and 1972, over 45,000 Steller sea lion pups of both sexes were killed in the Aleutian Islands and Gulf of Alaska. The harvest of adult males likely had no significant effect on the population trends, but the removal of the large number of pups contributed to local population trends in the Aleutian Islands and Gulf of Alaska from the 1960s through the early 1980s. There are presently no commercial harvests of Steller sea lions in Alaska.

Although government-sanctioned efforts to control populations of Steller sea lions considered as nuisances or competitors by the fishing industry and fishery management agencies ceased with passage of the MMPA in 1972, there are still anecdotal reports of fishermen shooting sea lions and a small number of prosecutions still occur. Records from NMFS Enforcement indicate that there were two cases of illegal shooting of Steller sea lions in 1998, both of which were successfully prosecuted (NMFS, Alaska Enforcement Division). In addition, there are a small number of Steller sea lions that strand with evidence of gunshot wounds (average of two animals per year from 1996-99; Angliss et al., in press). However, it is not possible to determine whether these animals were illegally shot or if they were struck and lost during the legal subsistence harvest. Because the full extent of such killings is not known, intentional shooting of

sea lions by fishermen should be considered a potential factor in the decline of sea lions at some locations.

3.1.2. Commercial Fishing

Commercial fisheries can directly affect Steller sea lions by capturing, injuring, or killing them incidental to fishing operations. Estimates of rates of entanglement through the early 1980s suggest that mortalities from entanglement were a contributing factor in the decline of Steller sea lions in the Bering Sea, Aleutian Islands, and Gulf of Alaska. The relative impact of mortalities to marine mammals occurring incidental to commerical fisheries is estimated under the MMPA by comparing minimum annual mortality rate to a Potential Biological Removal (PBR) level. Recent estimates of the numbers of sea lions killed incidental to commercial fisheries is low (28.3/year for the western stock and 16/year for the eastern stock). The estimate of incidental takes in the eastern stock is considered negligible being significantly less than 10% of the PBR for that stock (PBR = 1,395 animals) and is not considered to have a significant effect on Steller sea lion population dynamics. The relative impact of Steller sea lion incidental mortality in commercial fisheries in the western population is approximately equal to 10% of PBR for that population and may increase as the western population declines, even if the rate of incidental takes remains constant.

Commercial fisheries may also affect Steller sea lions indirectly by altering the quality of their habitat. The removal of large numbers of fish (both target and non-target or bycatch species) from a marine ecosystem can change the composition of the fish community, which can alter the abundance and distribution of prey available for Steller sea lions. In addition, removal of large amounts of biomass by commercial fisheries can compete with other consumers that depend on the target species for food, which can, in turn, increase competition between Steller sea lions and other piscivorous predators. Changes in the abundance and distribution of prey can have cascading effects on predators including increased susceptibility to predation and reduced productivity. These effects have been the focus of recent Biological Opinions written by NMFS on the effects of the groundfish fisheries in Alaska on Steller sea lions (NMFS 2000).

3.1.3 Subsistence Harvests

Steller sea lions are an important food source for many Alaska Native village residents. Between 1992 and 1995, the mean annual subsistence takes of Steller sea lions averaged 448 animals per year. The mean annual subsistence takes of Steller sea lions have declined to approximately one-third between 1996-1998, and have been estimated at 171 animals per year (Wolfe and Hutchinson-Scarbrough 1999). Wolfe and Hutchinson-Scarbrough (1999) indicate that subsistence harvest levels have declined sharply between 1992 and 1998, due largely to a decline in the number of hunters harvesting sea lions. The authors hypothesize that this decline in the subsistence harvest may be due to a number of local factors, including seasonal hunting conditions and local food needs, and may reflect a personal choice to avoid hunting Steller sea lions out of concerns about the population size. The majority of sea lions are taken in the Aleutian and Pribilof Islands.

The subsistence takes are below PBR for the western stock, are considered insignificant, and are managed thru agreements between NMFS and an Alaskan Native Organization under the MMPA. The estimated subsistence takes account for only a small portion of the total sea lions lost to the population each year. Further, the significance of subsistence harvesting, as with other sources of mortality, may increase as the population decreases, unless

there is a corresponding decrease in the rate of harvesting.

3.1.4 Scientific Research

Steller sea lions were intentionally killed for scientific research from the end of World War II up to as recently as the 1980s. The data collected from these animals, including stomach contents, blood samples, and morphometrics, was used to examine age, size, reproductive condition, food habits, and incidence of disease and parasites. Recent research efforts have employed non-lethal means for collecting such data, although there is the risk of accidental mortality resulting from certain research techniques, as described in Chapter 4. For more than a decade, researchers have been conducting aerial surveys, counts of pups on rookeries, and capturing individual sea lions for flipper-tagging, hot-branding, collection of blood and tissue samples, morphometric data, and attachment of scientific instruments. The effects of research on the Steller sea lion population are uncertain, but some research techniques and activities are known to adversely affect individual animals, as described in Chapter 4. It is not known whether research activities themselves have had a significant adverse impact on the Steller sea lion population, or if the disturbance and accidental mortality associated with research activities have been a factor in the decline.

Until recently, the principal investigators in Steller sea lion research activities were limited to a few scientists, primarily from federal and state entities, with collaboration from a small number of non-profit organizations, including several universities. Recent funding opportunities have significantly expanded the number of individuals and entities that would be engaged in Steller sea lion research, as well as the number and types of projects proposed.

The FY2001 congressional appropriations language identified a total of $43.2 million in the NOAA budget for the implementation of Steller sea lion protective measures. This represented a substantial increase of over $36.8 million for research and management of Steller sea lions from previous years. Recipients of the funding included NMFS, Office of Atmospheric Research (OAR), National Ocean Service (NOS), North Pacific Fisheries Management Council (NPFMC), State of Alaska (Alaska Department of Fish and Game: ADF&G), University of Alaska, Alaska Sea Life Center (ASLC), and the North Pacific Universities Marine Mammal Research Consortium (NPUMMRC). While portions of this appropriation were allocated directly to agencies or organizations for specific purposes, including research regarding litigation concerning the Alaska Steller sea lion and Bering Sea/Gulf of Alaska groundfish fisheries, $20,000,000 was appropriated to the Secretary of Commerce to develop a coordinated, comprehensive research and recovery program for the Steller sea lion. Of this, $15 million was set aside for non-federal research, to be distributed competitively through a grants process referred to as the Steller Sea Lion Research Initiative (66 FR 15842). Some of the grant recipients have yet to submit applications for the necessary marine mammal research permits. However, review of the proposals indicates that some of the proposed research funded under the SSLRI, is new, innovative, controversial, or experimental, likely to be adopted by other researchers, involves unique, unknown, or uncertain risks to an endangered or threatened species, and could have significant cumulative effects. An additional $40.15 million was appropriated in 2002 for research on Steller sea lions and was distributed non-competitively to the NMFS (for ESA, Steller sea lion recovery, climate change (OAR), and predator-prey studies (NOS)), North Pacific Fisheries Management Council, Alaska SeaLife Center, University of Alaska (Gulf Apex Predator Project), North Pacific Universities Marine Mammal Research Consortium, Alaska Department of Fish and Game, and the Alaska Fisheries Development Foundation.

Research has been and is also being conducted on endangered Steller sea lions in Russian and Japanese waters. This research includes population assessments and investigations of vital rates (which includes measuring and branding pups, and monitoring abundance and breeding success), remote monitoring of behavior (including attendance patterns) and resighting of marked (branded) animals, and collecting blood and scat samples. Much of the recent and ongoing research in Russia has involved collaborative effects between scientists from NMML and the Alaska SeaLife Center, using protocols and techniques comparable to those employed for studies of Steller sea lions in U.S. waters.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of the NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508). Thus, the significance must be analyzed in several contexts, such as society as a whole, the affected resources and regions, and the affected interests. Intensity refers to the severity of the impact and has the following 10 specific aspects that must be considered: (1) beneficial and adverse effects; (2) effects on public health and safety; (3) unique characteristics of the geographic area (e.g., proximity to historic or cultural resources, park lands, and ecologically critical areas); (4) degree to which possible effects are likely to be highly controversial; (5) degree to which possible effects are highly uncertain or involve unique or unknown risks; (6) precedent-setting actions; (7) whether the action is related to other actions with individually insignificant but cumulatively significant impacts; (8) loss or destruction of significant scientific, cultural, or historical resources (including adverse effects on sites listed in the National Register of Historic Places); (9) degree to which action may adversely affect an endangered or threatened species or designated critical habitats; and (10) violation of Federal, state, or local laws imposed for protection of the environment.

A detailed socioeconomic analysis on the effects of proposed fishery management measures related to the potential adverse effects of commercial fishing on Steller sea lions is available in the SEIS on Steller sea lion protection measures in the federal groundfish fisheries off Alaska (NMFS 2001). In so far as the results of the proposed research on Steller sea lions being considered in this EA may affect those protection measures or other, future, management measures for the groundfish fisheries, those analyses are relevant to this assessment. There may be economic effects of the alternatives considered in this EA that are not directly related to the fishing industry. Most notably, there may be effects on researchers involved in the research, as well as industries that support the research, such as charter airplanes and vessels, and suppliers of equipment needed to accomplish the research. The effects of all alternatives, except the "No-action" alternative, would likely be equally positive with respect to these entities.

The potential for loss or destruction of cultural or historic resources is likely equal among the alternatives, and probably negligible given the nature of the research and permit requirements. Given that declining numbers of Steller sea lions would probably increase the cost of subsistence harvests, and that fewer sea lions would be likely to be harvested, the effects of the proposed alternatives on the non-market use value (subsistence) of Steller sea lions would depend on whether there was likely to be a significant reduction, either locally or overall, in the numbers of Steller sea lions. The SEIS on Steller sea lion protection measures in the federal groundfish fisheries off Alaska (NMFS 2001) stated that improvements in welfare of subsistence users (i.e., positive econominc, cultural, and social benefits) would be directly correlated with improvement in the abundance of Steller sea lions. Whereas the objective of the alternatives is to collect information on the ecology and biology of threatened and endangered Steller sea lions that would improve understanding of management needs for recovering the species to the point that it can be removed from ESA listing, such welfare improvements would be equally likely under all alternatives in the long term.

An issue extremely relevant to the analysis of altematives and discussion of the proposed action is an examination of the information gained to conserve Steller sea lions relative to the potential for negative impacts on wildlife within the action area, especially Steller sea lions, and

their habitat. It is important to put into context the proposed research under review in these permit applications and the reason why the investigators developed their respective research plans. In FY01, Congress provided $43.15 M to address scientific and management needs regarding the continued decline of Steller sea lions in Alaska and the impact of that decline on Alaskan commercial fisheries. Congress specifically appropriated $20M to the DOC to develop and implement a coordinated, comprehensive research and recovery program for the Steller sea lion, which was designated to study:

1. Available prey species.
2. Predator/prey relationships.
3. Predation by other marine mammals
4. Interactions between fisheries and Steller sea lions, including localized depletion theory.
5. Regime shift, climate change, and other impacts associated with changing environmental conditions in the North Pacific and Bering Sea.
6. Disease.
7. Juvenile and pup survival rates.
8. Population counts.
9. Nutritional stress.
10. Foreign commercial harvest of sea lions outside the EEZ.
11. The residual impacts of former government authorized eradication bounty programs, and
12. The residual impacts of intentional lethal takes.

In addition to the funds provided to the DOC (including NMFS, OAR, NOS and the NPFMC), congress also appropriated funds for Steller sea lion studies to the Alaska Department of Fish and Game (ADFG), the Alaska Sea Life Center (ASLC), the University of Alaska (UA), and the North Pacific Marine Mammal Research Consortium (NPMMRC).

In response to the congressional directive to DOC and the NMFS, the NMFS provided funds through a competitive Request for Proposals (RFP) during FY01 termed the Steller Sea Lion Research Initiative (SSLRI). The NMFS attempted to synthesize the hypothesis-driven research program outlined by congress (above) into six major hypotheses. The proposers to the SSLRI were advised to develop research programs addressing one or all of these six hypotheses:

1. Fisheries competition hypothesis
2. Environmental change hypothesis
3. Predation hypothesis
4. Anthropogenic effects hypothesis
5. Disease hypothesis, and
6. Pollution hypothesis.

The research programs developed by the proposers to the NMFS SSLRI, and those entities specifically appropriated funds by congress, include those studies under review in the permit applications summarized in this Environmental Assessment. It is worth noting that none of the proposed permittees developed their planned permit activities outside the structure of the congressional guidance.

The proposed scientific research is not likely to affect designated Steller sea lion critical habitat or essential fish habitat because none of the proposed techniques have a measurable potential to alter any substrate or the marine environment in general. However, in gaining access

to research sites by land, there is the potential for damage to the terrestrial substrate in which some species of ground-nesting birds dwell. The animals most likely to be affected by the alternatives are those on or near the Steller sea lion rookeries and haulouts where the research activities would occur. Within their range, Steller sea lions co-occur with numerous other marine species including other pinnipeds (e.g., harbor seals, California sea lions, Northern fur seals, walrus), whales (e.g., blue, fin, humpback, and killer whales), fish and invertebrates (e.g., salmon, pollock, mackerel, flatfish, crabs, lobster, and squid), sea turtles, sharks, Northern sea otters, and seabirds (e.g., puffins, murres, gulls, kittiwakes, petrels, etc.). Because the majority of research activities occur on, or near Steller sea lion rookeries and haulouts, the potential for adverse impacts of the research on cetaceans and other aquatic species is negligible and would be limited to occasional level B harassment from aerial surveys or vessel approach. Steller sea lions and the other pinniped species mentioned do not typically occupy the same beaches at the same time. Therefore, the potential impacts of research activities on Steller sea lions on other pinnipeds would be limited to a small amount of incidental level B harassment from aerial surveys and occasional displacement due to disturbance from vessel approach to Steller sea lion rookeries and haulouts or researchers approaching on land. This would also apply to most of the terrestrial species that occur within the same geographic area as Steller sea lions. Of the other animals that occur within the geographic range of Steller sea lions, those most likely to potentially be adversely affected by research activities on Steller sea lion rookeries and haulouts are cliff-dwelling and ground-nesting seabirds. For example, there are a number of ground-nesting seabird species whose burrows are vulnerable to crushing by foot-traffic, including rhinoceros auklets on Forrester Island where there has been intense Steller sea lion research effort. Cliff-dwelling sea birds are vulnerable to disturbance, particularly from aerial surveys, as well as the presence of researchers conducting research activities on Steller sea lion rookeries and haulouts. Disturbance of cliff-dwelling birds can result in abandonment of nests and loss of eggs as adults flee a nest. The U.S. Fish and Wildlife Service (USFWS) is responsible for issuing special use permits for activities within the Alaska Maritime National Wildlife Refuge, and all holders of NMFS scientific research permits would be required to coordinate the timing and location of their research with the USFWS to ensure that the Steller sea lion research would not adversely impact birds or other animals within the Refuge.

4.1 Potential Effects of Research Activities on Steller Sea Lions

The proposed action is an examination of the information gained to conserve Steller sea lions relative to the potential for negative impacts on wildlife within the action area, especially Steller sea lions. The following is a description of the potential short-term, or immediate, effects on individual Steller sea lions from the various types of research activities authorized and proposed as part of the Proposed Action. Tables 1-8 summarize the numbers of Steller sea lions that would be affected by each of these types of takes for each Alternative. The effects discussed below are, in many cases, the worst case scenario. It should be understood that while some effects, as some amount of serious injury and mortality, are unavoidable during the types of procedures described, the application by experienced personnel of the mitigation measures that are considered "good practice" (see Chapter 2), in conjunction with appropriate monitoring, would make such serious injury and mortality unlikely for many procedures. Nevertheless, it is important to mention such worst cases in order to allow adequate consideration of the potential for significant effects of the proposed action.

Effects of Aerial surveys: Disturbance from aircraft and vessel traffic has been observed to have highly variable effects on Steller sea lions that are hauled out (Calkins and Pitcher 1982). Reactions ranged from none to complete and immediate departure from the haulout, i.e. a stampede. The applicants for both Permits No. 358-1564-01 and 782-1528 report

that, during aerial surveys, usually less than 1% of hauled out animals go into the water, and that the sound change associated with banking the aircraft increases the likelihood of disturbing the animals. When Steller sea lions are frightened off rookeries in this way, pups may be trampled, or even abandoned. Juvenile and adult animals can also be injured during stampedes. (See also "Ground Counts" below for additional detail on potential adverse effects of stampedes.). In the absence of adequate post-activity monitoring, such serious injuries or deaths would not be recorded.

The incidence of stampedes in response to aerial surveys flown as described in the application are not known. Researchers report that only a small percentage (less than 1%) of animals are observed to be affected by the approaching survey planes, but the magnitude or type of the response is not reported. In addition, the cumulative effects of aerial surveys on Steller sea lions in Alaska, both within a season and over years of research, have not been documented.

Effects of ground counts: The possible effects of a stampede are similar to those described for aerial surveys, i.e. serious injuries and mortality are possible. However, experienced personnel move slowly through a haulout or rookery to minimize the likelihood or to avoid entirely, such events. Parturition in Steller sea lions occurs from mid-May until mid-July, with the highest frequency of births occurring mid-June. Thus, the majority of pups on a rookery at the time these ground counts occur would be a few days to six weeks old, depending on the timing. If sufficient pre-disturbance monitoring is not conducted, it is not possible to identify mother-pup pairs. If researchers have not identified which mothers are in attendance and which are at sea, there is no way to determine whether a pup has been abandoned as the result of the disturbance unless they remain to monitor the rookery for several days. Foraging trips of lactating females may last several days or more (Brandon 2000). Even if mother-pup pairs have been identified, if researchers do not monitor a rookery after the disturbance until all the adult females that entered the water return to their pups, it will not be possible to determine if pups have been abandoned as a result of the disturbance. Fostering is very rare in Steller sea lions, thus the majority of abandoned pups will starve to death. Further, if pups (or adults) were injured during a stampede, they may not die from their injuries immediately. Death may not occur for several days, or weeks, in the case of infections or hemorrhages resulting from injuries, or injuries that affect an animal's ability to forage.

Steller sea lions in Alaska demonstrate site fidelity with respect to rookeries. The arrivals of males and pre-parturant females are closely timed and fairly predictable from one year to the next. Large males of reproductive age are usually the first to arrive, establishing territories by aggressive competition with other males. Presumably, the holders of the best territories gain access to more females, and are therefore more successful at mating. When adult animals are displaced from the rookery during breeding season at least some males will likely have to re-establish their territories by fighting with other males. Thus, each disturbance that displaces the males from their territories increases the likelihood of aggressive interactions among males and the possibility of injury. Adult male Steller sea lions have large canines and powerful jaws and are capable of inflicting serious puncture and laceration wounds on opponents. These wounds may become infected. In addition, other sea lions on the rookery, including pups, may be injured during these aggressive competitions among males. Along with the possibility of physical trauma, the heightened aggressive interactions and resulting psychological effects can result in secondary disease manifestations (Sweeney 1990).

The magnitude of the disturbance effects on the animals may be affected by the number of personnel who come ashore, the amount of time the rookery or haulout is occupied by researchers (which usually means the amount of time the animals remain in the water or the pups

are separated from their mothers), the frequency of these disturbances (both intra- and inter-annually), and the timing of the disturbance (with respect to breeding, pupping, etc.).

Effects of incidental disturbance during scat collection, capture, and observational activities: This typically disturbs animals in the same way, and has the same potential affects, as described for ground counts above. The majority of scat collection coincides with other shore-based activities, so disturbance is often incidental to these activities rather than the direct result of the scat collection itself, with the exception of some samples collected in winter when no capture activities are planned.

General Effects of Capture and Restraint: Restraint procedures constitute one of the most stressful incidents in the life of an animal, and intense or prolonged stimulation can induce detrimental responses (Fowler 1978). Each restraint incident has some effect on the behavior, life, or activities of an animal. A variety of somatic, psychological, and behavioral stressors can be associated with capture and restraint of wild animals. These include strange sounds, sights, and odors, the effects of chemicals or drugs, apprehension (which may intensify to become anxiety, fright, or terror), and territorial or hierarchical upsets associated with displacement of animals by researchers who come onto rookeries and haulouts. Animals that are stressed can incur contusions, concussions, lacerations, nerve injuries, hematomas, and fractures in their attempts to avoid capture or escape restraint (Fowler 1978). The stress response can change an animal's reaction to many drugs, including those commonly used for chemical restraint, which can have lethal consequences. The annual reports from the current and previous permits held by NMML and ADF&G indicate that some animals showing distress and/or adverse reactions to drugs or handling that were not immediately released, subsequently died. Continuous stimulation of the adrenal cortex, as from stress associated with chronic disturbance or repeated capture, can cause muscle weakness, weight loss, increased susceptibility to bacterial infections, and poor wound healing, and can lead to behavioral changes including increased aggressive and antisocial tendencies (Fowler 1986). Capture myopathy is a possible consequence of the stress associated with chase, capture, and handling in numerous mammal species (Fowler 1978). Capture myopathy is characterized by degeneration and necrosis of striated and cardiac muscles and usually develops within 7 to 14 days after capture and handling. It has been observed both in animals that exert themselves maximally and those that remain relatively quiet, and occurs with either physical or chemical restraint. Fear, anxiety, overexertion, repeated handling, and constant muscle tensions such as may occur in protracted alarm reaction are among the factors that predispose an animal to this disease. A variety of factors may function in concert or individually. The muscle necrosis is likely due to acidemia resulting from a build up of lactic acid following profound muscle exertion: once necrosis has occurred, the prognosis for recovery is not favorable. The number of times an animal is captured, the method(s) of restraint, as well as the age and general condition of the animal are all factors that will affect an animal's response to capture.

Effects of Chemical Immobilization (Anesthesia/Sedation): A fairly high mortality rate caused by anesthesia has been reported in otariids (Gage 1993). Delivery of anesthesia in pinnipeds can be complicated by their particular anatomical and physiological specializations to the marine environment and by the logistics of working with wild animals. Determining the proper dose is dependent on a fairly accurate assessment of the animal's weight and condition, as miscalculation of an animal's weight can lead to an overdose, which can have lethal consequences (Fowler 1986). The typical induction time for most chemical restraint agents is 10 to 20 minutes following intramuscular injection. Thus, darting can be dangerous because it can spook an animal into the water before the immobilization has taken affect, which can result in drowning. In February 1993, under Permit No. 771 (64), an adult female darted with Telazol

died.[2] Although the animal was "one of the farthest from the water" among the animals on the beach, she moved toward the water within 30 seconds of being darted. Within 5 minutes she had rolled over into the surf and appeared unable to swim. By the time the researchers reached the animal she was not breathing and was given Dopram (a respiratory stimulant). She resumed breathing and began moving her head side to side and moving her foreflippers slightly. When these movements on the part of the animal began to interfere with the researcher's efforts to collect samples and attach a transmitter, the animal's head was covered in an attempt to calm her. By the time attachment of the transmitter was nearly completed it was noted that the female had been still for about a minute. Upon removing the rain jacket it was discovered that her pupils were dilated and she had no blink reflex. Attempts at resuscitation were unsuccessful and it was believed that the animal's immersion in sea water after darting may have triggered the dive response (breath holding, decreased heart rate, and reduced peripheral blood flow) and/or she may have aspirated sea water. It was also suggested that covering the animal's head may have contributed to her death by making her condition difficult to monitor and/or by pushing her back into the dive reflex.

The safest injection site for projectile syringes (darts) are in the deep muscle areas of the hind limbs (Scott and Ayars 1980). However, the blubber layer on pinnipeds can make delivery of an injectable drug into the muscle, where needed for proper absorption and distribution, difficult. In addition, inadvertent injection of drugs into the blubber frequently results in aseptic necrosis, sometimes leading to large abscesses (Geraci and Sweeney 1986). Injections into the chest cavity or stomach region can result in puncture of the lungs or stomach, which may kill the animal. In February 1993, under Permit No. 771(64), issued to NMML, a pup that was accidentally darted with Telazol when it unexpectedly moved in front of the target adult animal died, apparently as a result of inadvertent intravenous injection of a drug intended for intramuscular administration in a larger animal. According to the report, the dart struck on the left flank, about 5 inches forward of the hip and about 2 inches off the spine, which apparently, as indicated by necropsy, entered the kidney, effectively causing an intravenous injection. Necropsy also revealed slight trauma to the kidney. The pup had also regurgitated approximately a liter or more of milk following the darting and may have aspirated some, which could have contributed to the death.

Hyperthermia (over-heating) can occur in animals under anesthesia because the blubber layer can make heat dissipation a problem, even at ambient temperatures that are comfortable for the researchers: otariids over 25 kg tend to become hyperthermic during anesthesia (Gage 1990). Hypothermia can also occur in sedated animals, during anesthesia or post-recovery, as many drugs can affect thermoregulation. In hypothermia, the reduction in body temperature reduces tissue metabolism, while hyperthermia increases it. Both of these can have implications for the animal's reaction to any drugs administered, as well as any pathological conditions that may exist.

About 10% of animals induced with Telazol (tiletamine-zolazepam) or gas were observed to become apneic (stop breathing) within five minutes of induction (Gage 1990). Tiletamine is a cyclohexamine, which is a dissociative anesthetic that induces catatonia. It also has an analgesic effect through its action on the spinal cord, but it does not block visceral pain. Both hyperthermia and hypothermia are possible consequences of immobilization with tiletamine, depending on ambient temperatures. Respiratory depression is also possible, as is hypersalivation, which can lead to choking or aspiration of fluid. There is an excitatory phase seen with tiletamine characterized by occasional muscle spasms resembling seizures, due to spinal reflex firings, which can be minimized by using tiletamine in combination with diazepam. Zolazepam is a benzodiazepine, or antianxiety drug, that has a sedative effect and is a skeletal muscle relaxant. Zolazepam slightly depresses cardiovascular function. Both tiletamine and

zolazepam are excreted in the kidneys and are contraindicated in animals with severe renal or hepatic disease. The safety of these drugs is adversely affected in animals that are ill, stressed, or which have suffered from physical exertion (e.g. have been chased) prior to administration of the drug. There is no antidote (reversal agent) for tiletamine. Diazepam, which is a benzodiazepine similar to zolazepam, is metabolized slowly, with clinical effects typically disappearing within 60 to 90 minutes (Fowler 1986). There is a reversal agent for zolazepam, flumazenil. However, because zolazepam is used in combination with tiletamine to reduce the effects of the excitatory phase, reversing the effects of zolazepam in the absence of a reversal agent for tiletamine could result in convulsions and other side effects.

Inhalation anesthetics such as isoflurane gas are used to induce anesthesia in animals that can be manually restrained, and are commonly used to augment analgesia or increase the depth of anesthesia in animals previously immobilized by injectable agents. Prolonging immobilization by administering repeated doses of injectable agents is associated with a high risk of mortality, and an additional dose of Telazol should never be given (Gage 1990).[4] Isoflurane, a halogenated ether with potent anesthetic action (Stedman's Medical Dictionary 2000), is an inhaled general anesthetic that induces reversible depression of the central nervous system, resulting in unconsciousness, analgesia, voluntary muscular relaxation, and suppression of reflex activity (Fowler 1986). Isoflurane is especially useful for short procedures in which rapid recovery and few aftereffects are desirable. The effects of inhalation anesthetics increase predictably with increased dose, unlike injectable agents, which tend to be unpredictable and idiosyncratic among animals (Fowler 1986). In general, captive animals have been observed to fully recover from anesthesia with isoflurane after 8 hours (Gage 1990). Isoflurane gas appears to have the best recovery characteristics, and be safe and reliable, in otariids (Haulena and Heath 2001).

Effects of blood collection (venipuncture): The risks of blood collection are largely incidental to capture and restraint, as are described above. However, multiple attempts to obtain a blood sample are not only stressful and cause some degree of pain, they can result in damage to the vein, clotting, and abscess. Removing a volume of blood too large relative to the animal's mass and ability to replace what was taken can result in fatigue, anemia, weakened immunity, and problems with clotting.

Effects of skin and blubber biopsy: The effects of the capture and restraint necessary for obtaining these samples are described above. In addition, as with any wound, there is always the potential for infection after any of these procedures, particularly given the unsanitary environment of the rookeries. An otherwise healthy animal should be able to heal and recover from a properly performed procedure, but animals with compromised immune systems may develop major complications. This procedure may cause more than momentary pain. There is a risk of injury from the pneumatically-propelled CO_2-rifle, and cross-bow fired biopsy darts if they strike an unintended area. In a study on the effectiveness of a crossbow-launched biopsy system for collecting tissue samples from South American fur seals (*Arctocephalus australis*), the authors concluded that animals were likely to be badly injured if a dart were to hit them in the head (Gemmell and Majluf 1997). The size of the sample dart for this study was smaller than that proposed by Dr. VanBlaricom, largely because the intent was to obtain samples for genetic and toxicological analyses rather than fatty acid profile analysis. Gemmell and Majluf (1997) also found that success was highly dependent on the location and angle of the biopsy dart at

[4] Note that several of the animals that died under previous permits issued to ADF&G were given repeat injections of medetomidine and/or ketamine, the injectable agents used to immobilize them. See annual reports for Permits No. 771 and 965.

impact and stated that the high animal densities and rugged terrain encountered on the study site hindered use of the remote biopsy dart system. Gemmell and Majluf (1997) reported that the typical response of male fur seals to the remote biopsy dart was to recoil from the impact and search briefly for the "assailant." Both sampling success and accuracy using remote biopsy darts decrease markedly with distance from the target.

The holders of Permit No. 782-1532 report that the response of animals struck by the dart fired from a CO_2-charged rifle is minimal, and less than that of animals struck by a Telazol dart. They also report that their techniques for using a blubber punch or pneumatically-propelled dart have been used without adverse effect on a variety of pinniped species.

Effects of muscle biopsy: The small diameter of the wound, combined with the depth of the biopsy, would create a wound that would tend to close on the surface prior to deep tissue healing. This increases the chances of abscess formation, particularly if the biopsy needle or dart was not properly sterilized. Biopsy wounds, as with any wounds including those acquired during intra-species aggressive interactions, can become contaminated despite use of sterile equipment. Therefore, leaving the wound open to drain should an abscess form, rather than suturing closed, is preferable. As with skin and blubber biopsies, unhealthy animals or those with compromised immune systems may develop major complications from such an infection. Depending on the depth of penetration and force of impact, biopsy darts can also damage internal organs if they strike the abdominal area. Animals can be severely injured if darts strike them in the head (Gemmell and Majluf 1997). The potential adverse effects of this procedure include more than momentary pain, risk of infection, and the stress and risks associated with capture and restraint, as described above.

Effects of ultrasound: This procedure, by itself, poses no risk of injury to an animal. However, there is the possibility for adverse affects from the need for capture and restraint, as described above.

Effects of fecal loops and culture swabs: The potential adverse affects relate primarily to the risks of capture and restraint, as described above. In addition, there is the slight potential to introduce or spread infection if the loops and swabs are not used properly. There is the potential for perforation, and subsequent infection, when fecal loops are inserted into the rectum. There is the possibility for damage to the cornea of the eye if ocular swabbing is done incorrectly. When performed by a qualified, experienced person using commonly accepted standards of good practice, these risks are likely negligible.

Effects of tooth extraction: The potential adverse affects relate to the risks of capture, anesthesia, and the possibility of infection following extraction. The procedure may result in more than momentary pain, which could interfere with foraging, at least temporarily.

Effects of clipping vibrissae, hair, and nails: Clipping whiskers, hair and nails is not likely to result in any pain. The effects on the animal of clipping a whisker, toenail or patch of hair are probably largely incidental to the effects of capture and restraint described above.

Effects of pulling vibrissae: The area of the snout where the vibrissae follicles are located is highly vascularized and ennervated to enable a sea lion to use its vibrissae in search of food even at very cold temperatures (Gee 1998). Owing to the highly sensitive nature of this sensory organ, the pulling of a whisker may cause more than momentary pain. The effects on the animal of pulling a whisker are probably largely incidental to the effects of capture and restraint described above.

General effects of marking (e.g., flipper tags and branding): Measures of natality and rearing success, sex and age ratios, mortality, and survival are important indicators of population health. Studies of these vital rates are often facilitated by the ability to recognize individual animals in a population. For example, although natality can be estimated by counting newborns, observing deaths is more difficult and is therefore usually estimated using mark-recapture techniques that use mathematical formulas to correlate capture probability with survival rates. Mark-recapture studies require that individual animals be easily recognized. In a large number of marine and terrestrial species, natural marks have been and are used to identify individual animals. For example, individual humpback whales can be recognized by the patterns of pigment on their tail flukes, right whales are known by their callosities, lions have been identified by vibrissae pattems (Pennycuick and Rudnai 1970), and individual differences in appearance have been used to identify dolphins (*Tursiops truncatus*) and several primate species. In general, the use of natural marks and individual appearance requires familiarity with the subject animals, which typically means many hours of personal observation. When the use of natural marks to identify individual animals is not suitable or practical for achieving study objectives, there are a variety of methods for marking animals available. Marking devices can be divided into temporary, semi-permanent, and permanent.

Temporary marks: Paints and dyes have been used successfully to temporarily mark Steller sea lions and other pinnipeds. The duration of the mark depends on, among other things, the type of paint or dye used, and the season applied, because all pinnipeds molt (shed their coats) annually. Thus, paints and dyes can be used to identify individuals for weeks to months. Paint marks can be applied remotely using a paint gun that fires pellets filled with pigment that burst on impact and leave a spot on the animal's fur. This method does not allow use of alphanumeric characters and is therefore not practical when other than the crudest of marks are needed. If animals can be captured and restrained, paints and dyes can be used to make unique alphanumeric marks on their fur. This method likely involves more stress to the animal than remote marking, and may cause incidental disturbance of conspecifics. However, the marks can be made large enough to be easily read from a distance, making it unnecessary to recapture the animal for identification, or cause additional disturbance to conspecifics. A variation on painting or dying the animal's fur is to capture animals and glue (using epoxy) a colored tag to their fur. This tag would fall off when the animal molts, and could have unique alphanumeric information written on it that could be read if researchers could get close enough or recapture the animal. Attaching a scientific instrument that emits a unique signal to the fur is also a method of temporary marking that has been used in a variety of species, including Steller sea lions.

Semi-permanent marks: There are numerous plastic, aluminum, and plated-steel tags available in a variety of colors, sizes, and identifying symbols that can be affixed to animals to allow identification of individuals. All of these techniques require capture and restraint of the animal. Plastic cattle ear tags have been used for many years to mark numerous pinniped species, including Steller sea lions. The tags are attached through the flippers. While these tags may remain attached for the life of the animal, they can and do pull out. In addition, they can become faded or otherwise difficult to read over time. These plastic tags cannot necessarily be read from as a great a distance as large paint or dye marks, thus recapture of animals may be required for positive identification of individuals. However, when the study objectives require identification of individuals for longer than a few months or a season, or when animals will need to be recaptured for other reasons, plastic tags are the alternative of choice for many researchers. Another method of identifying individual animals is to attach scientific instruments, such as VHF and satellite transmitters, that broadcast signals on unique frequencies and allow tracking of animals or remote monitoring of their movement and activities. In pinnipeds, these tags are

glued to the fur, or affixed to plastic tags that are attached through the flippers. These are considered temporary (if glued to fur) or semi-permanent (if affixed to flipper tags) because they will fall off when the animal molts or be lost when the flipper tag pulls out. In addition, the life of the tag is limited by the battery capacity, which, in turn, is limited by the size of the tag.

Permanent marks: When study objectives require recognition of individual animals for more than a season or a few years, temporary or semi-permanent marks must be re-applied, or a permanent mark can be used. As discussed above, applying both temporary and semi-permanent marks usually requires capture and restraint of the animal. Given that each capture event is stressful, and has the potential to injure the animal, when the objective is only to have animals that can be individually recognized from a distance, it is more advantageous to apply a permanent mark from the start. Using permanent marks is also favored over re-applying temporary marks when the interval between capture events is longer than the duration of the temporary mark. Hot brands have been used for many years to permanently mark domestic livestock and some species of wildlife, including Steller sea lions and other pinnipeds. Cryo-branding, or freeze branding has also been used successfully to permanently mark numerous species, including white-tail dear, horses, and harbor seals. Tattoos have also been used to permanently identify domestic animals (e.g., cattle, dogs, horses) and wildlife (e.g., rabbits, polar bears, deer). To be clear and legible, tattoos must be applied to a body site free of hair (either a hairless site on the animal, or a site shaved prior to tattoo application), and work best on light-colored skin. The most common sites for tattoos on animals are the ear, inner lip, and inner thigh. The technique for tattooing animals involves applying tattoo pliers that puncture the skin, followed by rubbing dye into the puncture wound. Thus, as with branding, tattooing involves some degree of pain and risk of infection. The advantage of a brand over a tattoo is that the brand can be made large enough to be visible from a distance, whereas reading tattoos usually requires capture of the animal to read the mark.

Freeze branding is considered by some to be more acceptable for marking wildlife than hot branding because, if done correctly, there is a negligible risk of infection (Day et al., 1980). In the 1993 EA on the effects of branding, hot-branding was said to be preferred over freeze branding because freeze branding required longer restraint times that could result in increased stress on the animals. There was also concern about the safety of using anesthesia to restrain the sea lions. NMML and ADF&G have been using isoflurane gas to anesthetize Steller sea lions for many years, with few complications. Since the animals being hot-branded under existing permits are anesthetized, a longer restraint time would not necessarily result in more stress. However, the use of anesthesia is not entirely without risks, and the risk of adverse effects increases with the duration of use. Thus, if pups needed to be under anesthesia for significantly longer for freeze-branding than for hot-branding, the risk of adverse effects from anesthesia might outweigh the potential benefit of decreased risk of infection from freeze branding. In addition, if it takes significantly more time to freeze-brand Steller sea lions than to hot brand the same number of animals, the rookeries would be disturbed for longer, or fewer animals would be marked. The applicants state it currently takes about one minute per animal [exclusive of preparation time and anesthesia] to apply a four-character hot-brand, as described in Section 2.2.1. The 1993 EA also found that freeze branding was less preferable than hot branding because of concerns about the visibility of freeze-brands on the light pelage of Steller sea lions and evidence that freeze brands may disappear over time and with molting. However, in a study on spatial structure of harbor seals in Sweden, 163 harbor seals were freeze-branded as pups (less than one year old) and juveniles/young adults (1-4 years old) and tracked for up to 14 years, including during periods of molting (Härkönen and Harding 2001).

The practicality of hot-branding as a means of permanently marking pinnipeds in the wild has been demonstrated in several studies. However, there has been insufficient resight

effort of the more than 15,000 sea lions branded by ADF&G and NMML since 1975 to validate the merits of hot-branding versus the potential for adverse impacts to individual sea lions. The applicants state there is no evidence suggesting increased mortality of pups after branding. The absence of such evidence cannot be interpreted as evidence of no effect because there has not been sufficient post-activity monitoring to determine whether hot-branding, or other research activities on rookeries, has contributed to increased mortality of pups. Further, Merrick et al. (1996) state that studies of branded Steller sea lions on Marmot Island in Alaska suggest branding may lead to increased

In 1993, 399 Steller sea lion pups were branded on Forrester Island in Southeast Alaska.[5] Four to five days after branding six dead, branded pups were collected during pup counts. Necropsy revealed blunt trauma as the probable cause of death for two of the pups, and starvation was the likely cause of death for the other four. Although the pathologist stated that these deaths could not be linked to branding, it is not apparent how this possibility could be ruled out. In a subsequent report from the permit holder, it was stated that it was unclear whether branding operations contributed to abandonment of pups, and their subsequent starvation.[6] An additional 36 dead pups were recovered on this rookery 4-5 days after branding. Five of these pups were from a growth study in which pups were marked to be recaptured regularly for weighing and other measurements: at least four of these pups appeared to have starved, possibly as the result of abandonment. Of the remaining 26 dead pups, 1 was still born, 3 were neonatal deaths of unknown cause, 15-16 were emaciated and probably starved to death, 4 died of trauma, 1 from pneumonia, and 1 drowned. The possibility that the deaths of the emaciated animals, or those that died from trauma, pneumonia or drowning were related to the branding and research activities cannot be ruled out.

In a recent branding of Steller sea lion pups on rookeries in Oregon (under Permit No. 782-1532), approximately 1/3 of the pups present were captured and branded. Several days later 7 pup carcasses were observed on the rookery: 6 of the dead pups were branded.[7] It is not known what percentage of these mortalities could be attributed to the research activities vs. natural causes. Necropsy indicated that one of the dead branded pups probably died as the result of trauma associated with a bite wound on the head.[8] An additional dead pup was recovered during the branding operations whose death was believed to be due to suffocation as a result of being trapped in a crevice beneath another pup: this is being counted against the total number of accidental mortalities allowed under their permit.

Effects of flipper tagging: As described above, these types of tags are best considered semi-permanent markers as they can and do pull out because sea lions use their foreflippers in both aquatic and terrestrial locomotion. In addition to the effects of capture and restraint as described above, it is likely that affixing these tags to the flippers of sea lions causes more than momentary pain. When the tag is affixed there is the potential for infection at the wound site, particularly because the environment on the rookery is not aseptic and because the activity of the animal may prolong or prevent healing by producing repetitive stress on the wound. There is also the potential for infection when a tag pulls out of the flipper, for whatever reason. In moving about on a rookery or haulout, or swimming, there is the potential for a tag to be torn out of the flipper by abrasion on the substrate or by hydrodynamic pressure (Fowler

[5] A letter reporting on activities conducted under Permit No. 809, issued to NMML, submitted by D. Calkins to H. Braham, NMML on December 14, 1994.
[6] Annual report on research conducted under MMPA Permit No. 809. Submitted December 30, 1994.
[7] David Pitkin, Oregon Coast National Wildlife Refuge Complex, USFWS, Newport, OR., personal communication
[8] Memo from D.P. DeMaster to Ann Terbush, dated July 25, 2001 regarding Steller sea lion pup mortality during and after handling activity at Rogue Reef, Oregon.

1986). There is no information on long-term tag retention or average retention rates in the annual reports from NMFS permits holders who use these tags on Steller sea lions. There is also no quantitative information on the rate of infection caused by flipper tagging. Both applicants report that tag-related mortality does not add significantly to natural mortality. Also, Merrick et al. (1996) report that flipper tags can become difficult to read as the colors and markings on them fade over time and that they are not readily visible from any distance, partially because the gregarious nature of sea lions causes them to group together and obscure the flippers.

Effects of Attachment of scientific instruments: In addition to the effects of capture and restraint described above, the attachment of an instrument can have both short- and long-term adverse effects. Possible chronic, short-term effects can include a reduction in foraging activity or an increase in grooming at the expense of other behaviors (Kenward 1987). These types of effects are likely present after most tagging events and may be as much a delayed result of the capture and handling as of the tag's presence. Short-term effects can lead to acute problems for animals of various species: the presence of a tag has exacerbated capture shock and led to death in hares; the disturbance of tagging has resulted in desertion by incubating birds; abandonment or rejection of young in birds and ungulates was seen following tagging; and tagging may be enough to stop a dispersing animal from securing a territory, or push an animal over the brink of starvation when food is short (Kenward 1987). The hydrodynamic drag created by the instrument can exert an additional energetic demand on an animal which could, over time, result in reduced foraging success, increased metabolic load, and resultant stress to the animal. Reactions of pinnipeds fitted with Crittercams ranged from apparent curiosity about the instrument, to attempts to dislodge it, and aggressive reactions (Marshall 1998).

The attachment of instruments to the hair with epoxy should not cause any pain if done properly, but may result in discomfort if the placement of the instrument causes pulling of the hair or skin as the animal moves. In addition, if the ratio of resin and catalyst is not correctly measured, the resultant exothermic (heat-producing) reaction can burn the animal's skin. Both the resin and hardener (catalyst) can cause skin irritation (itching, rashes, hives) and prolonged or repeated skin contact may cause sensitivity (itching, swelling, rashes). The low vapor pressure of the resin by itself makes inhalation unlikely in normal use. There is the possibility that an instrument could be knocked or torn off, pulling out the hair and/or some of the underlying skin, which would then be open to infection.

The use of the proposed experimental collar could be problematic in a number of ways depending on the design used. Even the best-fitting collars may snag, and if this were to occur while an animal is underwater and unable to free itself, the animal would drown. Collars can chafe, and the constant irritation could lead to infection. If collars are too tight, either when initially attached or due to seasonal or age related changes in the neck circumference, an animal's ability to swallow large food items (such as whole fish) without choking would be hindered. A too tight collar could also interfere with breathing, or could, over time, cut into the animal as it grows. There may also be unanticipated behavioral effects of the collar.

General Effects of Administering Drugs and Other Substances: As with the other activities, the potential adverse affects of administering drugs in general are related to the effects of capture and restraint, as described above. In addition, because the blubber in some areas is not well vascularized, inadvertent injection of drugs into the blubber frequently results in aseptic necrosis, sometime leading to large abscesses (Fowler 1986). Thus, subcutaneous administration of drugs is usually problematic in marine mammals. There is the possibility of accidentally injecting drugs subdurally (beneath the dura matter, a fibrous membrane covering the central nervous system) when attempting to inject into the extradural vein (Stoskopf 1990).

Effects of deuterium oxide injection: Deuterium oxide (^2H_2O) is a stable, relatively non-toxic and naturally occurring isotope: up to 20-25% of body water can be replaced by deuterium oxide in mice before toxic effects are observed (Oftedal and Iverson 1987). The effects of injecting deuterium are probably largely incidental to the capture and restraint as described above. However, because a post-equilibration sample must be collected, the use of deuterium increases the amount of time an individual animal must be held and the amount of time researchers are occupying a rookery. As with any procedure that breaks the skin, there is also the potential to introduce infection during injection.

Effects of lidocaine: A surface anesthetic effect, e.g. loss of feeling or sensation, can be achieved by subcutaneous injection. Lidocaine hurts for several seconds to a minute following injection into the skin. Lidocaine can produce serious side-effects if injected intravascularly, and if accidentally swallowed, can cause convulsions.[9] The use of lidocaine with epinephrine is contraindicated as it may cause tachycardia (rapid heart rate). As a surface anesthetic, lidocaine is relatively safe, as evidenced by its available in a variety of over-the-counter topical preparations for relieving pain and itching in humans.

Effects of valium: The effects are dose-related, and cumulative. It is metabolized by the liver and excreted by the kidneys. Possible side effects include bradycardia (slowed heart rate), respiratory depression, tremor, confusion, photo-phobia, blurred vision, nausea, vomiting, depressed gag reflex, lethargy, and ataxia (inability to coordinate muscle activity during voluntary movement). It should be used with caution in animals experiencing shock.[10] Injectable valium is irritating to the vein and tissue, and may cause pain during administration. It has a rapid onset when given intravenously.

Effects of injecting Evans blue dye: Evans blue is a diazo dye used for determination of blood volume on the basis of dilution of a standard solution of the dye in plasma following intravenous injection. The dye binds to albumin in the blood stream and remains bound long enough to circulate and distribute in the entire plasma volume of the blood stream. Evans blue was carcinogenic in one study in rats when administered intraperitoneally, the only species and route tested. It produced sarcomas of the reticuloendothelial system in the liver.[11] This dye is considered a teratogen at high doses, which can cause abnormal prenatal development.[12] However, although there are no references to the safety of this dye in Steller sea lions, this dye is currently used safely for numerous human medicine applications.[13]

Effects of Betadine: Following contact with skin, a burning sensation and itching can occur. Severe complications are rare following application on intact skin.

Effects of bioelectric impedence analysis: Because the animals would be anesthetized, there will be no pain associated with the insertion of the needles. The insertion of needles does pose a risk of infection: bacteria or other infectious agents that may be present on the animal's skin or hair can be introduced under the skin. When performed by a qualified, experienced person using commonly accepted standards of good practice, these risks are likely negligible. The effects of this procedure are probably largely incidental to those associated with capture and restraint, as described above. However, the 2000 annual report for Permit No. 881-

[9] Lidocaine: adverse reactions. http://www.infomed.org/100drugs/lidotoc.html
[10] http://www.kcmetro.cc.mo.us/pennvalley/emt/diazep.htm
[11] Animal carcinogenicity data. http://193.51.164.11/htdocs/Monographs/Vol08/EvansBlue.html
[12] Aldrich Chemical Catalog, Aldrich, Milwaukee, WI.
[13] Numerous references available.

1443 (Alaska Sea Life Center) reported development of a subcutaneous abscess on a captive adult female Steller sea lion, apparently resulting from tissue necrosis induced by the focal electrical current at the site of a bioimpedence electrode implant. The abscess was opened for drainage and began to heal slowly over the next 5-6 months. However, a scab and area of granulation tissue then formed at the site and was treated with topical antibiotics for several months, resulting in a small area of scar tissue, which will likely remain hairless.

Effects of enemas: Any time a foreign object is inserted into the rectum there is the possibility of perforation, which can lead to peritonitis that may result in death. When performed by a qualified, experienced person using commonly accepted standards of good practice, these risks are likely negligible. As animals must be restrained for this procedure, and are usually chemically restrained, the risks associated with capture and restraint are also associated with this procedure.

Effects of stomach intubation: In addition to the effects of capture and restraint, as described above, there is the risk of introduction of liquid into the trachea, initiating aspiration pneumonia or death. There is also a risk of cross-contamination if equipment is not properly disinfected between animals. When performed by a qualified, experienced person using commonly accepted standards of good practice, these risks are likely negligible.

4.2 Potential Effects of Alternative 1 - Status Quo on Steller Sea Lions

4.2.1 Information Gained by this Alternative

Under Alternative 1-status quo: no amendments or new permits, NMFS and ADFG have existing research programs developed prior to the congressional appropriation and SSLRI which address specific research needs and hypotheses outlined in the Steller Sea Lion Recovery Plan. NMFS and ADFG studies under this alternative focus on monitoring sea lion status and trends through aerial and ground surveys; food habits through scat analysis, stable isotopes, and fatty acid; foraging ecology through deployment of satellite dive recorders on juvenile sea lions captured using hoop nets on land or underwater; stock identification using mitochondrial and nuclear DNA; health and condition by comparative morphological measures and a variety of blood parameters obtained from pups and captured juveniles; and determination of survival and age-specific reproductive rates by marking pups at their natal rookeries.

4.2.2 Potential Takes Under this Alternative

Under this Alternative, up to 20% of the pups born annually would be captured and handled for various sampling activities, including hot-branding, flipper-tagging, and blood and tissue sampling. The annual maximum number of sea lions that would be harassed during aerial surveys represents approximately three times the minimum population estimate. This could translate into each animal being harassed three times per year by this activity or some animals being harassed more or less, depending on the timing and locations of the surveys. Similarly, the total number of sea lions harassed during ground counts and scat collection, or incidental to capture activities, represents nearly twice the minimum estimated population. The total number of sea lions that could be potentially taken under this alternative through harassment is nearly five times the minimum estimated population. However, the number of sea lions authorized to be taken by harassment overestimates (based on previous research) the total number of animals that are actually harassed, or otherwise affected, in a given year. This relates

to the definitions of take and harassment under the MMPA where (1) attempting to harass a marine mammal is considered a take and (2) any act that has the potential to disturb a marine mammal is considered harassment. Thus, because aerial surveys may cover the entire range of Steller sea lions in North America, the number of takes authorized represents the number of animals estimated in the population times the number of surveys. However, not all sea lions surveyed may respond adversely to the survey. As with aerial surveys, the total number of sea lions authorized to be taken by harassment incidental to activities on land represents an estimate of the maximum number of sea lions that could be present in the research area multiplied by the number of times researchers visit a given site. However, the actual number of sea lions taken may be less because some may not be present on or near a rookery or haulout during a disturbance, or may be far enough away from the research activity to not be disturbed. The takes authorized in a permit are, therefore, conservative in allowing for the maximum potential number of animals that could be harassed, regardless of the intensity of the animals' reaction. However, the effects of harassment associated with a given activity are evaluated relative to the total number of animals that could be affected and, more importantly, by the intensity of the observed reaction of the animal and the potential effects (short- and long-term) on its survival and reproductive success.

The best available information indicates that there is a minimal likelihood for adverse physical and behavioral effects on individual Steller sea lions from the research activities currently authorized and conducted. For that reason, NMFS, Office of Protected Resources, made a determination these activities should be categorically excluded from further reviews under NEPA. However, upon receipt of subsequent research permit requests, it was determined that there have been no studies on the cumulative effects on individual stocks, or the population, especially with respect to the potential for adverse effects on the annual rates of recruitment or survival. There is a large amount of disturbance associated with some of the research activities. This disturbance could be considered significant if it affects the survival or fecundity of the population. The extent to which behavioral changes in response to disturbance can affect demographic parameters such as survival and reproductive success is not known for Steller sea lions. The potential consequences of such flight are discussed above under descriptions of effects of aerial survey and ground counts.

Under this alternative, which is the "no action" alternative, no amendments to existing permits or new permits for scientific research on Steller sea lions would be issued. However, all takes of Steller sea lions presently authorized under permits held by NMML (Permit No. 782-1532) and ADF&G (Permit No. 358-1564-01) would continue until the permits expire in December 2004 and June 2005, respectively. These two permits currently authorize takes of Steller sea lions throughout their range in the U.S. (including California, Oregon, and Alaska) by a variety of research activities involving both level A and level B harassment, as defined under the MMPA. Table 1 summarizes the numbers of sea lions authorized to be taken under these two permits. A description of the authorized takes that could occur under each activity authorized under this alternative is provided in Chapter 4.1-Effects of Alternative 1.

Table 1: Potential Cumulative Annual Takes of Steller Sea Lions, Range-wide in the U.S., for Scientific Research, under the Status Quo Alternative
(All currently authorized takes for Permits No. 358-1564-01 (ADF&G) and 782-1532 (NMML))

Activity	Age Class	# animals taken/year*	# takes/ animal/ year	season	location
1. Aerial survey: breeding season	pups	15,000 *(ADF&G)*	unknown[8]	June-July annually [ADF&G and NMML fly in alternating years]	Alaska-wide
		15,000 *(NMML)*			range-wide (CA, OR, AK)
	non-pups	45,000 *(ADF&G)*			Alaska-wide
		45,000 *(NMML)*			range-wide
2. Aerial survey: non-breeding season	all ages	25,000 *(NMML)*	unknown	Aug-May annually	range-wide
3. Aerial survey: monthly regional	all ages	15,000 *(NMML)*	unknown	Jan-Dec bi-annually	Gulf of AK, Aleutian Is. (western stock)
4. Ground counts (and incidental scat collection)	non-pups	15,000 *(ADF&G)*	unknown	June-July	ADF&G = Alaska-wide
		12,000		2003,2004	
		30,000 *(NMML)*		2002	NMML = Range-wide
	pups	10,000 *(ADF&G)*			[including all 40+ rookeries]

		4,000 15,000 *(NMML)*		2003,2004 2002	
5. Incidental disturbance during scat collection capture activities, observational, and remote monitoring activities	all ages	7,000 *(ADF&G)*	unknown	all year	Alaska-wide
		4,000 *(NMML)*			range-wide
6. Remote biopsy sampling	2 months to 3 years	120 *(NMML)*	2	all year	range-wide
	adults	60 *(NMML)*	1		
7. Accidental mortality	all ages	5 *(ADF&G)*	1	all year	Alaska-wide
		5 *(NMML)*			range-wide
8. Behavioral and Demographic Observations and Remote Monitoring	All ages	None *(ADF&G and NMML)*	None	All year	Range wide
9. Capture and Restraint (includes hoop net, underwater lasso, restraining net, Valium, isoflurane, Telazol)	newborn to 2 months	700 *(ADF&G)*	2	June-July	Alaska-wide
	2 months to 3 years	300 *(ADF&G)*	2	all year	Alaska-wide
	newborn to 4 months	1300 *(NMML)*	2	June-July	Range-wide
	4 months to 3 years	120 *(NMML)*	2	all year	range-wide
	all ages	10 *(ADF&G)*	2	all year	Alaska-wide
					Note that the

					following takes are a subset of those animals captured in Activity 9 and thus do not represent additional animals taken, but rather additional procedures per animal.
9.a. Blood collection	newborn to 4 months	450 *(NMML)*	2	June-July	range-wide
	newborn to 2 months	350 *(ADF&G)*		June-July	Alaska-wide
	4 mo to 3 yrs	120 *(NMML)*		all year	range-wide
	2 months to 3 yrs	300 *(ADF&G)*		all year	Alaska-wide
	all ages	10 *(ADF&G)*		all year	Alaska-wide
9.b. Tissue samples for genetic analysis (skin biopsy)	newborn to 1.5 months	450 *(NMML)*	1	June-July	range-wide
	newborn to 2 months	350 *(ADF&G)*			
9.c. Skin/Blubber biopsy	> 2 months to 3 years	300 *(ADF&G)*	2	All year	Alaska-wide
	4 months to 3 years	120 *(NMML)*	2	all year	range-wide
9.d. Fecal loops and culture swabs	newborn to 2 months	350 *(ADF&G)*	2	June-July	Alaska-wide

	> 2 months to 3 years	300 *(ADF&G)*	2	all year	Alaska-wide
	pups ≤ 1.5 months	450 *(NMML)*	2	June-July	range-wide
	4 months to 3 years	120 *(NMML)*	2	all year	range-wide
	all ages	10 *(ADF&G)*	2	all year	Alaska-wide
9.e. Tooth extraction (Note: only 1 tooth is extracted over the life of an animal)	2 months to 3 years	300 *(ADF&G)*	1	all year	Alaska-wide
	all ages	10 *(ADF&G)*	1	all year	
9.f. Clip vibrissae, hair, and nails for isotope analyses	newborn to 3 years	650 *(ADF&G)*	2	all year	Alaska-wide
	all ages	10 *(ADF&G)*	2		Alaska-wide
	4 months to 3 years	120 *(NMML)*	2		Range-wide
9.g. Flipper tag (may retain skin punch for genetic analysis)	Pups	700 *(ADF&G)*	1	June-July	Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*		all year	Alaska-wide
	newborn to 4 months	1300 *(NMML)*		June-July	range-wide
	4 months to 3 years	120 *(NMML)*		All year	range-wide

9.h. Hot-brand (only one brand over life of animal)	pups ≤ 1.5 months	600 *(ADF&G)*	1	June-July	Alaska-wide
	2 months to 3 years	300 *(ADF&G)*		all year	Alaska-wide
	pups ≤ 1.5 months	800 *(NMML)*		June-July	range-wide
9.i. Attachment of scientific instruments (includes VHF, SLTDR)	2 months to 3 years	45 *(ADF&G)*	2	all year	Alaska-wide
	4 months to 3 years	120 *(NMML)*	2		Range-wide
9.j. Enemas	> 1.5 months to 3 years	650	2	all year	Alaska-wide
	all ages	10 *(ADF&G)*	2		range-wide
	4 months to 3 years	120 *(NMML)*			
9.k. Deuterated water	> 2 months to 3 years	300 *(ADF&G)*	2	all year	Alaska-wide

Aerial survey: Permit No. 358-1564-01 currently authorizes harassment of 45,000 non-pups and 15,000 pups per each year of the survey, in Southeast Alaska. Permit No. 782-1532 currently authorizes harassment by aerial survey of: 45,000 non-pups and 15,000 pups during breeding season (June and July) of 2000. 2002, and 2004, range-wide; 25,000 of all ages during non-breeding season (August-May) range-wide, three times in five years; and 15,000 per month, of all ages, year-round in the Gulf of Alaska and Aleutian Islands. The June-July and August-May surveys are currently flown every other year.

Ground counts: Permit No. 358-1564-01 currently authorizes harassment of 15,000 non-pups and 10,000 pups per year, in southeast Alaska and the Aleutian Islands, for these counts. Permit No. 782-1532 currently authorizes harassment of 30,000 non-pups and 15,000 pups in June-July 2002, 12,000 non-pups and 4,000 pups per year in 2000-2004, range-wide for similar activities. The applicants state that these counts are limited to no more than once every other year per rookery to reduce the potential adverse effects of disturbance. The NMML and ADF&G alternate years on rookeries so that no single rookery is disturbed more than once per breeding season by this activity.

Incidental disturbance (during scat collection, capture activities, behavioral and demographic observations and remote monitoring): Permit No. 358-1564-01 authorizes incidental disturbance of 7,000 Steller sea lions per year range-wide during scat collection, capture activities and observational activities. Permit No. 782-1532, authorizes disturbance of 4,000 animals per year, range-wide, for these activities.

Capture and restraint: Permit No. 358-1564-01 currently authorizes capture and restraint of 700 pups ≤ 1.5 months old, 300 animals between two months and three years old, and 10 animals of any age annually. The permit authorizes each animal to be captured up to two times per year. Permit No. 782-1532 currently authorizes capture and restraint of 1,300 pups, and 120 animals ages four months to three years, annually, range-wide. The permit authorizes each animal to be captured up to two times per year.

Blood collection (venipuncture): Permit No. 358-1564-01 currently authorizes collection of 25 ml of blood from 700 pups ≤ 1.5 months old per year, range-wide, and 75 ml from 300 sea lions aged two months to three years, with two takes per animal allowed annually. Permit No. 782-1532 currently authorizes blood collection (25 to 40 cc) from 1,300 pups and 120 animals aged four months to three years, range-wide, annually.

Skin and blubber biopsy: Permit No. 358-1564-01 currently authorizes collection of skin and blubber biopsies from 300 animals aged two months to three years annually, Alaska-wide. In addition, for up to 700 pups per year that are flipper-tagged, the punch of skin is retained. Permit No. 782-1532 authorizes skin and blubber biopsies from 120 animals aged four months to three years annually, and a skin biopsy only from up to 450 pups ≤ 1.5 months old, range-wide.

Remote blubber biopsy: Permit No. 782-1532currently authorizes collection of blubber samples from 60 un-restrained adult females and an additional 120 pups/juveniles by a blubber punch, by a pneumatically-propelled dart, or a modified cetacean biopsy dart fired from a CO_2-charged rifle.

Fecal loops and culture swabs: Permit No. 358-1564-01 currently authorizes use of these sampling devices for up to 350 pups ≤ 1.5 months old, 300 animals aged two months to three years, and 10 animals of any age annually, range-wide. Permit No. 782-1532 currently

authorizes samples collected using fecal loops and swabs from 450 pups and 120 animals aged four months to three years annually, range-wide.

Tooth extraction: Permit No. 358-1564-01 currently authorizes collection of a tooth from 300 animals aged two months to three years old per year, and 10 animals of any age annually. Permit No. 782-1532, does not authorize tooth extraction at this time.

Collecting vibrissae, hair and nails: Permit No. 358-1564-01 currently authorizes clipping1-2 vibrissae close to the skin from 300 pups > 1.5 months old and 10 animals of any age annually. Permit No. 782-1532 currently authorizes clipping two vibrissae close to the skin from 120 animals ages four months to three years. Both permits authorize clipping of hair from an area approximately $3cm^2$, and clipping the tip of a nail from each fore flipper from these same animals.

Flipper tagging: Permit No. 358-1564-01 currently authorizes attachment of plastic tags through the flippers of 700 pups ≤ 1.5 months old and 300 animals ages two months to three years annually, range-wide. Permit No. 782-1532 currently authorizes flipper-tagging of 1300 pups and 120 animals aged four months to three years, annually, range-wide.

Hot branding: Permit No. 358-1564-01, which currently authorizes hot-branding of 600 pups ≤ 1.5 months old and 300 animals ages two months to three years, per year, range-wide. Permit No. 782-1532 currently authorizes branding of 800 pups per year, range-wide.

Attachment of scientific instruments (e.g. VHF and SLTDR tags): Permit No. 358-1564-01 currently authorizes attachment of SLTDR and VHF tags to 45 of the 300 animals aged two months to three years, annually, range-wide. Permit No. 782-1532 currently authorizes attachment of instruments to 120 animals aged four months to three years, annually, range-wide.

Deuterated water: Permit No. 358-1564-01 currently authorizes the use of deuterated water in 300 animals aged two months to three years annually, range-wide.

Lidocaine (Xylocaine): Permit No. 358-1564-01 currently authorizes use of lidocaine associated with biopsies for 300 animals aged two months to three years annually, range-wide. Permit No. 782-1532 currently authorizes use of lidocaine for skin and blubber biopsies of 120 animals aged four months to three years annually.

Valium (Diazepam): Permit No. 782-1532 currently authorizes use of Valium to restrain up to 120 animals aged four months to three years annually.

Enemas: Permit No. 358-1564-01 currently authorizes use of enemas on 350 pups ≤ 1.5 months old and 300 animals aged two months to three years. Permit No. 782-1532 currently authorizes enemas for 120 animals aged four months to three years annually, range-wide. However, in the field, enemas are only given to pups 4 months old and juveniles, and usually only when researchers have reason to believe they have recently returned from sea. Enemas will not be given to pups ≤ 1.5 months old.

Accidental Mortality: Both Permit No. 782-1532 and Permit No. 358-1564-01 authorize a maximum of 5 accidental mortalities per year, of any age or sex.

4.3 Potential Effects of the Proposed Action - Alternative 2

4.3.1 Information Gained by this Alternative

Under this alternative the proposed permitted research addresses items 1-9 of the congressional study list and six of the SSLRI hypotheses. Of the three alternatives considered in this EA, Alternative 2 provides the broadest research plan addressing a variety of information needs specifically identified in the congressional appropriation and SSLRI. The modifications to existing permits for NMFS and ADFG will provide information on items 1-4 and 6-9 and hypotheses 1-6. Item 5, regime shift and climate change impacts are dealt with indirectly through their studies on foraging ecology, health and condition. Additionally, the proposed amendments to the NMFS permit allow NMFS to conduct the same types of procedures and studies on juvenile Steller sea lions for which the ADFG is presently permitted. This alternative, therefore, allows both agencies to conduct similar, comparative research such that their data can be combined and compared.

Dr. Van Blaricom's study addresses items 1, 2, 4, and 9 and hypotheses 1, 2, and 4. The Aleutians East Borough study addresses items 1-4, and 7-8 and hypotheses 1-4. The study by Dr. Davis pertains to items 1-4, 8-9, and hypotheses 1-4. The studies proposed by the Alaska Sea Life Center address items 1-4, 6-9, and hypotheses 1-6. And finally, the Oregon Department of Fish and Wildlife proposed study will provide information on Steller sea lions in Oregon on items 1-4, 5-9, and hypotheses 1-6.

The Proposed Action provides needed information on topics that will enhance the government's ability to conserve and recover Steller sea lions as well as information deemed important by congress and the NMFS to properly manage Alaska commercial fisheries that interact with Steller sea lions.

4.3.2 Potential Takes Under this Alternative

The proportion of pups born each year that would be taken by capture and disturbance on rookeries under this alternative is the same as under the Status Quo (i.e. 20%). Under amendments to permits held by NMML and ADF&G, individual animals already authorized for capture would be subjected to additional sampling procedures, and would be captured up to twice as often per year. An additional 240 juveniles and adults would be taken annually by remote biopsy sampling under a permit issued to Dr. VanBlaricom. Under a permit issued to Dr. Davis, an additional 30 juveniles and 15 adult females would be taken by capture and sampling. The number of animals authorized to be taken by disturbance incidental to other research activities would increase by 1400 per year under permits issued to Dr. VanBlaricom and Dr. Davis.

Up to an additional 800-1600 sea lions per year could be harassed incidental to vessel surveys and scat collections under a permit issued to the Aleutians East Borough. The number of accidental mortalities associated with research authorized under all permits and amendments would total 36 per year, which is an increase of 26 animals per year. This does not necessarily mean there will be more accidental mortalities per year under this alternative. The increase in authorized accidental mortalities reflects the possibility that up to that many sea lions may die accidentally as a result of unintended adverse effects of the research. However, all NMFS permits for research on marine mammals contain conditions designed to minimize this

possibility and the researchers have specified measures in their applications that they would take to reduce the risk of serious injury and mortality associated with research. Further, NMFS has built in a trigger far below the authorized level that would result in a review of incidental mortalities under all permitted research (See Chapter 2.1.4 - Additional mitigation measures to ensure insignificant impact of proposed action).

The number of annual takes from aerial surveys under this alternative represents nearly five times the minimum estimated population. As with the Status Quo, this could translate into each animal being harassed five times per year by this activity or some animals being harassed more or less, depending on the timing and locations of the surveys. Approximately twice the minimum estimated population of sea lions could be taken by harassment during ground counts, scat collection, and incidental to capture activities. The total number of takes under this alternative could be nearly seven times the minimum estimated population. There is not enough information on the effects of the research activities on the Steller sea lion population to determine whether there would be a significant adverse impact on the population under this alternative. However, this alternative does increase the intensity and magnitude of effect on Steller sea lions compared to the Status Quo.

Under this alternative, in addition to the takes described under Alternative 1, Permits No. 782-1532 (NMML) and 358-1564-01 (ADF&G) would be amended to include additional types of takes per animal and increases in the numbers of animals taken. In addition, the number of takes authorized for certain activities would be further increased by issuance of the proposed permits to the AEB, Dr. VanBlaricom, Dr. Davis, the ASLC, and ODFW.

Table 2 summarizes the number of animals that could be taken under permits issued according to this Alternative compared to the status quo. A description of the additional types of take activities and numbers of animals that would be taken follows. A schedule of the time and location of proposed research activities by NMML, ADF&G, Aleutians East Borough, and Dr. VanBlaricom is in Appendix B.

Table 2: Potential Cumulative Maximum Annual Takes of Steller Sea Lions, Range-wide in the U.S., for Scientific Research, under Proposed Action Alternative

(All currently authorized takes plus all requested new permits and amendments)

Differences from Status Quo are in bold font

Activity	Age Class	# animals taken/year*	# takes/ animal/ year	season	location
1. Aerial survey: breeding season	pups	15,000 *(ADF&G)*	unknown[8]	June-July **annually**	Alaska-wide
		15,000 *(NMML)*			range-wide (CA, OR, AK)
	non-pups	45,000 *(ADF&G)*			Alaska-wide
		45,000 *(NMML)*			range-wide
2. Aerial survey: non-breeding season	all ages	25,000 *(NMML)*	Unknown	Aug-May, annually	range-wide
		19,000 ***(VanBlaricom)***	**2**	**Feb-May, annually**	**southeast Alaska**
3. Aerial survey: monthly regional	all ages	**35,000** *(NMML)*	unknown	Jan-Dec annually	Gulf of AK, Aleutian Is., and **SE AK**

4. Aerial survey: quarterly (AEB)	**all ages**	**77,000 (>02)** **28,000 (>03)** **14,000 (>04)**	**unknown (up to 4 or more times/ year)**	**September, December, March, and June**	**western stock**
5. Vessel survey (AEB)	**all ages**	**1600 (>02)** **1600 (>03)** **800 (>04)**	**unknown (up to 4 or more times per year)**	**September, December, March, and June**	**western stock**
6. Ground counts (and incidental scat collection)	non-pups	15,000 *(ADF&G)*	unknown	June-July Annually	ADF&G = Alaska-wide
		10,200 *(NMML)*			NMML = Range-wide (except WA, OR, CA)
		2,600 *(ODFW)*			
	pups	10,000 *(ADF&G)*			ODFW = Washington, Oregon, California
		3,100 *(NMML)*			
		1,200 *(ODFW)*			
7. Incidental disturbance during scat collection capture/sampling activities, observational activities	all ages	7,000 *(ADF&G)*	unknown	all year	Alaska-wide
		15,000 *(NMML)*			range-wide **(except CA, WA, OR)**
		10,000 *(ODFW)*			**CA, WA, OR**
		1000 *(VanBlaricom)*			

		400 *(Davis)*			**Alaska-wide**
		5,850 *(ASLC)*			**Alaska-wide**
8. Quarterly scat collection (AEB)	**all ages**	**1600 (>02)** **1600 (>03)** **800 (>04)**	**unknown (up to 4 or more times per year)**	**September, December, March, and June**	**Alaska-wide** **western stock**
9. Accidental mortality	all ages	**10** *(ADF&G)*	1	all year	Alaska-wide
		10 ***(NMML)***			range-wide
		10 *(ODFW)*			**CA, WA, OR**
		3 ***(VanBlaricom)***			range-wide
		13 ***(Davis)***			range-wide
		5 *(ASLC)*			**Alaska-wide**
10. Capture (includes hoop net, underwater lasso, floating trap, Telazol) and Restraint (restraining net, Valium, isoflurane,)	> 5 days to 2 months	700 *(ADF&G)*	1	June-July	Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*	2 – **4**	all year	Alaska-wide
	> 5 days to 4 months	**1100** *(NMML)*	1	June-July	Alaska-wide
	4 months to 3 years	120 *(NMML)*	2	all year	range-wide
	all ages	10*(ADF&G)*	2	all year	Alaska-wide
		30 ***(Davis)***			

	juveniles	**15** ***(Davis)***	**3**	**all year**	
	adult females		**3**	**all year**	**Alaska-wide**
		200 *(ODFW)*			
	> 1 week to < 6 weeks	**30** *(ODFW)*	**1**	**June-July**	
	> 4 months to 3 years		**1**	**All year**	**CA, WA, OR**
		300 *(ASLC)*			**CA, WA, OR**
	pups	**230***(ASLC)*	**1**	**All year**	
	juveniles	**80** *(ASLC)*	**1**	**All year**	**Alaska-wide**
	adult females		**1**	**All year**	**Alaska-wide**
					Alaska-wide
					Note that the following takes are a subset of those animals captured in Activity 10 and thus do not represent additional animals taken, but rather additional procedures per animal.
10.a. Blood collection	newborn to 4 months	450 *(NMML)*	2	June-July	range-wide **(except CA,WA,OR)**
	newborn to 2 months	350 *(ADF&G)*	2 - **4**	June-July	Alaska-wide
	4 mo to 3 yrs	120 *(NMML)*	2	all year	Range-wide
	2 months to 3 yrs	300 *(ADF&G)*	2 - **4**	all year	Alaska-wide

	all ages	10 *(ADF&G)*	2	all year	Alaska-wide
	juveniles	***30* (Davis)**	**3**	**all year**	Alaska-wide
	adult females	***15* (Davis)**	**3**	**all year**	
	> 1 week to < 6 weeks	**50** *(ODFW)*	**1**	**June-July**	**CA, WA, OR**
	> 4 months to 3 years	**30** *(ODFW)*	**1**	**All year**	**CA, WA, OR**
	pups	**120** *(ASLC)*	**1**	**All year**	**Alaska-wide**
	juveniles	**170** *(ASLC)*	**1**	**All year**	**Alaska-wide**
	adult females	**20** *(ASLC)*	**1**	**All year**	**Alaska-wide**
10.b. **Muscle biopsy**	**2 months to 3 years**	**90** *(ADF&G)*	**2 – 4**	**all year**	**Alaska-wide**
	4 months to 3 years	**20** ***(NMML)***	**2**		**range-wide**
10.c. Tissue samples for genetic analysis (skin biopsy)	≤ 1.5 months	450 *(NMML)*	1	June-July	Range-wide **(except CA,WA,OR)**
	> 1 week to < 6 weeks	**200** *(ODFW)*	1	June-July	
	4 months to 3 years	**30** *(ODFW)*	1	All year	CA, WA, OR
10.d. Skin/blubber biopsy	**newborn to 2 months**	**350**	2 – **4**	all year	CA, WA, OR Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*			range-wide
	4 months to 3 years	120 *(NMML)*	2		
	juveniles	**30** ***(Davis)***	**3**		**Alaska-wide**
	adult females	**15** ***(Davis)***	**3**		
			1		

	pups	**120** *(ASLC)*	**1**		**Alaska-wide**
	juveniles	**170** *(ASLC)*	**1**		
	adult females	**20** *(ASLC)*			
10.e. Fecal loops and culture swabs	pups > 1.5 months	350 *(ADF&G)*	2	June-July	Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*	2 **- 4**	all year	Alaska-wide
	pups ≤ 1.5 months	**250** *(NMML)*	2	June-July	range-wide **(except CA,WA,OR)**
	4 months to 3 years	120 *(NMML)*	2	All year	range-wide
	all ages	10 *(ADF&G)*	2	All year	Alaska-wide
		30 *(Davis)*			
	juveniles	**15** *(Davis)*	**3**	**All year**	**Alaska-wide**
	adult females		**3**		
		200 *(ODFW)*			
	pups ≤ 1.5 months	**30** *(ODFW)*	**1**	**June-July**	**CA, WA, OR**
	4 months to 3 years		**1**	**All year**	**CA, WA, OR**
	pups	**60** *(ASLC)*	**1**	**All year**	**Alaska-wide**
	juveniles	**170** *(ASLC)*	**1**		
	adult females	**20** *(ASLC)*	**1**		
10.f. Tooth extraction (only 1 tooth is taken over the life of an animal)	2 months to 3 years	300 *(ADF&G)*	1	all year	Alaska-wide
	4 months to 3 years	**120** *(NMML)*	1		range-wide

	all ages	10 *(ADF&G)*	1		Alaska-wide
10.g. **Pull vibrissae**, clip hair and nails	newborn to 3 years	650 ***(ADF&G)***	2	all year	Alaska-wide
	all ages	10 *(ADF&G)*	2		Alaska-wide
	4 months to 3 years	120 ***(NMML)***	2		range-wide
10.h. Flipper tag (may retain skin punch for genetic analysis)	Pups	700 *(ADF&G)*	1	all year	Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*			Alaska-wide
	newborn to 4 months	**1100** *(NMML)*			range-wide **(except CA,WA,OR)**
	4 months to 3 years	120 *(NMML)*			range-wide
	juveniles	**30** ***(Davis)***			
	adult females	**15** ***(Davis)***			**Alaska-wide**
	pups < 6 weeks	**200** *(ODFW)*			
	4 months to 3 years	**30** *(ODFW)*			**CA, WA, OR**
	pups	**120** *(ASLC)*			
	juveniles	**36** *(ASLC)*			**Alaska-wide**
	adult females	**20** *(ASLC)*			
10.i. Hot-brand (only one brand over life of animal)	pups ≤ 1.5 months	600 *(ADF&G)*	1	all year	Alaska-wide
	> 2 months to 3 years	300 *(ADF&G)*			Alaska-wide
		600 *(NMML)*			

	pups ≤ 1.5 months				range-wide **(except CA,WA,OR)**
	4 months to 3 years	**120** *(NMML)*			
		30 ***(Davis)***			**Alaska-wide**
	juveniles	**15** ***(Davis)***			
	adult females	**200** *(ODFW)*			**CA,WA,OR**
	pups ≤ 1.5 months	**30** *(ODFW)*			**Alaska-wide**
	4 months to 3 years	**60** *(ASLC)*			
	pups				
	2 months to 3 yrs	**65** ***(ADF&G)***	2-**4**	all year	Alaska-wide
10.j. Attachment of scientific instruments (includes VHF, SLTDR, **UTPR, video system/data logger**, PTT)	4 months to 3 years	120 ***(NMML)***	2		range-wide
	juveniles	**30** ***(Davis)***	**3**		**Alaska-wide**
	adult females	**15** ***(Davis)***	**3**		
	4 months to 3 years	**30** ***(ODFW)***	**1**		**CA,WA,OR**
	juveniles	**16** ***(ASLC)***	**1**		**Alaska-wide**
10.k. Bioelectric impedence analysis	**4 months to 3 years**	**120** ***(NMML)***	**2**	**all year**	**range-wide**
	2 months to 3 years	**300** *(ADF&G)*	**2**		**Alaska-wide**
	juveniles	**150** *(ASLC)*	**1**		**Alaska-wide**
10.l. Deuterated water	> 2 months to 3 years	300 *(ADF&G)*	2-**4**	all year	Alaska-wide

	4 months to 3 years	**120*(NMML)***	**2**		**range-wide**
	juveniles	**150 *(ASLC)***	**1**		**Alaska-wide**
10.m. Evans blue dye	**> 2 months to 3 years**	**90** *(ADF&G)*	**2-4**	**all year**	**Alaska-wide**
	4 months to 3 years	**20** ***(NMML)***	**2**		**range-wide**
10.n. Stomach intubation (as an alternative to enemas)	**> 5 days to 3 years**	**650** ***(ADF&G)***	**2-4**	**all year**	**range-wide**
10.o. Enemas	Pups ≤ 1.5 months	350 *(ADF&G)*	2	June-July	Alaska-wide
	>2 months to 3 years	300 *(ADF&G)*	2 - **4**	all year	Alaska-wide
	4 months to 3 years	120 *(NMML*	2	all year	range-wide
		30 *(ODFW))*	1	all year	CA, WA. OR
10.p. Ultrasound blubber depth	**juveniles**	**150** *(ASLC)*	**1**	**All year**	**Alaska-wide**
11. Remote blubber biopsy	2 months to 3 years	120 *(NMML)*	1	**all year**	**range-wide**
	adults	60 *(NMML)*	1		
	juveniles and adults	**240** ***(VanBlaricom)***	**1**		**range-wide**
12. Behavioral and Demographic Observations and Remote Monitoring	all ages	None *(ADF&G)*	Unknown	all year	Alaska-wide
		None *(NMML)*			Range-wide

	None ***(AEB)***	**Alaska-wide**

Aerial Surveys: In addition to the takes presently authorized, Permit No. 358-1564-01 (ADF&G) would be amended to change the frequency of aerial surveys from biennial to annual, which would double the number of takes per year by aerial survey in Southeast Alaska during June and July (breeding season) to photograph non-pups.

In addition to the takes presently authorized, Permit No. 782-1532 (NMML) would allow annual (every year instead of every other year) range-wide surveys during non-breeding season, and monthly surveys in Southeast Alaska (in addition to those flown in the Gulf of Alaska and Aleutian Islands), thereby increasing the potential annual takes of Steller sea lions by aerial survey under this permit by 20,000 animals. These takes would be on the eastern stock of Steller sea lions.

Issuance of a permit to the Aleutians East Borough, as requested in their application, would increase the potential number of takes of Steller sea lions in the western stock during aerial surveys by 77,000 in 2002, 28,000 in 2003, and 14,000 in 2004. Aerial surveys under this permit would be flown quarterly (in September, December, March, and June of each year of the permit), meaning individual Steller sea lions may be disturbed once every three months, in addition to the surveys already conducted under existing permits. The June 2002 surveys that would be conducted by Aleutians East Borough would occur just prior to and after the NMML surveys for comparative purposes. Elements of survey protocol that are designed to minimize and or mitigate potential disturbance, as described in Alternative 1, are applicable in this alternative.

Finally, issuing a permit to Dr. VanBlaricom could increase the takes of Steller sea lions during non-breeding season by aerial survey by 19,000 per year over three years in order to correlate the temporal and spatial distribution of spring-spawning runs of herring and eulachon to the distribution and abundance of Steller sea lions in southeastern Alaska. These surveys would be flown twice per year between February and May. Thus, some sea lions might be taken twice per year under this permit, in addition to any takes by aerial survey under the other permits. Animals of all ages, including pups, would be taken by the surveys under all permits.

There would be a net increase of up to 82,000 sea lions per year authorized for take by harassment from aerial surveys compared to the Status Quo.

Vessel surveys: Issuing a permit to the Aleutians East Borough, as requested in their application (File No. 1010-1641), would authorize takes of Steller sea lions from the western stock as follows: 1600 in 2002, 1600 in 2003, and 800 in 2004. Vessel surveys would be conducted quarterly (in September, December, March, and June of each year of the permit) at up to 3-4 haulouts and one rookery per quarter. Vessel surveys would be timed to occur soon after aerial surveys for the same sites, meaning individual sea lions would be disturbed first by the aerial survey and then by the vessel approach. There would be a net increase of up to 1,600 sea lions per year authorized for take by harassment from vessel surveys compared to the Status Quo.

Incidental disturbance during scat collection, capture/sampling activities and observational activities: Amending Permit No. 782-1532 (NMML), as requested in the application, would allow disturbance of an additional 11,000 Steller sea lions per year for scat collection. This requested increase is to accommodate regular, year-round scat collection at several sites near Juneau, as well as greater than anticipated numbers of animals encountered during previous scat collections near Kodiak.

Issuance of a permit to the Aleutians East Borough, as requested in the application (File No. 1010-1641), would add takes by harassment of an additional 1600 sea lions in 2002, 1600 in 2003, and 800 in 2004 for collection of scat samples. Collection of scat samples by the Aleutians East Borough would occur quarterly (in September, December, March, and June of each year of the permit) at 3-4 haulouts per quarter. The Aleutians East Borough would not collect scat samples in June 2002 to avoid overlap of effort with surveys planned by the NMML.

Approximately 500 sea lions of all ages and both sexes in the western stock and 500 in the eastern stock would be harassed during remote biopsy sampling efforts under a permit issued to Dr. VanBlaricom, because sea lions will be approached for remote biopsy sampling on rookeries and haulouts, or in the water near these locations, where other sea lions could be disturbed by the presence or actions of the researchers.

Issuance of a permit to Dr. Davis (File No. 800-1664) as requested in the application, would authorize harassment of up to 400 additional Steller sea lions of all ages per year throughout Alaska incidental to capture and sampling activities.

Issuance of a permit to ODFW (File No. 434-1669) would authorize harassment of up to 10,000 sea lions of all ages in California, Washington, and Oregon per year during capture and sampling of older pups and juveniles, scat collection, behavioral observations and remote monitoring activities.

A maximum of 5,850 sea lions of all ages throughout Alaska would be harassed during scat collection, collection of sea lion carcasses, capture of animals and remote monitoring activities under a permit issued to ASLC (File No. 881-1668).

There would be a net increase of up to 29,850 sea lions per year authorized for take by harassment from incidental disturbance during scat collection, capture/sampling activities and observational activities compared to the Status Quo.

Behavioral and Demographic Observations and Remote Monitoring: A permit would be issued to the Aleutians East Borough (File No. 1010-1641) to place observers, or teams of observers, at one or more locations (rookeries and haulouts) for collecting behavioral data including daily attendance patterns of branded, tagged, or naturally marked animals to estimate time spent at sea foraging and observations of entangled or injured marine mammals. Observers would also conduct daily counts of sea lions by age class, collect information on the presence of marked animals (tagged or branded by NMML or ADF&G), record the presence of females nursing juveniles, and record the presence of other marine mammals (including killer whales) and boat and air traffic, including vessels within the 3 or 10 nm buffer zones. Observations would be made from cliffs or other vantage points above rookeries so as to avoid disturbing the sea lions. Therefore, no additional takes would be anticipated from this activity compared to the Status Quo.

Capture and restraint: Amending Permit No. 358-1564-01 (ADF&G), as requested in the application for an amendment, would increase the number of times individual animals between two months and three years old are captured from the current two times per animal per year to four times per animal per year, but would not increase the total number of animals being captured annually.

Amending Permit No. 782-1532 (NMML), as requested in the application, would not increase the number of animals taken, but would authorize use of isoflurane gas to restrain 120

animals aged 4 months to three years per year. The use of anesthesia would facilitate the additional physiological procedures requested by NMML, as described below. The number of pups less than six weeks old authorized for capture in June-July of 2003 and 2004 would be reduced by 200 pups per year because these takes would be authorized under a permit issued to ODFW (File No. 434-1669) as indicated below.

Issuance of a permit to Dr. Davis (File No. 800-1664), as requested in the application, would increase the total number of Steller sea lions captured per year by 45 animals, with up to three recaptures per each of these 45 animals per year.

Issuance of a permit to ODFW (File No. 434-1669) would increase the number of sea lions aged four months to three years by 30 animals per year. This permit would authorize capture of up to 200 pups less than six weeks old in June-July of each of the five years of the permit. In 2003 and 2004, these 200 pups would be those subtracted from the amended permit that would be issued to NMML and represent animals captured in California, Washington, and Oregon.

Issuance of a permit to ASLC (File No. 881-1668) would increase the number of pups captured each year by 300 animals per year. The total number of juvenile sea lions captured per year would be increased by 230 animals per year if this permit were issued. There would also be 80 adult female sea lions capture per year under this permit.

There would be a net increase of 685 sea lions per year authorized for take by capture and restraint (and various of the sampling and tagging activities as described below) compared to the Status Quo.

Blood collection (venipuncture): Amending Permit No. 358-1564-01 (ADF&G), as requested in the application, would increase the volume of blood collected from individual animals aged two months to three years from 75 ml per animal per capture to 120 ml per animal per capture, and increase the number of captures (during which blood may be drawn) from two times per animal per year to four times per animal per year. These are the same animals already authorized for capture in the permit.

Amending Permit No. 782-1532 (NMML), as requested in the application, would authorize collection of 120 ml of blood from the 120 animals aged four months to three years already authorized for capture annually to accommodate addition of studies on total blood volume (using Evans blue dye) and body composition (using deuterated water). The number of pups captured and blood sampled under this amended permit would be reduced by 200 animals per year because these takes would be covered under a permit issued to ODFW as described below.

Issuance of a permit to Dr. Davis (File No. 800-1664), as requested in the application, would increase the total number of Steller sea lions from which blood is collected by 45 animals (juveniles of both sexes and adult females) per year. Up to 20 ml of blood would be collected from each of the 45 animals up to four times per year.

Issuance of a permit to ODFW would authorize blood sampling from 200 pups per year in California, Washington, and Oregon for five years. In 2003 and 2004, these pups would be those subtracted from the amended NMML permit. Under a permit issued to ODFW, an additional 30 sea lions aged four months to three years would be blood sampled per year.

Issuance of a permit to ASLC would authorize collection of blood samples from an additional 120 pups, 170 juveniles, and 20 adult females per year.

Under this alternative, blood samples would be authorized for collection from a net increase of 385 sea lions per year compared to the Status Quo.

Muscle biopsy: Permit No. 358-1564-01, if amended, would authorize collection of muscle biopsies on up to 300 animals (ages two months to three years) per year already authorized for capture, and up to four times per animal per year, range-wide. The ADF&G proposes to collect two samples of 25 to 35 mg each: one from the pectoralis muscle group and one from the hind limb complex (at the same site as the blubber biopsy to minimize incisions). The purpose of collecting samples from these two sites is to compare myoglobin concentrations between muscles.

Permit No. 782-1532, if amended, would authorize muscle biopsies on up to 60 animals ages four months to three years already authorized to be captured annually. The NMML proposes to collect two samples of 25 to 35 mg each, from these same muscle sites, at different angles.

Under the Status Quo, this procedure is not authorized. Thus, this alternative would represent new authorization for collection of muscle biopsies from up to 360 sea lions per year compared to the Status Quo.

Skin and blubber biopsy: Amending Permit No. 358-1564-01 (ADF&G), as requested in the application, would allow collection of blubber biopsies from pups already being skin biopsied. This procedure would be performed in conjunction with capture, anesthesia, flipper tagging, branding, blood collection, tooth extraction and muscle biopsy.

Permit No. 782-1532 would be amended to subtract collection of skin biopsies from 200 pups less than six weeks old captured in California, Washington, and Oregon in June-July of 2003 and 2004. These takes would be covered under a permit issued to ODFW (File No. 434-1669) as described below.

Issuance of a permit to Dr. Davis (File No. 800-1664), as requested in the application, would allow collection of a blubber sample from an additional 45 Steller sea lions (juveniles of both sexes and adult females) per year, with up to four samples per individual per year. The procedure for blubber biopsy collection described by the applicant for File No. 800-1664 differs from that described in the other applications. The procedure would involve making an incision 2 cm wide by 1-1.5 cm deep with a scalpel, grasping the blubber with tweezers and using the scalpel to cut a 0.5 g piece of blubber. The incision would then be closed with a few sutures. These blubber samples would be used for toxicological analyses.

Issuance of a permit to ODFW (File No. 434-1669) would authorize collection of skin biopsies from up to 200 pups less than six weeks old per year captured in June-July in California, Washington, and Oregon. In the first two years of the permit (2003 and 2004) these would be takes that were subtracted from the amended NMML Permit No. 782-1532. The ODFW permit would also authorize collection of skin biopsies from up to 30 sea lions aged four months to three years captured in California, Washington, and Oregon.

Issuance of permit to ASLC (File No. 881-1668) would authorize collection of skin and blubber biopsies from up to 120 pups, 170 juveniles, and 20 adult females per year captured in Alaska.

Under this alternative, collection of skin and/or blubber biopsies would be authorized to be collected from a net increase of 385 sea lions per year.

Remote biopsy sampling: Issuing the permit to Dr. VanBlaricom, as requested in the application, would authorize collection of skin and blubber samples from up to 120 adult or juvenile male and female Steller sea lions from the western stock and 120 from the eastern stock. Pregnant and lactating females might be sampled, but pups would not be targeted. Sampling would occur primarily in the spring (March-May) of each year, although some sampling might occur in winter (November-February) or summer (June-July) in conjunction with relevant fish runs. There is a possibility that individual sea lions would be taken more than once for tissue sampling, either by the holder of this permit, or other permit holders, because the animals would not be marked in a way that would make recognition of individuals by other researchers possible. This could represent unnecessarily duplicative research if animals are biopsied more than once within a short period of time. However, because blubber fatty acid profiles could change over time with changes in diet or nutritional status, if the samples were several months or more apart, they could provide information on diet over different time periods.

There would be a net increase of 240 in the number of takes of sea lions by remote biopsy compared to the Status Quo.

Fecal loops and culture swabs: Issuing a permit to Dr. Davis, as described in the application (File No. 800-1664) would allow collection of samples of fluids and tissues from an additional 30 juveniles and 15 adult female Steller sea lions per year, with up to 4 sampling events per animal per year.

Permit No. 782-1532 would be amended to subtract authorization to collect samples of fluids and tissues from 200 pups less than six weeks old because these takes would be authorized in a permit that would be issued to ODFW as described below.

Issuance of a permit to ODFW (File No. 434-1669) would authorize collection of samples of fluids and tissues from up to 200 pups less than six weeks old per year captured in California, Washington, and Oregon. The ODFW permit would also authorize collection of samples of fluids and tissues from up to 30 sea lions aged four months to three years captured in California, Washington, and Oregon.

Issuance of a permit to ASLC (File No. 881-1668) would authorize collection of samples of fluids and tissues from up to 60 pups, 170 juveniles, and 20 adult females per year captured in Alaska.

Under this alternative, collection of fluids and tissues would be authorized to be collected from a net increase of 325 sea lions per year.

Tooth extraction: Amending Permit No. 782-1532 (NMML), as requested in the application, would authorize extraction of one 2nd pre-molar tooth from up to 120 animals aged four months to three years annually. These are the same animals already authorized for capture in the existing permit.

Pulling vibrissae: Under the Status Quo, this procedure is not authorized. Amending Permits No. 782-1532 (NMML) and 358-1564 (ADF&G), as requested by the permit holders, would allow pulling of the entire vibrissae by gripping with forceps and pulling forcefully and rapidly in one smooth motion, rather than clipping two vibrissae close to the skin, from 360

animals of any age and 120 animals ages four months to three years, respectively. These are the same animals already authorized for capture and sampling in the permits.

Hot-branding: Amending Permit No. 782-1532 (NMML), as requested in the application, would allow hot-branding of the 120 animals ages four months to three years being captured annually for other procedures, including gas anesthesia, administration of deuterium oxide and Evans blue dye, blood collection, enemas or stomach lavage, tooth extraction, skin, blubber, and muscle biopsy. The applicants state that, in addition to contributing to the sample size of long-term marking research (e.g., estimates of survival rates, natality rates, age at first reproduction, seasonal movements, dispersal, and site fidelity), the purpose of this amendment is to allow recapture of some previously captured and sampled sea lions, which could provide unparalleled information on the growth, development of diving behavior, and foraging ability of individual animals. Conversely, when it is not desirable to recapture a previously sampled animal, the researchers will be able to identify those animals that have already been sampled. Permit No. 782-1532 would also be amended to subtract authorization to brand 200 pups less than six weeks old in California, Washington, and Oregon because these takes would be authorized in a permit that would be issued to ODFW as described below.

Issuance of a permit to Dr. Davis (File No. 800-1664) as requested in the application, would allow hot-branding of an additional 30 juvenile (male and female) and 15 adult female Steller sea lions per year. The procedure would be the same as described in the applications for Permit No. 782-1532 and 358-1564. In the application (File No. 800-1664), Dr. Davis states that although hot-branding is not essential to his proposed research, it is of general scientific interest to be able to identify the animal again in the future once it has been captured and sampled initially.

Issuance of a permit to ODFW (File No. 434-1669) would authorize hot-branding of 200 pups less than six weeks old and 30 sea lions aged four months to three years per captured in California, Washington, and Oregon per year. In the first two years of the permit (2003 and 2004) the takes for pups less than six weeks old would be takes that were subtracted from the amended NMML Permit No. 782-1532.

Issuance of a permit to ASLC (File No. 881-1668) would authorize hot branding of up to 60 pups per year captured in Alaska.

The total number of animals that would be hot-branded under this alternative represents a net increase of 255 sea lions per year compared to the Status Quo.

Attachment of scientific instruments (e.g. VHF and SLTDR tags): Amending Permit No. 358-1564-01 (ADF&G), as requested in the application, would allow attachment of instruments to an additional 20 of the 300 animals aged two months to three years, per year to accommodate collaboration with researchers funded under the Steller Sea Lion Research Initiative.

Amending Permit No. 782-1532 (NMML), as requested in the application, would allow attachment of a newly developed Underwater Timed Picture Recorder (UTPR) on some of the 120 animals aged four months to three years already authorized for capture, in addition to a VHF transmitter or PTT. The currently authorized VHF and SLTDR packages weigh < 300 g with a cross-sectional area of 10 cm^2. The UTPRs would weigh 700 g on land and 200 g in water, with dimensions of 55 x 85 x 105 mm. The UTPR would be attached with a remote-release platform so that it could be retrieved without recapture of the animal. These instruments were designed to facilitate studies of how sea lions interact with the environment, their prey, and

other animals at depth. This system has been successfully deployed on Antarctic fur seals, revealing information on how to interpret dive behavior with respect to foraging success (Hooker et al. 2001).

Issuance of a permit to Dr. Davis (File No. 800-1664) as requested in the application, would allow attachment of a video system/data logger, a GPS, and satellite/VHF transmitters to up to 30 juvenile and 15 adult female Steller sea lions per year. The video system/data logger is a two part instrument. The main unit, measuring approximately 25 cm long by 10 cm wide by 6 cm high, and weighing about 2 kg in air (neutrally bouyant in water) would be glued to the fur in the mid-dorsal area using epoxy or neoprene rubber cement. The total surface area of attachment would be about 200 cm^2. The second part of the instrument, which would be glued to the fur on the head, measures approximately 8.5 cm long by 5 cm wide by 3 cm high) and weighs 400 g in air. The GPS module and antenna measures 5.6 cm long by 4.32 cm wide by 2.9 cm high and is integrated into the head-mounted housing with the video system/data logger. The video system package is designed to remain attached for two weeks, and can be remotely released, although part of the package remains glued to the sea lion's fur until it molts. The satellite transmitter, which would be glued to the fur on the mid-dorsal region, measures 7 cm by 2 cm by 2cm and weighs 200g. The VHF transmitter, which would also be glued to the fur on the mid-dorsal region, measures 4 cm by 1.5 cm by 2 cm and weighs 92 g. Both the satellite and VHF transmitters would remain attached to the sea lion until it molts three to six months after attachment. Although the video system/data logger unit can be remotely released, the applicant for File No. 800-1664 would need to recapture the sea lions up to three times per year to replace batteries and videotapes in the recorder. Each recapture event would require anesthesia for up to one hour. In addition, blood and blubber biopsies, and swabs would be collected from each animal at each recapture event.

Issuance of a permit to ODFW (File No. 434-1669) would authorize attachment of VHF, SLTDR, and UTPR tags to up to 30 sea lions aged four months to three years per year captured in California, Washington, and Oregon.

Issuance of a permit to ASLC (File No. 881-1668) would authorize attachment of SLTDR and PTT tags to up to 16 juvenile sea lions captured in Alaska per year.

The total number of animals that would have scientific instruments attached under this alternative represents a net increase of 91 sea lions per year compared to the Status Quo.

Bioelectric Impedence Analysis (BIA): Neither permit currently authorizes this technique. Permit No. 782-1532 (NMML), if amended, would authorize the use of BIA on 120 animals aged four months to three years annually. Permit No. 358-1564-01 (ADF&G), if amended, would authorize the use of BIA on up to 300 animals greater than two months old. In both cases, these are the same animals already authorized for capture and sampling.

Issuance of a permit to ASLC (File No. 881-1668) would authorize the use of BIA on up to 150 juvenile sea lions captured in Alaska per year.

Under the Status Quo, this procedure is not authorized. Thus, under this alternative, the use of BIA would be authorized on a net increase of 570 sea lions per year compared to the Status Quo.

Evans blue dye: Under the Status Quo, this procedure is not authorized. Permit No. 358-1564-01 (ADF&G), as amended, would authorize administering Evans blue dye to the same 300

animals aged two months to three years already being captured and given deuterated water. Amending Permit No. 782-1532 (NMML), as requested in the application, would authorize administering Evans blue dye and deuterated water would to 120 animals aged four months to three years annually that are already authorized for capture.

Stomach intubation: Under the Status Quo, this procedure is not authorized. Amending Permit No. 358-1564-01 (ADF&G), as requested in the application, would allow collection of stomach contents via stomach tubes from 350 pups ≤ 1.5 months old and 300 animals ages two months to three years annually. The permit currently authorizes use of enemas in these animals.

Accidental mortality: Permits No. 358-1564-01 (ADF&G) and 782-1532 (NMML)would be amended, as requested by the permit holders, to increase the authorized accidental mortality resulting from research to 10 sea lions per year each. Issuing the permit to Dr. VanBlaricom, as requested in the application (File No. 1016-1651), would authorize takes of up to three Steller sea lions per year, not to exceed eight over the five-year duration of the permit, by accidental mortality resulting from research activities. Issuing a permit to Dr. Davis, as requested in the application (File No. 800-1664), would authorize takes by accidental mortality resulting from research activities of up to 3 pups, 5 juveniles, and 5 adult female Steller sea lions per year over five years. Issuing a permit to ODFW (File No. 434-1669) as requested in the application would authorize takes of up to 10 sea lions of any age per year (not to exceed 30 sea lions over the five years of the permit) in California, Washington, and Oregon by accidental mortality resulting from research activities. Issuance of a permit to ASLC (File No. 881-1668) would authorize takes of up to 5 sea lions of any age per year in Alaska by accidental mortality resulting from research activities. Thus the total authorized maximum annual takes of sea lions throughout their range in the U.S. under all permits would equal 51 animals of any age, which is an increase of 41 sea lions per year compared to the Status Quo Alternative. However, much of this increase would be in the eastern population and is considered negligible for that population. Further, NMFS has built in a trigger far below the authorized level that would result in a review of incidental mortalities under all permitted research (See Chapter 2.1.4 - Additional mitigation measures to ensure insignificant impact of proposed action).

4.4 Effects of Alternative 3-Reallocation of Intrusive Research

4.4.1 Information Gained by this Alternative

Research under this alternative is less inclusive than in the Proposed Action - Alternative 2, in that most intrusive research would be directed toward the eastern stock of Steller sea lions or a surrogate species. Information identified in the congressional appropriation and the SSLRI pertaining to items 1-3, 6, and 9 would be restricted and not completed in the breath of detail requested by the applicants or expected by congress or under the SSLRI. Samples of blood, blubber, and other tissues would be reduced to assess health and condition of pups and juveniles. New studies on comparative foraging ecology would be restricted to the eastern stock only; new studies of muscle physiology important in understanding the cost of foraging will be restricted to the eastern stock only or to a surrogate species. Biopsy sampling of blubber for assessment of prey during seasonal prey availability will be restricted to the eastern stock. Physiological studies to investigate body condition, health, metabolic rates (related to foraging ecology and health and condition), and the energetic costs of foraging would be restricted to the eastern stock. Finally, studies of food habits and prey using stomach intubation and enemas will

be restricted to the eastern stock.

4.4.2 Potential Takes Under this Alternative

The number of animals potentially taken, and the number of potential takes per individual animal under this alternative would not be significantly different as compared to the Status Quo or Proposed Action. However, the potential adverse effects of intrusive research would be lower for the endangered western population compared to the Status Quo and Proposed Action because only research essential to determinations of health and disease status, genetics of stock structure, and a limited amount of foraging ecology would be conducted on this population. Research of a more intrusive nature, and not determined to be essential to these purposes, would be re-directed to the threatened eastern population, or to captive stock or surrogate species. In addition, for both populations, pups of the year would be virtually excluded from the majority of intrusive research. This would reduce the potential adverse effects associated with disturbance of sea lions during a vulnerable life stage. Further, structuring permits to require more post-activity monitoring and detailed documentation of the effects of research would ultimately provide information that could be useful in coordinating future research to ensure minimal effects.

Under this alternative, takes from non-intrusive research (aerial surveys) and essential population monitoring (pup counts) would be allowed as with the Status Quo, Proposed Action, and Population Monitoring Alternatives. The only research of an intrusive nature that would be permitted for the western (endangered) population would be that directly related to conservation and management needs, such as collection of genetic samples for determination of population structure or blood samples for health assessment. All other intrusive research would be restricted to the eastern (threatened) population, or a non-ESA listed surrogate species, such as California sea lions. The decision as to whether intrusive research should be performed on the western population, eastern population, or a surrogate species, would be related to how the proposed research would fit into the overall Steller sea lion recovery plan framework or is otherwise related to something that is important to the recovery of the species. Thus, consistent with the issuance criteria under the MMPA and ESA, as outlined in Sections 1.5.2 and 1.5.3, which require that research be conducted consistent with the purposes and policies set forth in section 2 of the ESA, proposed intrusive research that would contribute significantly to identifying, evaluating, or resolving conservation problems for the species or stock would be allowed on both the eastern and western stocks.

Intrusive research that would contribute to fulfilling a research need or objective identified in the Recovery Plan would begin with the eastern stock until the potential negative effects are known to be negligible. This includes testing new techniques and equipment, some of which would also be re-directed to surrogate species prior to authorization on Steller sea lions. Intrusive research that would contribute significantly to understanding the basic biology or ecology of the species (and is therefore not likely to vary among populations or stocks), or contribute significantly to fulfilling a critically important research need not directly related to conservation and management, would be limited to the eastern stock and/or surrogate species. Until a new Recovery Plan is released, research permits would be granted based on goals identified in the current Recovery Plan, and in consideration of the research objectives identified by the peer-reviewed workshops, conservation measures in the Biological Opinion on the Alaska groundfish fishery (NMFS 2000), and in consultation with the Marine Mammal Commission and other experts consulted during the permit application review process.

Table 3 summarizes the number of sea lions that would be authorized to be taken by permit, and thus affected under this alternative. All mitigation measures identified under the

previous alternatives would be required for activities under this alternative. In addition, the timing, frequency, or location of some takes would be re-distributed according to the criteria described for this alternative.

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Table 3: Cumulative Annual Takes of Steller Sea Lions, Range-wide in the U.S., for Scientific Research, under Re-allocation of Intrusive Research Alternative

(Differences from Status Quo are in bold font)

Activity	Age Class	# animals taken/year* *(ADF&G/ NMML)*	# takes/ animal/ year	season	location
1. Aerial survey: breeding season	pups	15,000 (ADF&G)	unknown[8]	June-July annually	Alaska-wide
		15,000 (NMML)			Range-wide
	non-pups	45,000 (ADF&G)			Alaska-wide
		45,000 (NMML)			range-wide
2. Aerial survey: non-breeding season	all ages	25,000 *(NMML)*	Unknown	Aug-May annually	range-wide
		19,000 ***(VanBlaricom)***	**2**	**Feb-May annually**	**southeast Alaska**
3. Aerial survey: monthly regional	all ages	**35,000** *(NMML)*	unknown	Jan-Dec annually	Gulf of AK, Aleutian Is., and **SE AK**
4. Aerial survey: quarterly (AEB)	**all ages**	**77,000 (>02) 28,000 (>03) 14,000 (>04)**	**unknown (up to 4 or more times per year)**	**September, December, March, and June**	**western stock**
	all ages	**1600 (>02)**	**unknown**	**September,**	**western stock**

5. Vessel survey (AEB)		**1600 (>03) 800 (>04)**	**(up to 4 or more times per year)**	**December, March, and June**	
6. Ground counts	non-pups (1 year old)	15,000 *(ADF&G)*	unknown	annually	ADF&G = Alaska-wide
		10,200 *(NMML)*			NMML = range-wide (except CA, WA, OR)
		2,600 *(ODFW)*			
	pups	10,000 *(ADF&G)*			**ODFW = CA, WA, OR**
		19,000 *(NMML)*			
		1,200 *(ODFW)*			
7. Incidental disturbance from capture and sampling activities (**all scat collection** *would be incidental to ground counts/capture activities or on vacant haulouts)*	all ages	7,000 *(ADF&G)*	Unknown	all year	Alaska-wide
		4,000 *(NMML)*	Unknown	all year	range-wide
		none additional *(AEB)*	**Unknown, up to 4 times/year**	**September, December, March, and June**	**Western-stock**
		1000 *(VanBlaricom)*		**All year**	**Eastern stock**
		400 *(Davis)*	**Unknown**		
		10,000 *(ODFW)*	**Unknown**	**All year**	**Eastern stock**

			Unknown	**All year**	**CA, WA, OR**
8. Accidental mortality	all ages	**10** *(ADF&G)*	1	all year	Alaska-wide
		10 ***(NMML)***			range-wide
		3 ***(VanBlaricom)***			**Eastern-stock**
		13 ***(Davis)***			**Eastern-stock**
		10 ***(ODFW)***			**CA, WA, OR**
9. Capture and Restraint (includes hoop net, underwater lasso, restraining net, Valium, isoflurane, Telazol)	**> 5 days to ≤ 6 weeks**	700 *(ADF&G)*	1	all year	Alaska-wide
	2 months to 3 years	300 *(ADF&G)*	2 - **4**		Alaska-wide
	> 5 days to ≤ 6 weeks	**1100** *(NMML)*	1		range-wide
	4 months to 3 years	120 *(NMML)*	2		range-wide
	juveniles (>1 year old)	**30** ***(Davis)***	**3**	**All year**	**Eastern stock**
	adult females	**15** ***(Davis)***	**3**	**except peak pupping season**	
	pups < 6 weeks	**200** ***(ODFW)***	**1**	**June-July**	**CA, WA, OR**
	4 months to 3 years	**30** ***(ODFW)***	**1**	**All year**	*Note that the following takes are a subset of those animals captured in*

					Activity 9 and thus do not represent additional animals taken, but rather additional procedures per animal.
9.a. Blood collection (samples for health and disease screening from eastern and western stock; samples related to other studies from eastern stock only)	5 days to 4 months	**1,250** *(NMML)*	1	June-July	range-wide
	4 months to 3 yrs	120 *(NMML)*	2 **- 4**	all year	range-wide
	5 days to 2 months	700 *(ADF&G)*	**1**	June-July	Alaska-wide
	2 months to 3 yrs	300 *(ADF&G)*	2	All year	Alaska-wide
	pups < 6 weeks	**50** *(ODFW)*	**1**	**June-July**	**CA, WA, OR**
	4 months to 3 yrs	**30** *(ODFW)*	**1**	**All year**	
9.b. **Muscle biopsy**	**6** months to 3 years	**300** *(ADF&G)*	2	all year	**Eastern stock or Surrogate species**
		60 *(NMML)*	2		
9.c. Skin biopsy (for genetics)	5 days to 4 months	**250** *(NMML)*	1	all year	Range-wide
	4 months to 3 yrs	120 *(NMML)*			Range-wide
	5 days to 2 months	350 *(ADF&G)*			Alaska-wide
	2 months to 3 yrs	300 *(ADF&G)*			range-wide

	pups < 6 weeks				**CA, WA, OR**
	4 months to 3 yrs	**200** *(ODFW)*			
		30 *(ODFW)*			
9.d. Skin/blubber biopsy (for isotopes, fatty acids, toxicology)	6 months to 3 years	300 *(ADF&G)*	2	All year	**Eastern stock**
		120 *(NMML)*			
9.e. Fecal loops and culture swabs	5 days to 6 weeks	350 *(ADF&G)*	2	June-July	Alaska-wide
		250 *(NMML)*	2		range-wide
	> 2 months to 3 years	300 *(ADF&G)*	2 **- 4**	all year	Alaska-wide
	4 months to 3 years	120 *(NMML)*	2	all year	Range-wide
	pups < 6 weeks	**200** *(ODFW)*			
	4 months to 3 years	**30** *(ODFW)*	**1**	**June-July**	**CA, WA, OR**
			1	**All year**	
9.f. **Tooth extraction**	**Juveniles 1** to 3 years	**300** ***(ADF&G)***	1 over life of animal	all year	Alaska-wide
		120 *(NMML)*			range-wide
9.g. **Pull**/clip vibrissae, clip hair and nails	**Juveniles 1** to 3 years	300 *(ADF&G)*	2	all year	Alaska-wide
		120 ***(NMML)***	2		range-wide

9.h. Temporary mark (i.e., bleach, dye, flipper tag) for those animals not permanently marked	**1** to 2 months	700 *(ADF&G)*	1 over life of animal	June-July	Alaska-wide
	2 months to 3 years	300 *(ADF&G)*		all year	Alaska-wide
	1 to 4 months	**1300** *(NMML)*		June-July	range-wide
	4 months to 3 years	120 *(NMML)*		All year	range-wide
	4 months to 3 years	**30** *(ODFW)*		All year	CA, WA, OR
9.i. Permanent mark (e.g., freeze-brand or hot-brand)	**Pups** > 5 days old	300 *(ADF&G)*	1 over life of animal	June-July	Alaska-wide
		600 *(NMML)*			range-wide **(except CA, WA, OR)**
		200 *(ODFW)*			**CA, WA, OR**
9.j. Attachment of scientific instruments (includes VHF, SLTDR, **UTPR, and video data logger**)	**Juveniles 1** to 3 yrs	**65** *(ADF&G)*	2-**4**	all year	Alaska-wide
		120 *(NMML)*	2		range-wide
	juveniles	**30 (Davis)**			
	adult females	**15 (Davis)**	**3**	**all year**	**eastern stock**
			3		
	juveniles 1 to 3 yrs	**30** *(ODFW)*	**1**	**all year**	**CA, WA, OR**
9.k. Bioelectric impedence analysis	≥ **6 months**	**120** *(NMML)*	**2**	**all year**	**surrogate species or captive SSL**
	≥ **6 months**	**300** *(ADF&G)*	**2**		

9.l. Deuterated water	**≥6 months**	300 *(ADF&G)*	2**-4**	**all year**	**surrogate species or captive SSL**
		120 ***(NMML)***	**2**		
9.m. Evans blue dye	**6 months to 3 years**	**300** *(ADF&G)*	**2**	**all year**	**surrogate species or captive SSL**
		120 *(NMML)* ***)***			
9.n. Stomach intubation[I]	**6 months to 3 years**	**650** ***(ADF&G)***	**2**	**all year**	**eastern stock**
9.o. Enemas[I]	**6 months** to 3 years	300 *(ADF&G)*	2	all year	**eastern stock**
		120 *(NMML)*	2		
		30 *(ODFW)*	1		
10. Remote blubber biopsy[I]	6 months to 3 years	120 *(NMML)*	1	**all year**	**eastern stock**
	adults	60 *(NMML)*	1		
	juveniles and adults	**240** ***(VanBlaricom)***	**1**		
11. Ground-based behavioral observations	**All ages**	**None additional** ***(AEB)***	**Unknown**	**All year**	**Alaska-wide**

The Recovery Plan for Steller Sea Lions recommends preparing guidelines and regulations to control potentially disruptive activities, including disturbance that may be caused by vessels, aircraft, and researchers on the ground. Accordingly, the NMFS would work with veterinarians, biologists, and physiologists to develop a handbook of "good practices" that incorporates all the items necessary for safe handling of pinnipeds, and require that all permit holders, as a condition of the permit, be required to follow these practices. Many of the measures listed as mitigation in this document are simply "good practice" and are already followed by responsible, experienced researchers.

The Recovery Plan also recommends documenting the effects of disturbance caused by human activities that might contribute to the population decline, and suggests they be evaluated in relation to population trends of Steller sea lion management units. In addition, the panels for the peer-review workshops convened in 1997 and 1999 to evaluate the research done on Steller sea lions recommended development of a strategic plan (to be peer reviewed before and after its implementation) and study designs to integrate the various research projects into a cohesive approach for determining what factors are affecting sea lion populations and their potential recovery. The panels also recommended coordination of the research activities to ensure consistency in collection and analysis of data. The panelists were also concerned that some research did not appear associated with anything that would affect survival probability, and that there appeared to be a lack of integration of the various research programs and disciplines, such that it was not clear how the studies fit together. It is therefore recommended that a panel of independent experts in vertebrate biology, ecology, and management be convened to assist in the development and review of a strategic plan and guidelines or protocols for research, with approved techniques for a variety of intrusive procedures, aerial surveys and pup counts, as well as a protocol for evaluating the effects of research on Steller sea lions. This panel would also be involved, where practicable, in reviewing the results of permitted research activities as documented in the annual reports submitted by permit holders to the Service.

Finally, given the increase in the number of individuals and entities involved in research on Steller sea lions, there is an even greater need for close coordination of the research to avoid unnecessarily duplicative research or unnecessary adverse effects on the animals. All marine mammal research permits issued by the NMFS contain conditions requiring permit holders to coordinate their activities with those of others doing similar work on the same species and/or in the same area or seasons. When the majority of research was authorized under permits held by NMML and ADF&G, this coordination was accomplished between the holders of the two permits. However, the recent congressional appropriations for research on Steller sea lions have significantly increased the number of individuals and entities who have or will be applying for marine mammal research permits. This means coordination between permit holders would require more effort and resources to support the permit conditions. The NMFS Division of Permits, Education and Conservation would require the support and assistance of NMFS Regional Office in coordinating and monitoring the timing and location of various research activities. The Service would also encourage permit holders and applicants to cooperate among themselves to share samples and resources to the maximum extent practical to avoid unnecessary duplication of research and adverse effects on the sea lions, and would require all permit holders to conduct monitoring of the effects of their research.

Aerial surveys: Limiting the frequency of aerial surveys over individual rookeries and haulout sites, limiting surveys to times of year when pups are older and more capable of avoiding being trampled or otherwise injured if adults were to stampede, and requiring that surveys be flown at higher altitudes or greater distances from rookeries and haul-outs could reduce the possibility of adverse effects. The limitations of the photographic equipment used

may preclude conducting surveys at altitudes or distances greater than those already permitted. In addition, researchers state that rookery structure begins to break down (i.e., animals begin dispersing to other sites) about six weeks after the peak of pupping, which means that aerial surveys conducted after this period would tend to underestimate abundance of sea lions relative to surveys conducted earlier in the season. Therefore, survey data would not be comparable with trend counts made in previous years. Aerial surveys would continue to be conducted using the same protocols (altitudes, air speeds, distance, frequencies) as in previous years. The number and frequency of takes would be the same as described for the Proposed Action alternative. To assist NMFS in assessing whether the frequency and/or timing of these surveys are having an adverse effect on threatened or endangered Steller sea lions, researchers would be required to provide a more detailed and qualitative description of observed responses of sea lions to the surveys in their annual permit reports, to allow NMFS to better assess the effects and determine if the frequency or timing of aerial surveys needs to be adjusted to minimize adverse effects.

Ground counts (a.k.a. pup surveys) and other activities on rookeries: To reduce the potential for adverse effects from chronic disturbance, the frequency of ground counts would be limited to every other or every third year, to the maximum extent practical. Researchers would continue to count pups without driving the adults from the rookery (i.e., from overlooks or vessels) where possible, or using new photographic techniques as they become available. Individual rookeries would not be disturbed more than once per season (i.e., animals would not be repeatedly "herded" or displaced over the course of several days) either under a single permit or by multiple permit holders, unless necessary for achieving other essential research objectives. Researchers would be required to conduct pre- and post-activity monitoring and would also be required to maintain and provide records with qualitative and quantitative reports of the response of animals to disturbance. Regarding observations of reactions to disturbance, all researchers working with Steller sea lions would develop and use a standardized set of criteria by which reactions are measured, to assist NMFS in evaluating the effects of this activity.

Scat collection: All scat collections would be in conjunction with other permitted activities on the rookery, (i.e., pup counts, capture activities), or on vacant haulouts, in order to minimize the number of times a rookery or haulout is disturbed. Thus, there would be no takes for this activity.

Land-based behavioral observations: There would be no takes for this activity because observers would access rookeries and haulouts from locations that would not disturb sea lions, or would access these areas in conjunction with disturbance related to ground counts and capture activities. Because data on the effects of research are vital to monitoring and coordinating research and minimizing the potential adverse impacts on the sea lions, observers would, to the maximum extent possible, be located at rookeries and haulouts where NMML and ADF&G had disturbed animals for research activities, as well as at sites not disturbed for comparison (i.e., an experimental control). A panel of independent experts would be convened to review the study protocol and, as needed, make recommendations to ensure that the study protocol is appropriate to address the effects of research.

Intrusive activities (including capture and restraint, blood sampling, biopsy, and attachment of scientific instruments): The total number of sea lions taken by intrusive activities would be the same as described under the Proposed Action. However, under this alternative, takes of an intrusive nature would be limited to those related to population monitoring, including some health and disease screening via blood and tissue samples (skin

biopsy and fecal loops/culture swabs) for the endangered western population. Of the intrusive activities that would occur in the endangered population, pups < six months old would not be captured, except for those authorized for permanent marking studies related to collecting information on vital statistics, studies of population genetics, etc. Takes related to studies of weaning, dive ontogeny, foraging ecology and energetics (i.e., muscle biopsy, blubber biopsy, stomach intubation, enemas, administering deuterated water and Evans blue dye, and some instrument attachment) would not be allowed on the endangered population. In the eastern population, takes related to these types of studies would not be allowed on pups = six months old. Because the age of pups during the breeding season, and subsequent few months can be estimated from the time of sampling, size of the animal, and eruption pattern of teeth, pulling a tooth to determine the age of an animal would not be allowed on animals less than one year of age in either population. Collecting vibrissae (by clipping or puling), hair and nails (by clipping) for isotope analysis of diet would be restricted to animals at least one year of age. Collection of a skin biopsy for genetic analysis would be allowed in both populations, and on pups as young as 5 days old when captured as part of permanent marking studies. Collection of blood samples would be allowed for both populations only as needed for health and disease screening and on pups less than 4 months old only when they are captured as part of the permanent marking study to estimate vital rates. Studies using deuterated water and bioelectric impedance analysis to further develop a model for determining body composition in Steller sea lions would be directed to either captive stock or a surrogate species such as California sea lions. When the model has been fully developed by these means, takes in the eastern population would be allowed to verify the model, prior to consideration of allowing the use of BIA on animals in the western population. Studies of the development of dive ability using Evans blue dye and muscle biopsy would be directed to captive stock or a surrogate species.

Attachment of scientific instruments to examine foraging ecology and dive behavior would be restricted to juvenile sea lions in both populations, where juveniles are those animals at least one year old. Remote blubber biopsy samples would be collected only from sea lions in the eastern stock, and according to an appropriately stratified (e.g., by age, sex, location) sampling protocol suitable to achieving the study objective. Some animals in both populations would be recaptured up to four times per year for re-attachment of scientific instruments. At that time, additional blood and tissue samples (fecal loops and culture swabs) could be collected for health and disease screenings, and isotope analyses (whiskers, hair, and nails). For young of the year (pups less than one year old), no pup would be recaptured more than twice in a six month period.

Researchers would not disturb an individual rookery more than once per season unless circumstances warrant additional disturbance (e.g. post-activity monitoring reveals carcasses, the collection of which would provide valuable information whose worth would outweigh the effects of an additional disturbance).

Marking (including flipper tagging and hot-branding): Because flipper tags have the potential to cause pain and infection, the NMFS recommends that an alternative, non-invasive method be employed for the short-term marking of animals, as appropriate to the study objectives. One alternative that has been used with success in the past is dying or bleaching marks onto the hair using commercially available hair dyes. These marks would likely last until the animal molts, weeks to months after application. Where the use of flipper tags is justified (i.e. no other alternative is feasible given the research objectives and logistic constraints), only animals believed to be in optimal health will be captured and subjected to this and other invasive procedures, unless the research objectives require examination of diseased or moribund animals. Thus, animals in both populations may be temporarily marked when the study protocol

requires recapture (or avoidance of recapture) within a season. These temporary marks would be in the form of bleach or dye marks, or attachment of external scientific instruments. Flipper tags would only be used in either population when the study objective required the ability to recognize and recapture (or avoid recapturing) known animals over the course of several years.

Because of the continued public controversy (not scientific) related to the humaneness of the technique, and questions about the reliability of survival estimates using hot-branded animals where the brand-related mortality is not known, the NMFS would require researchers to develop, and submit for approval by a panel of independent experts, a study protocol designed to examine the effects of hot-branding on Steller sea lions. The Service also suggests that researchers design and conduct a study on the effects of hot-branding versus other techniques for permanently marking Steller sea lions (i.e., cryo- or freeze-branding) using the eastern population.

Permit holders and applicants would be required to submit, for approval by the Service in consultation with the MMC and a panel of independent experts, detailed protocols for the re-sighting of branded animals relevant to their stated objective of estimating survival rates, natality rates, and age at first reproduction in Steller sea lions. Researchers would also be required to demonstrate that sufficient resources were available to conduct appropriate re-sight efforts and monitoring.

Animals in both populations would only be permanently marked as needed for studies of population vital rates. Thus, only known age animals would be permanently marked, and only as many as determined necessary by the sampling protocol and probability of re-sight given appropriate re-sigh effort. Opportunistic permanent marking of any animal captured would not be allowed unless it could be demonstrated how this would contribute to studies of vital rates. Animals that are permanently marked would not be flipper tagged as this represents unnecessarily duplicative impacts.

Accidental mortality: The number of accidental mortalities allowed under this alternative would be the same as under the Proposed Action (51) and would include the total requested by all permit holders and applicants for takes in the wild.

4.5 Significance of Effects

Table 4 summarizes the relative effects of the three alternatives. The level of intensity for all alternatives is similarly high because the area in which the majority of the takes would occur is similar between alternatives, often within designated critical habitat for a threatened and endangered species. Given that the effects of the past and present research activities on Steller sea lion populations are uncertain, as are the cumulative or synergistic effects of a variety of research activities, alternatives must be compared largely in qualitative terms relative to the Status Quo.

Table 5 summarizes the numbers of sea lions that could be taken under each alternative. There is no difference in the maximum number of sea lions that may be taken annually by aerial survey among the three alternatives compared to the Status Quo. The total number of sea lions that would be taken incidental to activities on rookeries is lowest under the Non-intrusive Population Monitoring alternative and increases from the Status Quo to the Re-allocation of Intrusive Research alternative, being highest under the Proposed Action. The major difference in the potential for adverse effects among the alternatives relates to the number of intrusive procedures

performed per animal, and to the timing of these takes relative to the reproductive cycle of Steller sea lions. The number of intrusive procedures correlates to the amount and type of data that could be collected. Under all the alternatives, the non-intrusive population monitoring methods (i.e., aerial/vessel survey , behavioral observations, and remote monitoring) would yield important data on population abundance and distribution needed for monitoring and management, as well as some details of behavioral ecology (e.g. activity budgets, lactating female attendance patterns, time of weaning, social interactions such as mating, parental care, aggressive encounters). Some physiological data such as body condition (i.e. mass relative to age or length, lean body mass ratio) could be assessed using developing photogrammetry techniques. Measures of physical health (i.e. blood chemistry parameters; incidence of parasites and diseases; nutritional status; and contaminant levels) which have been identified as important variables in assessing the health and status of the Steller sea lion population could be collected under any of the alternatives. This information would be available under all the alternatives, though collection of these samples would be more limited under the Re-allocation of Intrusive alternatives compared to the Status Quo and Preferred Alternative. Reconstructing the diet of marine mammals from analysis of hard parts in scat samples is typically limited to revelations of the most recent meal and may not represent the entire array of prey being consumed. Samples of vibrissae, hair, and nails for isotope analysis and blubber biopsies for fatty acid analysis would provide more detailed and longer-term information on the diet of Steller sea lions. These samples are available under all the alternatives, however, the Re-allocation of Intrusive alternatives is more restrictive with respect to the age of animals that can be sampled and the geographic location of the sampling.

As noted in Table 5, nearly half (Status quo) of the estimated take of Steller sea lions has already been permitted, and existing permits were considered under NEPA and excluded from the need for an EA or EIS under permit regulations (categorical exclusion for research with benign effects). Furthermore, nearly half (276,000) of the estimated take in the proposed action would be authorized for aerial surveys. Estimates for take for aerial surveys are calculated from the total number of sea lions expected to be exposed to aircraft flying over rookeries and haulouts. Experience has shown that sea lions react only rarely to survey aircraft. In those cases that some reaction occurs, it is generally a slight shift in behavior (increased alertness), which may not meet the threshold for Level B harassment. On very rare occasions, sea lions may be harassed in mass from the beach, and when such harassment occurs, there is a potential that one or more of the sea lions will be injured or killed. Therefore, aerial surveys are considered a negligible risk for significant impact on Steller sea lion populations.

Incidental harassment (i.e., harassment incidental to research actions, such as scat collection, ground counts, and capture operations, on haulouts or rookeries) accounts for the majority of estimated take in the proposed action (291,850). Commonly employed mitigation measures and existing mitigation measures in NMFS permits (see sections 2.1.2 and 2.1.3, respectively) minimize the impact for injury or death of sea lions during field activities. These measures call for experienced field personnel to conduct handling operations and coordination of research activities through the regional office. Approximately one-third of the proposed take for incidental harassment have already been permitted (see status quo in Table 5). Such activities have occurred historically for Steller sea lion research, and little impact to individuals or local aggregations has been documented. Most of the additional incidental harassment included in the proposed action is being conducted by the existing permit holders (NMML and ADF&G) and the initial review of the permit modifications by these permit holders resulted in a categorical exclusion from preparing an EA or EIS when receipt of the permit modification was announced. Much of the incidental harassment of Steller sea lions under the proposed action has already been permitted, and existing mitigation measures reduce the potential for significant

adverse effects. Consequently, NMFS maintains that incidental harassment is not likely to have a significant adverse effect on Steller sea lions.

The analysis included in this EA was prompted in large part by the requested increased in intrusive procedures. Specifically, there is concern that numerous intrusive procedures performed on the same animal will have a cumulative effect on individual sea lions, which in turn may have an adverse impact on the population. These procedures are commonly used in wildlife research and have been commonly applied to marine mammals. In smaller sample sizes, many of these procedures have been applied to Steller sea lions. For example, the status quo, which has already been determined to have an insignificant effect on Steller sea lion populations, would allow up to 11 procedures to be performed on about 2,400 sea lions annually throughout their range (Tables 6-8). The proposed action would increase the number of sea lions subject to intrusive procedures to about 3,100 annually and would increase the number of procedures to 15. One of these procedures, BIA, is relatively minor and is being tested and calibrated to replace another, more intrusive, method (deuterated water) for evaluating the condition of Steller sea lions, and the more intrusive method will be discontinued in the future.

There is insufficient information for a reliable evaluation of the synergistic effects of these repeated procedures on individual sea lions; however, NMFS has already determined that allowing most of these procedures to be performed on 2,400 sea lions for an additional 2 years (the existing permits expire in December 2004 and June 2005) would not have a significant effect on Steller sea lions. Consequently, as a mitigating measure, NMFS is authorizing additional take or procedures only for the duration of the existing permits. This restricted duration will limit the impact (potential lethal or sublethal effects) only to the animals that will be handled through June 2005. During this period, NMFS will work with to address concerns raised during review of the permit applications, including the development of a monitoring plan that can produce information to assess the impact of the research program more reliably over the long-term. With these mitigation measures in place, NMFS believes that authorizing additional intrusive procedures on Steller sea lions will not have a significant effect on the population.

The total number of accidental mortalities per year under all the alternatives is very low and not likely, in the absence of other sources of mortality, to contribute significantly to the decline or failure to recover of threatened or endangered Steller sea lions. The upper limit for accidental mortality under the status quo is 10 Steller sea lions per year, and the proposed action would increase this limit to 51 sea lions per year. If all accidental mortality was restricted to the eastern stock of Steller sea lions, proposed authorization for accidental mortality would have a negligible impact on the stock. On the other hand, if all of this authorized take was applied to the western stock, such a level of mortality would exceed negligible impact. Consequently, NMFS has established an upper limit to the average annual mortality that can be applied to the western stock at a level that would cause insignificant impact. If accidental mortality in the western stock reached 10 sea lions (about 5% of the stock's PBR) then researchers would be required to consult with one another to identify research practices that would prevent accidental mortality in the western stock to exceed 20 sea lions (10% of te stock's PBR). With this mitigation measure in place, accidental mortality would not have a significant adverse impact on the Steller sea lion population. The total number of authorized accidental mortalities per year, as requested by the applicants, is the same under the Preferred Alternative and the Re-allocation of Intrusive Research alternative, which is higher than under the Status Quo alternative.

Table 4 Summary of Consequences of the Alternatives
Alternatives are compared relative to the Status Quo.

	Status Quo	Proposed Action	Re-allocation of Intrusive Research
Extent of Takes (spatial)	Range-wide*	Range-wide	Range-wide But less in Western population
Extent of Takes (temporal)	Year-round	Year-round	Year-round
Intensity of Takes‡	High (via Level A & B harassment)	Highest (via Level A & B harassment)	Lower (via Level A & B harassment)
Data Anticipated (as needed for Objective)	Yes	Yes	Yes
Potential for * adverse impact on individual SSL & populations	Uncertain Effects on both Eastern & Western populations	Highest Effects on both Eastern & Western populations	Lower Effect on Western population

* The term "range-wide" in this table means throughout the range of Steller sea lions in North America, including California, Washington, Oregon, Alaska, and British Columbia, but exclusive of Russia and Japan.

‡ Intensity represents the degree of pain and stress associated with a procedure as well as the number of procedures per individual sea lion and the total number of sea lions affected.

* Some of the proposed activities within each alternative are known to have the potential for adverse impacts on individual SSL, and the alternatives differ, among other things, in the numbers of animals affected and the intensity of the actions proposed.

Table 5: Comparison of Maximum Number Authorized Takes per Year under each Alternative

	Status Quo	Proposed Action	Re-allocation of intrusive Research
Aerial surveys[1]	160,000	276,000	276,000
Vessel surveys	0	1,600	1,600
Incidental harassment[2]	97,000	291,850	108,400
Remote biopsy sample	180	420	420
Capture, restraint, sampling	2,430	3,115	2,495
Recaptures per animal	Up to 2	Up to 4	Up to 4
Number of intrusive procedures per animal per capture event	Up to 11	Up to 15	Up to 12 (Eastern) Up to 8 (Western)
Total animals taken per year	259,610	572,985	388,915
Accidental mortalities per year	10	51	46

Note: the estimated Steller sea lion population in Alaska is 53,602

1. Individual animals may be taken by harassment more than once per year. The frequency of harassment per animal will depend on the frequency of the activities and the location of the animal.

2. Incidental harassment during scat collection, ground counts of pups, capture and sampling activities.

Table 6. Pup takes associated with handling under Status quo (Alternative 1) and Proposed Action (Alternative 2) alternatives. Numbers of sea lions with procedures are subsets of the total captured. Each subsequent column shows the number of sea lions upon which a specific additional procedure is performed.

Pups (<4 months)

Alternative 1: Status Quo

	NMML			ADFG			ODFW	Davis	ASLC
Total captures	1300			700			0	0	0
Procedure subsets	All	800	450	All	600	350			
Weigh, measure	x			x					
Blood collection			x			x			
Muscle Biopsy									
Skin Biopsy			x			x			
Skin/blubber biopsy									
Fecal loop/culture swabs			x			x			
Tooth extraction									
Clip vibrissae clip hair/nails						x			
Flipper tag	x			x					
Hot brand		x			x				
Instrumented									
BIA									
D2O									
Evans dye injection									
Intubation									
Enemas (>1.5 mo only)						x			

Alternative 2: Proposed Action

	NMML			ADFG			ODFW		Davis	ASLC
Total captures	1100			700			200		0	300
Procedure subsets	All	600	450	All	600	350	All	50		120
Weigh, measure	x			x			x			x
Blood collection			x			x		x		x
Muscle Biopsy										
Skin Biopsy			x				x			
Skin/blubber biopsy						x				x
Fecal loop/culture swabs			x			x	x			x
Tooth extraction										
Pull vibrissae						x[a]				
clip hair/nails										
Flipper tag	x			x			x			x
Hot brand		x			x		x			
Instrumented										
BIA										
D2O										
Evans dye injection										
Intubation						x				
Enemas (>1.5 mo only)										

[a]Anticipated sample size of 20 that would have a blubber biopsy removed.

Table 7. Juvenile takes associated with handling under Status quo (Alternative 1) and Proposed Action (Alternative 2) alternatives. Numbers of sea lions with procedures are subsets of the total captured. Each subsequent column shows the number of sea lions upon which a specific additional procedure is performed.

Juveniles (1.5 months to 3 years)

Alternative 1: Status Quo

	NMML	ADFG		ODFW	Davis	ASLC
Total captures	120	300		0	0	0
Procedure subsets	All	All	45			
Weigh and measure	x	x				
Blood collection	x	x				
Muscle Biopsy						
Skin Biopsy						
Skin/blubber biopsy	x	x				
Fecal loop/culture swabs	x	x				
Tooth extraction		x				
Clip vibrissae clip hair/nails		x				
Flipper tag	x	x				
Hot brand		x				
Instrumented	x		x			
BIA						
D2O		x				
Evans dye injection						
Intubation		x				
Enemas	x	x				

Alternative 2: Proposed Action

	NMML		ADFG			ODFW	Davis	ASLC			
Total captures	120		300			30	30	230			
Procedure subsets	All	20	All	90	65	All	All	170	150	36	16
Weigh and measure	x		x			x	x	x			
Blood collection	x		x			x	x	x			
Muscle Biopsy		x		x							
Skin Biopsy						x					
Skin/blubber biopsy	x		x				x	x			
Fecal loop/culture swabs	x		x			x	x	x			
Tooth extraction	x		x								
Pull vibrissae clip hair/nails	x		x								
Flipper tag	-		-			x	x			x	
Hot brand	x		x			x	x				
Instrumented	x				x	x	x				x
BIA	x		x						x		
D2O	x		x						x		
Evans dye injection		x		x							
Intubation			x								
Enemas	-		-			x					

Table 8. Adult takes associated with handling under Status quo (Alternative 1) and Proposed Action (Alternative 2) alternatives. Numbers of sea lions with procedures are subsets of the total captured. Each subsequent column shows the number of sea lions upon which a specific additional procedure is performed.

Adults and subadults

Alternative 1: Status Quo

	NMML	ADFG	ODFW	Davis	ASLC
Total captures	0	10	0	0	0
Procedure subsets		All			
Weigh and measure		x			
Blood collection		x			
Muscle Biopsy					
Skin Biopsy					
Skin/blubber biopsy		x			
Fecal loop/culture swabs		x			
Tooth extraction		x			
Pull vibrissae clip hair/nails		x			
Flipper tag					
Hot brand					
Instrumented					
BIA					
D2O					
Evans dye injection					
Intubation					
Enemas		x			

Alternative 2: Proposed Action

	NMML	ADFG	ODFW	Davis	ASLC
Total captures	0	10	0	15	80
Procedure subsets		All		All	20
Weigh and measure		x		x	x
Blood collection		x		x	x
Muscle Biopsy					
Skin Biopsy					
Skin/blubber biopsy		x		x	x
Fecal loop/culture swabs		x		x	x
Tooth extraction		x			
Pull vibrissae clip hair/nails		x			
Flipper tag				x	x
Hot brand				x	
Instrumented				x	
BIA					
D2O					
Evans dye injection					
Intubation					
Enemas		x			

4.6 Cumulative Effects

A cumulative effects analysis is a requirement of the National Environmental Policy Act (NEPA). An environmental assessment must consider cumulative effects when determining whether an action significantly affects environmental quality. The cumulative impact is the impact on the environment which results from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Significance cannot be avoided if it is reasonable to anticipate a cumulatively significant impact on the environment. The Council on Environmental Quality NEPA Regulations (40 CFR Parts 1500-1508) prohibit labeling effects temporary or short-term, or breaking them down into smaller component parts. Other actions that affect Steller sea lions within the action area are subsistence harvest and commercial fisheries. As discussed in Chapter 3, neither the current level of subsistence harvest nor estimated mortality incidental to fishing operations are presently thought to contribute significantly to the decline of the Steller sea lion by themselves. The relative impacts of all the research activities, as well as other activities such as the effects of subsistence or fishing, may increase as the population declines, and any additional sources of mortality may hinder recovery. It has been hypothesized that changes in environmental conditions that may be part of a larger pattern of climate fluctuation may also contribute to reductions in prey abundance or changes in prey distribution. Any adverse effects of the Preferred Alternative, and all the other alternatives, would be added to effects of fisheries and subsistence harvest.

The Council on Environmental Quality (CEQ) guidelines for evaluating cumulative effects state that "…the most devastating environmental effects may result not from the direct effects of a particular action but from the combination of individually minor effects of multiple actions over time."

The CEQ regulations for implementing NEPA define cumulative effects as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

Cumulative effects are linked to incremental actions or policy changes that individually may have small outcomes, but that in the aggregate and in combination with other factors can result in greater effects. At the same time, the CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action on the universe but to focus on those effects that are truly meaningful.

This section analyzes the potential direct and indirect effects of the three Steller sea lion permit alternatives with other factors that affect Steller sea lions at the individual and stock level. The following cumulative effects analysis addresses the potential magnitude of effects and is somewhat qualitative in nature.

Methodology: The intent of the cumulative effects analysis is to capture the total effects of

many actions over time that would be missed by evaluating each action individually. A cumulative effects assessment describes the additive and synergistic result of the actions proposed in this SEIS as they interact with factors external those proposed actions. Although predictions of direct effects of individual proposed actions tend to be more certain, cumulative effects may have more important consequences over the long term. The possibility of these "hidden" consequences presents a risk to decision makers, because the ultimate ramifications of an individual decision might not be obvious. The goal of identifying potential cumulative effects is to provide for informed decisions that consider the total effects (direct, indirect, and cumulative) of alternative management actions. This section characterizes the incremental cumulative effects that potentially arise from external factors in combination with the direct and indirect effects.

The methodology for cumulative effects analysis in this EA is similar to that followed in the Alaska Groundfish Draft Programmatic SEIS (NMFS 2001a), and is described in greater detail in section 4.13.1 and 4.13.2 of that document. It consists of the following steps:

(1) Identify characteristics and trends within the affected environment that are relevant to assessing cumulative effects of the action alternatives;

(2) Describe the potential direct and indirect effects of each of the three alternatives; and

(3) Identify past, present and reasonably foreseeable external factors such as fisheries, other types of human activities, and natural phenomena that could have additive or synergistic effects.

External Factors and Effects: A cumulative effects analysis takes into account the incremental impact of the proposed action when added to other past, present, and reasonablely foreseeable future actions (40 CFR 1508.7). For the purposes of this EA, the definition of other actions includes both human controlled events such as fisheries, pollution and industrial development, and natural events such as disease, and short and long term climate change.

Human Controlled Events: The detailed analyses address the following external actions which could be considered human controlled:

(1) Effects from fisheries - Direct catch, bycatch, and direct and indirect mortality from foreign, joint venture (JV), State of Alaska and international fisheries;

(2) *Effects from shooting and subsistence harvesting; and*

(3) *Anthropogenic effects* - pollution, oil and gas activities, harassment.

Historical Fisheries (Foreign Joint Venture, and Domestic): Other fisheries considered in this cumulative effects analysis include foreign fisheries both today and in the past, and past JV fisheries.

A very robust foreign groundfish fishery operated off Alaska long before the Magnuson-Stevens Act was passed in April 1976. The United States had little leverage to restrict the large offshore

Japanese and Soviet operations during their initial build-up. U.S.-foreign bilateral agreements were the main mechanism for managing the foreign fisheries. By 1972–1973, foreign operations had spread from Alaska south to the Pacific Coast off Washington and Oregon, leaving very depressed stocks in their wake off Alaska. Catches of yellowfin sole in the eastern Bering Sea, for example, had fallen sharply following very large removals by Japan and the Soviet Union. Pacific ocean perch stocks in the GOA were decimated. Pollock catches were increasing rapidly and were thought likely to follow the same pattern as perch and flatfish. When the Magnuson-Stevens Act was passed in 1976, groundfish fisheries were, for all practical purposes, totally foreign. Most measures were designed to lessen their impact on domestic fisheries for halibut and crab. U.S. commercial fisheries were limited mainly to red king crab in the GOA and eastern Bering Sea, herring in coastal waters, salmon, and halibut. Very little groundfish, other than sablefish and small amounts of Pacific cod off southeast Alaska, were taken by the domestic fleet.

By the end of 1985, only minor foreign fisheries, directed on pollock and Pacific cod, were being allowed in the GOA. Foreign harvesting continued in the Bering Sea. Even there, foreign trawling had ended within 20 nautical miles (nm) of the Aleutian Islands, and foreign longlining for cod was restricted to north of 55°N and west of 170°W, depending on ice conditions. Foreign harvests dropped to less than 1 million mt in 1985. In contrast, U.S.- foreign JVs had grown rapidly through the early 1980s. They harvested about 880,000 mt in 1985, using over 100 U.S. trawlers working within some 28 different company arrangements with such countries as Japan, South Korea, Poland, the Soviet Union, Portugal, and Iceland. Completely domestic annual processing (DAP) reached 105,000 mt in 1985, mostly by trawler catcher/processors (a.k.a. factory trawlers).

During the five year period between 1986–1991, the groundfish fisheries became totally domestic. The last years of foreign directed fishing in the GOA and BSAI were 1986 and 1987, respectively. Foreign JV peaked in 1987, and their last years of operation in the Gulf of Alaska and the Bering Sea were 1988 and 1991, respectively.

Commercial and Subsistence Hunting: Hunting has had a major impact on populations of marine mammals in both the Bering Sea and GOA. Over the past 200 years, nearly all species have been harvested for commercial and subsistence purposes. Gray whales, bowhead whales, fur seals, walruses, and sea otters have been severely reduced, but their populations are recovering. Species of relatively low commercial value such as Steller sea lions, and several species of seals including harbor seals were not severely depleted by hunting, but have been consistently hunted for their subsistence use.

Other Anthropogenic Effects: Of the anthropogenic effects listed above, introduced mammals were determined to be not significant at the level of population effects. Oil and gas leasing activities on the outer continental shelf of the GOA and BSAI were considered but are not incorporated into the analysis because such leasing is unlikely in the reasonably foreseeable future.

Natural Events

Natural events or phenomena considered in the checklists included:

(1) *Climate effects* – long and short term remotely forced sea surface temperature anomalies, and interdecadal climactic changes (regime shift); and

(2) *Trophic interactions* – predation, competition and changes in community structure.

Climate Effects: Atmospheric forced sea surface temperature impacts include two principal modes of remotely forced sea surface temperature anomalies: shorter term El Niño/Southern Oscillation (ENSO) events and longer term Pacific decadal oscillations (PDO).

The regime shift of 1976/1977 is now widely recognized, as well as its associated far reaching consequences for the large marine ecosystems of the North Pacific. The 50–70 year interdecadal variability (a two-regime cycle) has been prevalent from the eighteenth century to the present in North America and the likely cause is essentially an internal oscillation in the coupled atmosphere-ocean system. This suggests that the next climatic regime shift is most likely to occur in the coming decade between 2000 and 2007. Long-term changes in fish populations around the North Pacific have apparently been influenced by climatic change of the same 50–70 year variability.

In many cases, the effects of climate shifts are scored as a "+/-" on the cumulative effects tables. This score indicates that the climate shift could have positive or negative effects depending on the direction of the shift (colder or warmer water).

Trophic Interactions: Where information was available, these interactions and how they shape community structure are included in the checklists. The effects are brought forward to the cumulative effects tables only in cases where an indirect cause/effect relationship could be established.

4.6.1 Summary of Affected Environment Factors

Direct and indirect impacts of the alternatives are evaluated and rated as either significant, conditionally significant, or insignificant. For this analysis, three direct and two indirect effects are evaluated:

- Direct Effects: Accidental mortality during research
  Incidental mortality in commercial fisheries
  Direct take through shooting and subsistence harvest
- Indirect Effects: Synergistic effects of intrusive research
  Disturbance

Affected Environment Factors: The Steller sea lion ranges along the North Pacific Ocean rim, with centers of abundance and distribution in the GOA and Aleutian Islands, respectively ((Loughlin et al. 1984). Habitat of the Steller sea lion includes both marine pelagic and near shore waters, and terrestrial rookeries (breeding sites) and haulouts (resting sites). The northernmost breeding colony in the Bering Sea is on Walrus Island near the Pribilof Islands, and in the GOA on Seal Rocks in Prince William Sound, the northern most of all sea lion

rookeries (Kenyon and Rice, 1961).

In the Bering Sea and GOA, the Steller sea lion diet consists of a variety of schooling fishes (e.g., pollock, Atka mackerel, Pacific cod, flatfish, sculpin, capelin, Pacific sand lance, rockfish, Pacific herring, and salmon), as well as cephalopods, such as octopus and squid (Calkins and Goodwin 1988, Lowry et al. 1982, Merrick and Calkins 1995, Perez 1990). Additional information on the diet and foraging habitats of the Steller sea lion is presented in Section 3.1.1 of this document.

The U.S. western stock has continuously declined since the 1960s, from around 177,000 (excluding pups) in the 1960s to 33,600 (excluding pups) in 1994. The U.S eastern stock has remained relatively stable (Loughlin et al. 1992, Merrick et al. 1987). In 1990, the Steller sea lion was listed as threatened under the Endangered Species Act (ESA) throughout its range (see Section 3.4 of this document). A recovery plan was completed in 1992. In 1997, the National Marine Fisheries Service (NMFS) reclassified Steller sea lions as two distinct population segments, with the population segment west of 144°W, or approximately at Cape Suckling reclassified as endangered. The eastern stock remains listed as threatened.

External Factors and Consequences : It was not until after the 1950s that large numbers of Steller sea lions were taken in the commercial fisheries in the regions (Alverson 1992). The take of Steller sea lions was substantial during this period with over 20,000 animals believed to have been incidentally killed in the foreign JV fisheries from 1966 to 1988, although data from this period is not complete (Perez and Loughlin 1991). Other fisheries such as state-managed salmon drift and set gill net fisheries contributed to the overall take of Steller sea lions in the past. Intentional shooting of Steller sea lions also occurred in several near shore fisheries and this continued to some extent after the enactment of the Marine Mammal Protection Act (MMPA) in 1972 until the early 1990s when they were listed as threatened under the Endangered Species Act (ESA) and a ban on shooting at Steller sea lions was enacted (Hill and DeMaster 1999).

Little information is available on the fluctuations of Steller sea lion population prior to the 1960s but it is suspected that decreases in population numbers were likely due to human exploitation. Direct take of Steller sea lions during this early period has been estimated to range between about 300–500 animals annually (Hayes and Mishler 1991, Trites and Larkin 1992). Take of Steller sea lions in commercial fisheries after this period was considerable, with approximately 1,500 per year from 1966 to 1977 and 650 per year from 1978 to 1988. However, take of Steller sea lions had dropped dramatically to an average of 26 per year in the 1990s (Perez and Loughlin 1998, NMFS 2000c).

It is likely that historic commercial harvests of Steller sea lions for pelts also have had residual effects on the present day population levels of Steller sea lions in certain areas. However, a drastic decline in Steller sea lion numbers has still occurred in some North Pacific regions since protection for the species was instituted.

Foreign/joint venture fisheries and other fisheries were considered to had have negative effects on Steller seal lion populations and were rated as "-" for all effects category. Past subsistence and commercial harvest were also rated as "-" for incidental take and disturbance. Residual past influences were identified for all effects categories.

Present and predicted external effects on Steller sea lion incidental take include mortality from other fisheries. Based on satellite tracking data, Steller sea lions rarely travel outside the U.S. Exclusive Economic Zone (EEZ); therefore, the probability of Steller sea lion mortality from foreign fisheries is believed to be very low and insignificant (Hill and DeMaster 1999). The contribution to direct mortality of Steller sea lions from other fisheries is also relatively low; for the Prince William Sound drift gillnet fishery, the direct mortality is estimated at 14.5 animals per year for the years of 1990 and 1991 based on observer data (Hill and DeMaster 1999). Reported mortalities from six fisheries which did not employ observers are approximately 6.1 animals per year (Hill and DeMaster 1999). The total take from groundfish fisheries and other fisheries is approximately 30 animals per year (Hill and DeMaster 1999).

External effects of short-term or inter-annual climate changes such as the El Niño are not expected to result in population level effects on Steller sea lion since these animals are relatively long-lived, K-selected species. However, it is suspected that the steep declines in Steller sea lion numbers were due, in part, to long-term, climate-induced changes in the abundance and distribution of food for juveniles during a critical time in their life. Long-term climate change or regime shifts can potentially affect Steller sea lions either positively or negatively, depending on the direction of the change. Long-term or inter-decadal climate change has been postulated as a primary factor in the current decline of the Steller sea lion which began in the early 1970s in the eastern Aleutian Islands, and then in the central and western Aleutian Islands and in the western GOA. It has been suggested that declines in food availability and in the abundance of high-quality forage fish resulted in food-related stress in several species of marine mammals and seabirds (Merrick et al. 1987, Piatt & Anderson 1996, Anderson & Piatt 1999).

Subsistence harvest is a major external source of sea lion mortality in both the BSAI and GOA. Most of the subsistence harvest of Steller sea lions is by Aleut hunters targeting animals from the western U.S. stock in the Aleutian Islands and the Pribilof Islands (Wolfe et al. 1999). The mean annual harvest for the years 1993 to 1995 was 412 animals. In recent years, however, Steller sea lion harvest has decreased along with the overall population of sea lions. The subsistence harvest between 1996 and 1998 was approximately 182 animals per year, primarily from the western U.S. stock of Steller sea lions.

4.6.2 Analysis of Cumulative Effects

4.6.2.1 Alternative 1 – Status Quo-No Amendments or New permits

Under this alternative, which is the "no action" alternative, no amendments to existing permits or new permits or scientific research on Steller sea lions would be issued.

Accidental mortality during research: For more than three decades, researchers have been conducting surveys and behavioral research on Steller sea lions. The results of their annual studies suggest that Steller sea lion populations are not adversely affected by this research, although individual animals may be adversely affected or killed. Most recently, NMFS and ADFG disturbed about 66,000 pups and nonpups and captured 452 pups, tagged and branded 436, and experienced 3 mortalities. Also during 2001, ADFG captured and handled 140 juvenile sea lions and branded 132 of those; they also handled and branded 499 pups of which four died. Together both agencies handled 951 pups in 2001 and experienced a mortality rate of less than 1%. We note that both agencies have since modified their techniques during pup handling to reduce or eliminate the possibility of additional pup mortalities. In 1998, 48,000

Steller sea lions were disturbed by these investigations, 384 pups were captured, tagged, and branded, but there were no mortalities. In 1997, 31,150 Steller sea lions were approached by these researchers, 14,550 were disturbed, 137 were captured, and 121 were tagged, but there were no known mortalities. The studies conducted in 1996 had similar effects, although one Steller sea lions died during the study (which equates to 0.002% of the animals approached or 0.007% of the animals disturbed). In 1995, 7,500 Steller sea lions were disturbed and none of them died. The NMFS believes that the cumulative effect of accidental mortality for Alternative 1 is insignificant.

Incidental Take/Entanglement: Steller sea lions are incidentally taken by commercial fisheries other than groundfish fisheries, including some nearshore salmon drift or set gillnet fisheries and halibut longline fisheries. An estimated minimum mean annual mortality rate from the past five years of data for all commercial fisheries taking Steller sea lions from the western stock is 28.3 (CV = 0.64) sea lions per year (Angliss *et al*., 2001). However, many fisheries known to interact with Steller sea lions have not been observed, and thus this should be considered a minimum estimate.

Entanglement of Steller sea lions in derelict fishing gear or other materials seems to occur at frequencies that do not have significant effects upon the population. From a sample of rookeries and haulout sites in the Aleutian Islands, of 15,957 adults observed, Loughlin *et al.* (1986) found only 11 (0.07%) entangled in marine debris, some of which was derelict fishing gear. Observations of sea lions at Marmot Island for several months during the same year observed 2 of 2,200 adults (0.09%) entangled in marine debris. During 1993-97, only one fishery-related stranding was reported from the range of the western stock, a sea lion observed in August 1997 with troll gear in its mouth and down its throat (Angliss *et al*., 2001). Entanglement of sea lions in derelict fishing gear or other marine debris does not appear to represent a significant threat to the population.

Entanglement of Steller sea lions in derelict fishing gear or other materials seems to occur at frequencies that do not have significant effects upon the population. Considering that the overall take including entanglement is below the PBR, the cumulative effect for all Alternatives is considered to be insignificant.

Direct take through shooting and subsistence harvest: Steller sea lions are primarily utilized for subsistence purposes in communities within the range of the western stock. Pinniped harvests in southeast Alaska tend to be dominated by harbor seal rather than Steller sea lions, and essentially all of the harvest is from the western stock. Of these, most are harvested in the Pribilof Islands. Estimates of the total number of sea lions taken (harvested plus struck and lost) declined over the six year period of 1992 - 1998 from 549 to 171 per year (Angliss *et al*., 2001), with an overall mean annual take of 329 sea lions for the entire period.

Harvest levels typically have been lowest during June - August, peaking during September - November and declining through May, but this seasonality has been less pronounced since 1996 with declining harvest rates (Wolfe and Mishler, 1997). The proportion of the harvest comprised of female sea lions has been relatively low. For 1996 - 1998, adult females comprised 14.2%, 9.2%, and 6.9% of the total harvest, while juvenile females accounted for 5.8%, 6.9% and 3.0% (Wolfe and Mishler, 1997; Wolfe and Hutchinson-Scarbrough, 1999). Takahashi and Wada (1998) used a modified Leslie matrix model to assess the possible effect of hunting Steller sea lions in Japanese waters and concluded that hunting near Hokkaido to reduce

damage to local fisheries likely depleted the sea lion population in the Kuril Islands. When the annual take from fisheries is combined with the annual subsistence harvest, the total take is about 88 percent of the PBR of 234 animals as calculated under the MMPA for the western U.S. stock of Steller sea lions (Hill and DeMaster 1999).

Illegal shooting occurs, but the frequency of occurrence is difficult to estimate. NMFS successfully prosecuted two cases of illegal shooting of sea lions in the Kodiak area in 1998, and two cases in southeast Alaska between 1995 - 1999 (Angliss *et al*., 2001). The NMFS believes that the cumulative effect of shooting and the subsistence harvest for all Alternatives is considered to be insignificant.

Synergistic effects of intrusive research: The analysis included in this EA was prompted in large part by the requested increased in intrusive procedures. Specifically, there is concern that numerous intrusive procedures performed on the same animal will have a cumulative effect on individual sea lions, which in turn may have an adverse impact on the population. These procedures are commonly used in wildlife research and have been commonly applied to marine mammals. In smaller sample sizes, many of these procedures have been applied to Steller sea lions. For example, the status quo, which has already been determined to have an insignificant effect on Steller sea lion populations, would allow up to 11 procedures to be performed on about 2,400 sea lions annually throughout their range. The proposed action would increase the number of sea lions subject to intrusive procedures to about 3,100 annually and would increase the number of procedures to 15. One of these procedures, BIA, is relatively minor and is being tested and calibrated to replace another, more intrusive, method (deuterated water) for evaluating the condition of Steller sea lions, and the more intrusive method will be discontinued in the future.

There is insufficient information for a reliable evaluation of the synergistic effects of these repeated procedures on individual sea lions; however, NMFS has already determined that allowing most of these procedures to be performed on 2,400 sea lions for an additional 2 years (the existing permits expire in December 2004 and June 2005) would not have a significant effect on Steller sea lions. Consequently, as a mitigating measure, NMFS is authorizing additional take or procedures only for the duration of the existing permits. This restricted duration will limit the impact (potential lethal or sublethal effects) only to the animals that will be handled through June 2005. During this period, NMFS will work with to address concerns raised during review of the permit applications, including the development of a monitoring plan that can produce information to assess the impact of the research program more reliably over the long-term. With these mitigation measures in place, NMFS believes that authorizing additional intrusive procedures on Steller sea lions will not have a significant effect on the population.

Disturbance: Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has extremely variable effects on hauled-out sea lions ranging from no reaction at all to complete and immediate departure from the haulout. When sea lions are frightened off rookeries during the breeding and pupping season, pups may be trampled or, in extreme cases, abandoned. Sea lions have temporarily abandoned haulouts after repeated disturbance (Thorsteinson and Lensink 1962), but in other situations they have continued using areas after repeated and severe harassment. Johnson et al. (1989) evaluated the potential vulnerability of various Steller sea lion haulout sites and rookeries to noise and disturbance and also noted a variable effect on sea lions. Kenyon (1962) noted permanent abandonment of areas in the Pribilof Islands that were subjected to repeated disturbance. A major sea lion rookery at Cape Sarichef was abandoned after the construction of a light house at that site, but then has been used again as a haulout after

the light house was no longer inhabited by humans. The consequences of such disturbance to the overall population are difficult to measure. Disturbance may have contributed to or exacerbated the decline, although Federal, State, and private researchers familiar with the data do not believe disturbance has been a major factor in the decline of Steller sea lions. Disturbance of sea lions during research, transiting vessels, and researchers is recognized as a potential factor affecting Steller sea lions but is not believed to produce effects at the population level. Past external influences of disturbance are identified for foreign fisheries and state-managed fisheries such as state-managed salmon and herring fisheries. The limits on fishing activity within critical habitat are expected to offer some level of protection from these disturbances. Disturbance from researchers visiting sites across the US range of the species at infrequent intervals under Alternative 1, and vessel traffic and acoustic disturbance from trawling is an ongoing condition of these areas, and Steller sea lions appear to be tolerant of at least some anthropogenic effects. Overall, the current level of disturbance is rated as insignificant.

4.6.2.2 Alternative 2 – Proposed Action: Issue New and Amend Existing Permits to Allow All Additional Takes as Requested by Applicants

Under this Alternative, in addition to the takes described under Alternative 1, permits to NMML and ADFG would be amended to include additional types of take per animal and increases the numbers of animals taken. In addition, the number of takes authorized for certain activities would be further increased by issuance of the proposed permits to AEB, Dr. van Blaricom, Dr. Davis, the ASLC, and ODFW.

Accidental mortality during research: The upper limit for accidental mortality under the status quo is 10 Steller sea lions per year, and the proposed action would increase this limit to 51 sea lions per year. If all accidental mortality was restricted to the eastern stock of Steller sea lions, proposed authorization for accidental mortality would have a negligible impact on the stock. On the other hand, if all of this authorized take was applied to the western stock, such a level of mortality would exceed negligible impact. Consequently, NMFS has established an upper limit to the average annual mortality that can be applied to the western stock at a level that would cause insignificant impact. If accidental mortality in the western stock reached 10 sea lions (about 5% of the stock's PBR) then researchers would be required to consult with one another to identify research practices that would prevent accidental mortality in the western stock to exceed 20 sea lions (10% of te stock's PBR). With this mitigation measure in place, accidental mortality would not have a significant adverse impact on the Steller sea lion population.

Incidental Take/Entanglement: The cumulative effect of incidental take/entanglement is similar to Alternatives 1 and 3 and considered insignificant.

Direct take through subsistence harvest: The cumulative effect of shooting and subsistence harvest is similar to Alternatives 1 and 3 and considered insignificant.

Synergistic effects of intrusive research: See Section 4.6.2.1

Disturbance: The cumulative effect of disturbance is similar to Alternatives 1 and 3 and considered insignificant.

4.6.2.3 Alternative 3 – Re-allocation of Intrusive Research

Under this alternative, takes from non-intrusive research (e.g., aerial surveys) and essential population monitoring (e.g., pup counts) would be allowed as with the Status Quo and Proposed Action Alternatives. The only research of an intrusive nature that would be permitted in the western stock would be that directly related to conservation and management needs. All other intrusive research would be restricted to the eastern stock or a surrogate species.

Accidental mortality during research: The upper limit for accidental mortality under the status quo is 10 Steller sea lions per year, and the proposed action would increase this limit to 51 sea lions per year. If all accidental mortality was restricted to the eastern stock of Steller sea lions, proposed authorization for accidental mortality would have a negligible impact on the stock. On the other hand, if all of this authorized take was applied to the western stock, such a level of mortality would exceed negligible impact. Consequently, NMFS has established an upper limit to the average annual mortality that can be applied to the westem stock at a level that would cause insignificant impact. If accidental mortality in the western stock reached 10 sea lions (about 5% of the stock's PBR) then researchers would be required to consult with one another to identify research practices that would prevent accidental mortality in the western stock to exceed 20 sea lions (10% of te stock's PBR). With this mitigation measure in place, accidental mortality would not have a significant adverse impact on the Steller sea lion population.

Incidental Take/Entanglement: The cumulative effect of incidental take/entanglement is similar to Alternatives 1 and 2 and considered insignificant.

Direct take through subsistence harvest: The cumulative effect of shooting and subsistence harvest is similar to Alternatives 1 and 2 and considered insignificant.

Synergistic effects of intrusive research: See Section 4.6.2.1

Disturbance: The cumulative effect of disturbance is similar to Alternatives 1 and 2 and considered insignificant.

CHAPTER 5 LIST OF PREPARERS

NMFS, Office of Protected Resources

NMFS, Alaska Fisheries Science Center

NMFS, Alaska Regional Office, Protected Resources Division

CHAPTER 6 OTHER APPLICABLE LAWS

Endangered Species Act

Section 7(a)(2) of the ESA requires Federal agencies to ensure that their actions are not likely to jeopardize endangered or threatened species or harm their critical habitat. Federal agencies must consult with either FWS or NMFS depending on the species involved. In this case, the consulting agency would be the Office of Protected Resources, Endangered Species Division, NMFS. A Biological Opinion analyzing the impact of a proposed action on listed species will be issued by NMFS prior to the issuance of the Proposed Action - the issuance of scientific research permits as identified in this EA. NMFS has determined that the status quo alternative was did not pose harm to a listed species, nor did it result in jeopardy or adverse modification of critical habitat for Steller sea lions. NMFS has determined that the issuance of the five research permits as identified in the Proposed Action would not result in an increased level of take of Steller sea lions such that it would not jeopardize the continued existence of Steller sea lions.

Marine Mammal Protection Act

The issuance of the research permits identified in the proposed action are in compliance with regulations promulgated at 50 CFR 216.34. Specific components of 216.34 that are applicable to this action include the following: (1) The activity does not present any unnecessary risks to the health and welfare of marine mammals; (2) The activities will be conducted consistent with the purposes and policies set forth in the MMPA; (3) The proposed activity by itself or in combination with other activities, will not likely have a significant adverse impact on the species or stock; (4) the applicant's expertise, facilities, and resources are adequate to accomplish successfully the objectives and activities stated in the application.

The issuance of the research permits are also consistent with the requirements at 216.41(b) which include that (1) The proposed activity furthers a *bona fide* scientific or enhancement purpose; (2) the proposed research will not likely have significant adverse effects on any other component of the marine ecosystem of which the affected species or stock is a part; and the research to be done on an endangered and threatened species cannot (a) be accomplished using a species or stock that is not designated or proposed to be designated as depleted, or listed or proposed to be listed as threatened or endangered; (b) the proposed research, by itself or in combination with other activities will not likely have a long-term direct or indirect adverse impact on the species or stock; and (c) the proposed research will contribute to fulfilling a research need or objective identified in the Steller Sea Lion Recovery and contribute significantly to understanding the basic biology or ecology of the species or stock, or to identifying, evaluating, or resolving conservation problems for the species or stock.

Essential Fish Habitat (EFH)

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires NMFS to complete an EFH consultation for any action authorized, funded or undertaken that may adversely affect EFH. This issuance of these research permits will have no affect on EFH. As a result no consultation is required.

Magnuson-Stevens Act - Scientific Research Permit (SRP)

SRPs are issued for scientific research conducted by NOAA vessels or vessels under contract to NMFS in order to consider all requirements of law. The MSA exempts scientific research conducted from scientific research vessels from regulation under the Act. For the conduct of research identified in the Proposed Action, any participating vessels, as appropriate and as needed, are considered scientific research vessels and may be issued SRPs if necessary. For more information on scientific research, see the definitions and at 50 CFR 600.10 and the implementing regulations at 50 CFR 600.745.

CHAPTER 7 FINDING OF NO SIGNIFICANT IMPACT

For the reasons discussed in the Environmental Assessment on the Effects of NMFS Permitted Scientific Research Activities on Threatened and Endangered Steller Sea Lions,, the issuance of five new scientific research permits and amendments to two existing scientific research permits for takes of Steller sea lions in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.), the National Marine Fisheries Service has determined that issuance of the permits as identified in the Proposed Action, with the mitigating conditions identified in the Environmental Assessment, would not significantly affect the quality of the human environment.

The special mitigation measures for issuing these permits include the following:

(a) Duration: New permits would be limited in duration to the term of the existing permits that are being modified; thus, potential synergistic effects would be short-term;
(b) Monitoring: The research program includes long-term monitoring of branded animals to allow assessment of the sub-lethal effects of research activities;
(c) Accidental Mortality: Require researchers to consult with one another if annual accidental mortality in the western stock reach 10 sea lions to identify actions that would prevent accidental mortality from exceeding 20 sea lions per year in the western stock; and
(d) Research coordination: Use the period when research is being conducted to use existing coordination mechanisms within the Alaska Fisheries Science Center and Alaska Regional Offfice to ensure that research activities are coordinated and are consistent with high-priority recovery actions.

The primary purpose of the proposed permits is to authorize takes of threatened and endangered Steller sea lions for scientific research related to better understanding the cause(s) of the population decline in order to develop conservation measures to ensure sea lion recovery and to obtain sufficient information to make appropriate conservation decisions related to fishery management and other human activities in the range of Steller sea lions. Therefore, preparation of an Environmental Impact Statement on this action is not required by section 102(2) of the National Environmental Policy Act or its implementing regulations.

National Oceanic and Atmospheric Administration Order (NAO) 216-16 (revised May 20, 1999) provides nine criteria for determining the significance of a proposed action. These criteria are discussed below.

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

The issuance of these research permits would not jeopardize the continued existence of endangered or threatened Steller sea lions, or adversely modify their critical habitat. Rather the research is intended to obtain sufficient information to make appropriate conservation decisions related to fishery management and other human activities in the range of Steller sea lions such that the species can some day be considered recovered and removed from ESA (Sections 2.1-

2.3, 4.1-4.3)

2. Can the proposed action be reasonably expected to allow substantial damage to the ocean and coastal habitats and/or Essential Fish Habitat (EFH) as defined under the Magnuson-Stevens Act and identified in Fishery Management Plans (FMP)?

The proposed action would not be expected to allow substantial change to the ocean and coastal habitats and/or EFH as defined under the Magnuson-Stevens Fishery Conservation and Management Act and identified in the Fisheries Management Plans for the Bering Sea/Aleutian Islands or the Gulf of Alaska..

3. Can the proposed action be reasonably expected to have a substantial adverse impact on public health and safety?

The proposed action would not be expected to have a substantial adverse impact on public health or safety. The proposed action is of limited scope and duration. In addition, the action would involve the collection of biological information to be used for enhancing the recovery of endangered Steller sea lions.

4. Can the proposed action be reasonably expected to have an adverse impact on endangered or threatened species, marine mammals, or critical habitat of these species?

The proposed action can be reasonably expected not to have adverse impacts on endangered or threatened species, marine mammals, or critical habitat for these species. NMFS was concerned that the increased research activity under the Proposed Action might result in a subsequent increase in takes as defined in the ESA and MMPA such that they would exceed the categorical exclusion under NEPA (42 U.S.C. 4321 et seq.) in that 1) the proposed action involves controversial techniques; 2) the proposed activities involve unknown or highly uncertain risks; 3) and the potential for an adverse effect on an endangered and threatened species because of the significant increase in research activity in recent years, which is largely related to recent funding opportunities, warranted a further environmental review to determine whether significant environmental impacts could result from issuance of the proposed scientific research permits and permit amendments. A Finding of No Significant Impact (FONSI) was signed by the Acting Assistant Administrator for Fisheries on July 16, 1993, for the status quo alternative. The scope of the EA, however, did not include an examination of the potential cumulative effects as a result of the significant increase in scientific research activities that are currently permitted and have been proposed since 2000. Thus, NMFS believed it necessary to reassess the effects of the increased scope of the research activities on Steller sea lions. However, based on this assessment, and as indicated in Sections 2 and 4 of this Environmental Assessment, NMFS believes the activities to be conducted under the Proposed Action neither result in a significant increase in the level of take over the status quo such that an EIS is required, nor does the proposed action increase the level of takes such that the categorical exclusion made in previous determinations under NEPA should be altered (Sections 2.2, 4.1-4.6).

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

The proposed action would not be expected to result in cumulative adverse effects that could

have a substantial impact on target (Section 4.5-4.6) or nontarget species. As indicated in Section 4, any possible cumulative negative effects would be insignificant as compared to the categorically excluded status quo, and would not cause a substantial impact.

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

The proposed action would not be expected to jeopardize the sustainability of any nontarget species under any statute..

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

The proposed action would not be expected to have a substantial impact on biodiversity and ecosystem function within the affected area because the proposed action is the issuance of research permits to enhance the sustainability of endangered and threatened Steller sea lions, and their continued ability to function, as a significant component of the ecosystem. The proposed studies are also environmentally safe and use extremely selective protocols limited in scope and duration (Sections 2.1 - 2.3).

8. Are significant social or economic impacts interrelated with significant natural or physical environmental effects?

The proposed action is not expected to result in negative significant social or economic impacts interrelated with significant natural or physical environmental effects. To the contrary, the commercial fishing industry in Alaska has experienced loss of revenue due to management measures implemented as a result of the lack of the information, and the ability to make improved management decisions as a result, that these research permits are trying to obtain. Therefore, the issuance of these permits may have a positive economic impact in the foreseeable future.

9. To what degree are the effects on the quality of the human environment expected to be highly controversial?

The measures contained in this action may be controversial because some sectors of the public oppose some of the methodologies used in the proposed action. However, the most controversial of the methodologies is a minor component of the proposed action (See Chapter 4). Also, NMFS has completed biological opinions that resulted in a jeopardy determination, indicating that the groundfish fisheries in the Bering Sea and Gulf of Alaska jeopardize the continued existence of Steller sea lions through competition for a limited resource. As a result, the FY2001 congressional appropriations language identified a total of $43.2 million in the NOAA budget for the implementation of Steller sea lion protective measures. This represented a substantial increase of over $36.8 million for research and management of Steller sea lions from previous years. Therefore there is a heightened expectancy that the results from permitting research under the Proposed Action will provide information necessary such that the conservation and management of Steller sea lions might eventually result in a reduced impact on the commercial fisheries. In this regard the “Steller Sea Lion” issue, including the release of

these permits, might be considered controversial. However, the need for the research outlined in the proposed action are recognized by all public sectors as being essential. In that regard, while the issue may be controversial, the issuance of these permits is not.

Date: 21 June 2002

William T. Hogarth

Dr. William T. Hogarth
Assistant Administrator for Fisheries
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

CHAPTER 8 REFERENCES

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GLOSSARY OF TERMS AND ACRONYMS

AEB: Aleutians East Borough, the applicant for File No. 1010-1641

ASLC: Alaska SeaLife Center, the applicant for File No. 881-1668

ADF&G: Alaska Department of Fish and Game, the Holder of Permit No. 358-1564

Bona fide scientific research: Defined as scientific research conducted by qualified personnel, the results of which: (1) likely would be accepted for publication in a refereed scientific journal; (2) are likely to contribute to the basic knowledge of marine mammal biology or ecology (this includes, e.g., marine mammal parts in a properly curated, professionally accredited scientific collection); or (3) are likely to identify, evaluate, or resolve conservation problems. [50 CFR 216.3]

ESA: Endangered Species Act of 1973 (16 U.S.C. 1532-1544). This Act requires federal consultation before any major federal action impacting threatened or endangered species is undertaken, outlaws the taking of such species, and provides for acquisition of habitat to protect threatened and endangered species.

Harass: Under the 1994 Amendments to the MMPA, harassment is statutorily defined as "Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)."

Harm:

Humane: The method of taking, import, export, or other activity that involves the least possible degree of pain and suffering practicable to the animal involved. [50 CFR 216.3]

Intrusive research: Defined as any procedure conducted for *bona fide* scientific research, that involves: a break in or cutting of the skin or equivalent, insertion of an instrument or material into an orifice, introduction of a substance or object into the animal's immediate environment that is likely either to be ingested or to contact and directly affect animal tissues (i.e., chemical substances), or a stimulus directed at animals that may involve a risk to health or welfare or that may have an impact on normal function or behavior (e.g., audio broadcasts directed at animals that may affect behavior, or attachment of instruments to an animal using suction-cups or by penetration of the animal's skin). [50 CFR 216.3]

MMC: Marine Mammal Commission. The MMPA established the MMC, which is composed of three members appointed by the President for three-year terms. The MMC was created to provide scientific advice and recommendations to the Secretaries of Commerce and the Interior, who share responsibilities under the Marine Mammal Protection Act. The MMC was required to establish a Committee of Scientific Advisors with which to consult on studies, recommendations, research programs, and permit applications for scientific research. The MMC has access to all studies and data compiled by federal agencies on marine mammals and must coordinate its efforts to avoid duplication of research.

MMPA: Marine Mammal Protection Act (16 U.S.C. 1361-1421h). This law, which became

effective in 1972, prohibits taking and importation of marine mammals without a permit. The Act established a federal responsibility to conserve marine mammals, with management authority vested in the Department of Commerce for cetaceans and pinnipeds other than walrus. The Department of the Interior is responsible for all other marine mammals, including sea otters, walrus, polar bear, dugong, and manatee.

NMML: National Marine Mammal Laboratory, the Holder of Permit No. 782-1532

ODFW: Oregon Department of Fish and Wildlife, the applicant for File No. 434-1669

Plan: Final Recovery Plan for Steller Sea Lions

Service: National Marine Fisheries Service, Office of Protected Resources

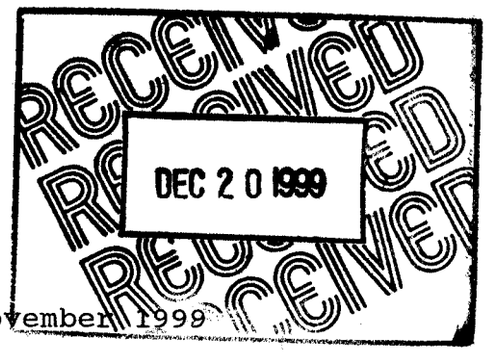
Take: Defined under the **MMPA** as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect" and under the **ESA** as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct".

APPENDICES

APPENDIX A: LETTER FROM THE MARINE MAMMAL COMMISSION
APPENDIX B: SCHEDULING MATRIX FOR 2002 RESEARCH UNDER ALTERNATIVE 2 – PROPOSED ACTION
(TABLE PROVIDED BY HOLDER OF PERMIT NO. 782-1532)

MARINE MAMMAL COMMISSION
4340 EAST-WEST HIGHWAY, ROOM 905
BETHESDA, MD 20814



10 November 1999

The Honorable Penelope D. Dalton
Director
National Marine Fisheries Service, NOAA
1315 East-West Highway
Silver Spring, MD 20910

Re: Permit Application No. 782-1532
(National Marine Mammal Laboratory,
Alaska Fisheries Science Center,
Thomas R. Loughlin, Ph.D.)

Dear Ms. Dalton:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit application with reference to the goals, policies, and requirements of the Marine Mammal Protection Act.

The applicant is requesting authorization to take Steller sea lions (*Eumetopias jubatus*) during research activities involving aerial surveys, branding, biopsy sampling for fatty acid analysis of blubber, tissue sampling, collecting blood, attaching satellite/VHF transmitters and Allflex tags, and conducting scat collections. The applicant also is requesting authorization to harass northern fur seals (*Callorhinus ursinus*) and harbor seals (*Phoca vitulina*) incidental to aerial and on-land surveys of Steller sea lions. The applicant proposes to conduct the activities in Southeast Alaska, the Gulf of Alaska and the Aleutian Islands.

The Marine Mammal Commission recommends approval of the requested authorization provided that:

-- activities be suspended, pending review and authorization to proceed, if mortalities or injuries in excess of those authorized occur; and

-- the Service ensure that activities to be conducted under this permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals.

The Commission believes that the activities for which it has recommended approval are consistent with the purposes and

policies of the Marine Mammal Protection Act.

Please contact me if you have any questions concerning this recommendation.

Sincerely,

John R. Twiss, Jr.
Executive Director

cc: Ms. Ann D. Terbush

MARINE MAMMAL COMMISSION
4340 EAST-WEST HIGHWAY, ROOM 905
BETHESDA, MD 20814

28 February 2000

The Honorable Penelope D. Dalton
Director
National Marine Fisheries Service, NOAA
1315 East-West Highway
Silver Spring, MD 20910

Re: Permit Application No. 358-1564
Alaska Department of Fish and Game
(Wayne L. Regelin, Ph.D.)

Dear Ms. Dalton:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit application with reference to the goals, policies, and requirements of the Marine Mammal Protection Act.

The applicant is requesting authorization to capture, immobilize, sample, tag, brand, release, and conduct aerial and land-based surveys of Steller sea lions in Alaska and British Columbia.

The Marine Mammal Commission recommends approval of the requested authorization provided that:

-- the Service consult the applicant and, as appropriate, provide authority for accidentally killing or injuring a limited number of animals (e.g., one or two) in the course of the activities and/or include in the permit a requirement that the activities be suspended, pending review, if more than the authorized number of animals die or are injured; and

-- the Service ensure that activities to be conducted under this permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals.

The Commission believes that the activities for which it has recommended approval are consistent with the purposes and policies of the Marine Mammal Protection Act. Please contact me if you have any questions concerning this recommendation.

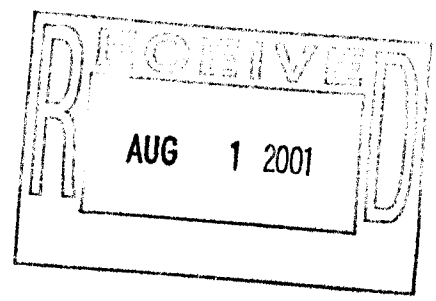
Sincerely,

John R. Twiss, Jr.
Executive Director

cc: Ms. Ann D. Terbush

MARINE MAMMAL COMMISSION
4340 EAST-WEST HIGHWAY, ROOM 905
BETHESDA, MD 20814

27 July 2001



Ms. Ann D. Terbush
Chief, Permits Division
Office of Protected Resources
National Marine Fisheries Service, NOAA
1315 East-West Highway
Silver Spring, MD 20910

Re: Requests for Amendment of Permit Nos. 782-1532 (National Marine Mammal Laboratory, National Marine Fisheries Service) and 358-1564 (Alaska Department of Fish and Game)

Dear Ms. Terbush:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced requests for permit amendments with regard to the goals, policies, and requirements of the Marine Mammal Protection Act.

Permit No. 782-1532 authorizes the permittee to (1) capture, anesthesize, sample, tag, brand, release, and conduct aerial and vessel surveys of Steller sea lions of both sexes and all ages over a five-year period (through 31 December 2004) in Alaska waters; and (2) harass northern fur seals and harbor seals incidental to research on Steller sea lions. Importation of blood and tissue samples collected from Steller sea lions outside United States territorial waters is also authorized.

The permittee is requesting that Permit No. 782-1532 be amended to authorize the harassment of additional numbers of Steller sea lions during scat collection; and conduct of additional procedures (*i.e.*, gas anesthesia, branding, administration of Evans blue dye and deuterated water, muscle biopsies, noninvasive bioelectric impedance analysis, increasing blood sample volume, tooth extractions, vibrissae sampling, and instrumentation with newly available Underwater Timed Picture Recorders) on animals currently authorized to be taken under the permit.

Permit No. 358-1564 authorizes the permittee to capture, anesthesize, sample, tag, brand, release, and conduct aerial and land-based surveys of Steller sea lions of both sexes and all ages over a five-year period (through 30 June 2005) in Alaska waters. Importation of blood and tissue samples collected from Steller sea lions outside United States territorial waters is also authorized.

PHONE: (301) 504-0087
FAX: (301) 504-0099

The permittee is requesting that Permit No. 35801564 be amended to authorize the administration of Evans blue dye to, the collection of additional blood and tissue samples from, the attachment of instruments to, and the conduct of additional recaptures of Steller sea lions already authorized to be captured and handled, and the conduct of additional aerial surveys of the population.

The Commission has no objection to the permittee's research authorized under the subject permits, nor the Service amending the permits to provide for the conduct of new or additional activities of a benign nature involving minimal risk of cumulative impacts on individual animals or populations. The Commission realizes an essential need for research on the Steller sea lion to determine the nature of its ongoing decline.

However, as discussed below, we are concerned that the proposed multi-year activities could have adverse effects on both individual Steller seal lions and sea lion populations. Due to increased funding, many projects are being planned and a number of those require invasive procedures on animals as well as associated disturbance of rookeries. The potential adverse effects of research on Steller sea lions have long been a matter of concern, as discussed in the recovery plan for this species. It is conceivable that the extensive research described in the existing permits, together with the additional research requested in the proposed amendments, and other research, may become a significant factor affecting the status of the species.

It is not clear that all of the planned research is essential, and that the potential merits outweigh the cumulative or combined risks. Some of the activities described have the potential to adversely affect individual animals, and all of the activities combined may also have the potential to affect populations of animals. Rookery and haulout populations are low and may be particularly vulnerable to disturbance. To ensure that such adverse effects do not occur and become a significant factor in the decline, the Service should develop a monitoring program to assess the effects of research that may affect individuals or populations.

In addition, research should be carried out under the guidance provided by the recovery plan and the recovery team. The plan is currently outdated and, to our knowledge, the recovery team has not been helping to coordinate the overall research effort. The Commission believes that the recovery plan should be updated and the recovery team should be more effectively incorporated into research planning. Among other things, the updated plan should describe for all participating management and research agencies and the public (1) the overall research direction, (2) the parties responsible for coordinating and conducting the resulting research, (3) the mechanisms for monitoring the adverse effects of such research, (4) a realistic research budget and schedule, and (5) an analysis of the benefits and risks associated with each major research activity. An updated Recovery Plan is necessary to ensure that the research effort

underway is carried out effectively without adding unnecessary adverse effects to what is already a very difficult and complex problem.

Please contact me if you have any questions concerning this recommendation.

Sincerely,

Robert H. Mattlin, Ph.D.
Executive Director

MARINE MAMMAL COMMISSION
4340 EAST-WEST HIGHWAY, ROOM 905
BETHESDA, MD 20814

5 September 2001

Ms. Ann D. Terbush
Chief, Permits Division
Office of Protected Resources
National Marine Fisheries Service, NOAA
1315 East-West Highway
Silver Spring, MD 20910

NOV 14 2001

Re: Permit Application No. 1010-1641 (Aleutians East Borough)

Dear Ms. Terbush:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit application with regard to the goals, policies, and requirements of the Marine Mammal Protection Act.

The applicant is requesting authorization to take up to 7,000 Steller sea lions by harassment during aerial surveys, vessel-based behavioral observations, and scat collections at rookeries and haul outs along the Alaska Peninsula and Eastern Aleutian Islands, over a three-year period. The Commission recommends approval of the requested permit, provided that the Service ensure that activities to be conducted under the permit and those of other permit holders who might be carrying out research on the same species in the same areas are coordinated and, as possible, data and samples shared, to avoid unnecessarily duplicative research and unnecessary disturbance of animals. In particular, the Service should be satisfied that the proposed research, in combination with other multi-year research activities, will not result in adverse cumulative effects on individual Steller sea lions and/or sea lion populations. The Commission's specific concerns and recommendations in this regard are provided in its letter to the Service of 27 July 2001, commenting on the amendment requests from the National Marine Mammal Laboratory (Amendment of Permit No. 782-1532) and the Alaska Department of Fish and Game (Amendment of Permit No. 358-1564)."

The Commission believes that the activities for which it has recommended approval are consistent with the purposes and policies of the Marine Mammal Protection Act.

Please contact me if you have any questions concerning this recommendation.

Sincerely,

Robert H. Mattlin, Ph.D.
Executive Director

PHONE: (301) 504-0087
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APPENDIX B: SCHEDULING MATRIX FOR 2002 RESEARCH UNDER ALTERNATIVE 2 – PROPOSED ACTION

(TABLE PROVIDED BY HOLDER OF PERMIT NO. 782-1532)

	DATES	ORG	PURPOSE
ALEUTIAN ISLANDS			
KISKA TO DUTCH HARBOR	APR	ADFG	JUVENILE CAPTURE, BRAND RESIGHTING
ATTU TO DUTCH HARBOR	JUN 10-20	NMML	AERIAL SURVEY
ATTU TO DUTCH HARBOR	JUN-JUL	NMML	PUP TAGGING/COUNT CRUISES
EASTERN ALEUTIAN ISLANDS TO CENTRAL GULF OF ALASKA			
DUTCH HARBOR TO PWS	JUN 10-20	NMML	AERIAL SURVEY
DUTCH HARBOR TO SEWARD	JUN-JUL	NMML	PUP BRANDING/TAGGING/COUNT CRUISES
EASTERN ALEUTIAN ISLANDS	MID MAY	NMML	BRAND RESIGHT CRUISES
	JUN 1-AUG		FIELD CAMPS FOR BEHAVIORAL OBSERVATIONS/BRAND
UGAMAK ISLAND	10	NMML	RESIGHTS
WESTERN GULF OF ALASKA	MAR	AEB	AERIAL SURVEY
WESTERN GULF OF ALASKA	MAR	AEB	SCAT COLLECTIONS, VESSEL SURVEYS, BRAND RESIGHTING
WESTERN GULF OF ALASKA	JUN	AEB	AERIAL SURVEY, PRIOR TO AND AFTER NMML SURVEY
WESTERN GULF OF ALASKA	SEP	AEB	AERIAL SURVEY
WESTERN GULF OF ALASKA	SEP	AEB	SCAT COLLECTIONS, VESSEL SURVEYS, BRAND RESIGHTING
WESTERN GULF OF ALASKA	DEC	AEB	AERIAL SURVEY
WESTERN GULF OF ALASKA	DEC	AEB	SCAT COLLECTIONS, VESSEL SURVEYS, BRAND RESIGHTING
KODIAK ISLAND	JAN	UAF	AERIAL SURVEY
KODIAK ISLAND	FEB	UAF	AERIAL SURVEY
KODIAK ISLAND	1ST QUARTER	UAF	SCAT COLLECTIONS
KODIAK ISLAND	MAR	UAF	AERIAL SURVEY
KODIAK ISLAND	APR	UAF	AERIAL SURVEY
KODIAK ISLAND	MAY	UAF	AERIAL SURVEY
KODIAK ISLAND	MID MAY	NMML	BRAND RESIGHT CRUISES
	JUN 1-AUG		FIELD CAMPS FOR BEHAVIORAL OBSERVATIONS/BRAND
MARMOT ISLAND	10	NMML	RESIGHTS
KODIAK ISLAND	JUL	UAF	AERIAL SURVEY
KODIAK ISLAND	2ND QUARTER	UAF	SCAT COLLECTIONS
KODIAK ISLAND	JUL-AUG	NMML	JUVENILE CAPTURE, BRAND RESIGHTING
KODIAK ISLAND	AUG	UAF	AERIAL SURVEY
KODIAK ISLAND	SEP	UAF	AERIAL SURVEY
KODIAK ISLAND	3RD QUARTER	UAF	SCAT COLLECTIONS
KODIAK ISLAND	OCT	UAF	AERIAL SURVEY
KODIAK ISLAND	NOV	UAF	AERIAL SURVEY
KODIAK ISLAND	4TH QUARTER	UAF	SCAT COLLECTIONS
KODIAK ISLAND	DEC	UAF	AERIAL SURVEY
KRENITZEN ISLANDS AND KODIAK	FEB-MAR	NMML	JUVENILE CAPTURE, BRAND RESIGHTING
KRENITZEN ISLANDS AND KODIAK	NOV	NMML	JUVENILE CAPTURE, BRAND RESIGHTING

	Dates	Org	Purpose
Prince William Sound			
Prince William Sound	May	ADFG	Juvenile capture, brand resighting
Prince William Sound	Mid May	NMML	Brand resight cruises
Prince William Sound	Jun	NMML	Aerial survey
	Jun 1-Aug		Field camps for behavioral observations/brand
Fish Island	10	NMML	resights
Prince William Sound	Sept	ADFG	Juvenile capture, brand resighting
AI/GOA/PWS			
Two sites	Mar-May	UW	Van Blaricom biopsy darting
Two sites	Jun-Jul	UW	Van Blaricom biopsy darting
Two sites	Nov-Feb	UW	Van Blaricom biopsy darting
Southeast Alaska			
Northern southeast	Jan	UAS	Aerial survey
Northern southeast	Feb	UAS	Aerial survey
Northern southeast	Mar	UAS	Aerial survey
Two sites	Mar-May	UW	Van Blaricom biopsy darting
Northern southeast	Apr	UAS	Aerial survey
Northern southeast	May	UAS	Aerial survey
Lowrie Island	May-Oct	ADFG	Field camps for behavioral observations/brand resights
White Sisters	May-Oct	ADFG	Field camps for behavioral observations/brand resights
Southeast Alaska	Jun-Jul	ADFG	Aerial Survey
Two sites	Jun-Jul	UW	Van Blaricom biopsy darting
White Sisters, Lowrie Island	Jun-Jul	ADFG	Pup branding/tagging/count cruises
Southeast Alaska	Jun-Jul	ADFG	Brand resight cruises
Southeast Alaska	Jul	ADFG	Juvenile capture
Southeast Alaska	Aug	ADFG	Brand resight cruises
Northern southeast	Aug	UAS	Aerial survey
Northern southeast	Sep	UAS	Aerial survey
Northern southeast	Oct	UAS	Aerial survey
Northern southeast	Nov	UAS	Aerial survey
Northern southeast	Dec	UAS	Aerial survey
Two sites	Nov-Feb	UW	Van Blaricom biopsy darting

ADFG – Alaska Department of Fish and Game (Permit No. 358-1564)
NMML – National Marine Mammal Laboratory (Permit No. 782-1532)
AEB – Aleutians East Borough (File No. 1010-1641)
UAF – University of Alaska Fairbanks
UW – University of Washington (VanBlaricom: File No. 1016-1651)
UAS – University of Alaska Southeast Appendix A: Scheduling Matrix for 2002 Research under Alternative 2 – Proposed Action (Table provided by holder of Permit No. 782-1532)

	Dates	Org	Purpose
Aleutian Islands			
Kiska to Dutch Harbor	Apr	ADFG	Juvenile capture, brand resighting
Attu to Dutch Harbor	Jun 10-20	NMML	Aerial survey
Attu to Dutch Harbor	Jun-Jul	NMML	Pup tagging/count cruises
Eastern Aleutian Islands to Central Gulf of Alaska			

Dutch Harbor to PWS	Jun 10-20	NMML	Aerial survey
Dutch Harbor to Seward	Jun-Jul	NMML	Pup branding/tagging/count cruises
Eastern Aleutian Islands	Mid May	NMML	Brand resight cruises
Ugamak Island	Jun 1-Aug 10	NMML	Field camps for behavioral observations/brand resights
Western Gulf of Alaska	Mar	AEB	Aerial survey
Western Gulf of Alaska	Mar	AEB	Scat collections, vessel surveys, brand resighting
Western Gulf of Alaska	Jun	AEB	Aerial survey, prior to and after NMML survey
Western Gulf of Alaska	Sep	AEB	Aerial survey
Western Gulf of Alaska	Sep	AEB	Scat collections, vessel surveys, brand resighting
Western Gulf of Alaska	Dec	AEB	Aerial survey
Western Gulf of Alaska	Dec	AEB	Scat collections, vessel surveys, brand resighting
Kodiak Island	Jan	UAF	Aerial survey
Kodiak Island	Feb	UAF	Aerial survey
Kodiak Island	1st quarter	UAF	Scat collections
Kodiak Island	Mar	UAF	Aerial survey
Kodiak Island	Apr	UAF	Aerial survey
Kodiak Island	May	UAF	Aerial survey
Kodiak Island	Mid May	NMML	Brand resight cruises
Marmot Island	Jun 1-Aug 10	NMML	Field camps for behavioral observations/brand resights
Kodiak Island	Jul	UAF	Aerial survey
Kodiak Island	2nd quarter	UAF	Scat collections
Kodiak Island	Jul-Aug	NMML	Juvenile capture, brand resighting
Kodiak Island	Aug	UAF	Aerial survey
Kodiak Island	Sep	UAF	Aerial survey
Kodiak Island	3rd quarter	UAF	Scat collections
Kodiak Island	Oct	UAF	Aerial survey
Kodiak Island	Nov	UAF	Aerial survey
Kodiak Island	4th quarter	UAF	Scat collections
Kodiak Island	Dec	UAF	Aerial survey
Krenitzen Islands and Kodiak	Feb-Mar	NMML	Juvenile capture, brand resighting
Krenitzen Islands and Kodiak	Nov	NMML	Juvenile capture, brand resighting

[1] See the notice of availability of funds for the Steller Sea Lion Research Initiative, 66 FR 15842, March 21, 2001; see also FY2001 Consolidated Appropriations Act, Pub. L. No. 106-554, Div. A, Chap. 2, Sections 206 and 209, 114 Stat. 2763, 2763A-175 through 2763A-179 (2000).

[2] Memorandum for the Record from R.L. Merrick, dated 10 March 1993, RE: Steller sea lion mortalities during field work, February 1993. Permit No. 771(64)

[*] Note that the 2000 Stock Assessment Report estimates a total minimum population of 52,602 Steller sea lions in Alaska (13,087 pups and 39,515 non-pups) and 68,434 range-wide, which includes CA/WA/OR and BC (15,364 pups and 53,070 non-pups).

[6] Individual sea lions may be harassed more than once: the frequency of harassment will depend on the frequency of the activities.

[*] Note that the 2001 Stock Assessment Report estimates a total minimum population of 49,773 Steller sea lions in Alaska (13,607 pups and 36,166 non-pups) and 65,605 range-wide, which includes CA/WA/OR and BC. The minimum estimated population for the eastern stock, exclusive of BC, is 21,728; the western stock is 34,600.

[6] Individual animals may be harassed more than once: the frequency of harassment will depend on the frequency of the activities.

[*] Note that the 2000 Stock Assessment Report estimates a total minimum population of 52,602 Steller sea lions in Alaska (13,087 pups and 39,515 non-pups) and 68,434 range-wide, which includes CA/WA/OR and BC (15,364 pups and 53,070 non-pups).

[6] Individual animals may be harassed more than once: the frequency of harassment will depend on the frequency of the activities.