I. APPLICATION FOR A PERMIT FOR SCIENTIFIC RESEARCH UNDER THE MARINE MAMMAL PROTECTION ACT AND FOR SCIENTIFIC PURPOSES UNDER THE ENDANGERED SPECIES ACT

II. DATE OF APPLICATION: 1 December 2006

III. APPLICANT AND PERSONNEL

A. Contact Information for Applicant and Personnel

Applicants

Dr. John Bengtson (primary contact)
Director
National Marine Mammal Laboratory
NOAA Fisheries Alaska Fisheries Science Center
7600 Sand Point Way, NE
Seattle, WA 98115
206-526-4016, fax: 206-526-6615
John.Bengtson@noaa.gov

Principal Investigator

Dr. Thomas Gelatt (supervised by applicant)
National Marine Mammal Laboratory
NOAA Fisheries Alaska Fisheries Science Center
7600 Sand Point Way, NE
Seattle, WA 98115
206-526-4040, fax: 206-526-6615
Tom.Gelatt@noaa.gov

Co-Investigators

Dr. Vladimir Burkanov
Dr. Robert DeLong
Dr. Brian Fadely
Lowell Fritz
Pat Gearin
Merrill Gosho
Steve Jeffries
Wayne Perryman
Dr. Lorrie Rea
Dr. Rolf Ream
Dr. Ward Testa
James Thomason

Other Personnel

Kate Call, Robert Caruso, Kathryn Chumbley, Dr. Bobette Dickerson, Sarah Finneseth, Carolyn Gudmundson, Dr. Devin Johnson, Erin Kunisch, Michelle Lander, Dr. Mary-

Anne Lea, Elizabeth Sinclair, Jeremy Sterling, Charles Stinchcomb, Rod Towell, and Tonya Zeppelin

Veterinary Personnel
Dr. Kathy Burek, Dr. Frances Gulland, Dr. Bruce Heath, and Dr. Stephanie Norman

B. Qualifications and Experience

Enclosed, find curriculum vitae (Appendix II) detailing relevant experience and publications for the designated PI and CIs. Dr. Thomas Gelatt, Dr. Vladimir Burkanov, Dr. Robert DeLong, Dr. Brian Fadely, Lowell Fritz, Pat Gearin, Merrill Gosho, Dr. Lorrie Rea, Dr. Rolf Ream, Dr. Ward Testa, and James Thomason will be responsible for overseeing activities and additional personnel. The PI and CIs will also be directly involved in conducting or delegating all activities listed herein.

Co-investigators Wayne Perryman and Steve Jeffries will be responsible for conducting aerial surveys.

All veterinary personnel will assist with administration of anesthesia and Activities 3, 4, and 6 listed below.

IV. PROPOSAL

A. Summary

Research during 2007-2011 will measure Steller sea lion (*Eumetopias jubatus*) population status, vital rates, foraging behavior, and condition in North Pacific Ocean areas pursuant to fulfilling NMFS legal requirements under the MMPA and ESA. Annually in the western stock, up to 73,000 sea lions may be exposed to aerial surveys, 27,000 to rookery-based activities, 23,000 to incidental activities. Up to 1,280 could be captured, with up to 630 having blood, skin and swab samples collected, 580 hot-branded, and up to 180 blubber and lesion biopsied, tooth and vibrissa removed, be ultrasonically imaged, and subject to stomach intubation or enema. Instruments may be attached on up to 280, and 880 may receive a non-permanent tag or mark. Annually in the eastern stock, up to 26,000 may be exposed to aerial surveys, and 5,000 to incidental activities. Up to 12 could be captured, and have blood, skin, blubber, fecal, and culture samples collected, a tooth and vibrissa removed, hot-brand, tag or non-permanent mark applied, and have an instrument attached. Harbor seals (5,000) and northern fur seals (15,000) may be disturbed incidental to activities in Alaska. California sea lions (3,000) and harbor seals (200) may be incidentally disturbed along the U.S. west coast.

B. Introduction

1. Species

a. Steller sea lion (*Eumetopias jubatus*) of western and eastern stocks will be directly and incidentally taken by the requested activities throughout their range.

b. Non-target species in Alaska may include incidental takes of northern fur seals (*Callorhinus ursinus*) at Bogoslof Island and possibly Pacific harbor seals (*Phoca vitulina*) of the Bering Sea, Gulf of Alaska, and Southeast Alaska stocks. Non-target species in Washington, Oregon, and California may include incidental takes of harbor seals (Washington, Oregon, and California stocks) and California sea lions (*Zalophus californianus*).

c. Status of Affected Stocks:

Steller sea lions were listed as "threatened" range-wide under the U.S. Endangered Species Act (ESA) on 26 November 1990 (55 Federal Register 49204). The population is comprised of two recognized management stocks (eastern and western), separated at 144° W longitude (Loughlin 1997). The western stock was listed as "endangered" under the ESA on 4 May 1997 and the eastern stock remains classified as "threatened" (62 FR 24345). Steller sea lions are listed as "depleted" under the MMPA. Both stocks are thus classified as strategic. Detailed reviews of Steller sea lion population status can be found in biological consultations for groundfish fisheries (NMFS 2001), supplemental environmental impact statements (NMFS 2002), and by the National Research Council (NRC 2003). Annual updates of stock status are also presented in the Alaska Marine Mammal Stock Assessment Reports (Angliss and Outlaw 2005).

Northern fur seals (Pribilof Islands and Eastern Pacific) are classified as a strategic stock and listed as "depleted" under the MMPA.

Harbor seal stocks (Bering Sea, Gulf of Alaska, Southeast Alaska, Washington, Oregon, and California stocks) are not classified as strategic stocks, nor are they listed as "depleted" under the MMPA, or as "threatened" or "endangered" under the ESA.

California sea lions are not classified as strategic stocks, nor are they listed as "depleted" under the MMPA, or as "threatened" or "endangered" under the ESA.

2. **Background/Literature Review**

a. Current Knowledge of the Problem under Investigation

The Steller sea lion ranges around the North Pacific Ocean rim from the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Gulf of Alaska, and south to Año Nuevo Island, central California. Steller sea lion populations of the western stock in the U.S. portion of their range declined by up to 87 % during the late 1960s through the 1980s (Loughlin et al. 1992). This decline was first detected in the eastern Aleutian Island area in the mid-1970s (Braham et al. 1980), before spreading eastward to the Kodiak Island area during the late 1970s and early 1980s, then westward throughout the Aleutian Islands into the mid-1980s (Merrick et al. 1987). During 1990-2000, counts at trend sites indicated declines of 40% throughout the western stock, an average of about 5% per year (Sease et al. 2001). However, index counts of Steller sea lions have increased since 2000. Though regional differences in pup and non-pup trends were found, recent counts completed in 2004 indicated an increase (11-12%) of non-pups since 2000, and this was the first increase observed across 3 consecutive surveys (2000, 2002,

and 2004) since the late 1970s (Sease and Gudmundson 2002, Fritz and Stinchcomb 2005). A total of 29,037 non-pups were counted at 262 surveyed sites during the 2004 aerial surveys, and a composite pup count from 2001 to 2004 resulted in 9,476 pups at 50 sites, indicating a minimum western stock population of nearly 38,513 sea lions in U.S. waters at that time (Angliss and Outlaw 2005, Fritz and Stinchcomb 2005). This underestimates the actual population because an unknown number of animals were at sea during surveys. The 2006 aerial survey did not result in a complete assessment of numbers at trend sites across the Alaskan range of Steller sea lions because surveys were delayed due to a court-ordered cessation (26 May 2006) of all Steller sea lion research authorized by permits issued by NMFS, and 2) inclement weather. However, nearly complete surveys in some areas indicated the population of non-pup Steller sea lions in the eastern Gulf of Alaska, western Gulf of Alaska, and eastern Aleutian Islands may have stabilized, whereas counts at trend sites in the western Aleutian Islands decreased by 19% from 2004, suggesting the decline is still occurring in this area.

The eastern stock of Steller sea lions encompasses southeast Alaska, British Columbia, Oregon, and California. Overall, the stock has shown an increasing trend during the past 20 years, with most of the increase in Alaska and British Columbia. The southeast Alaska sea lion population was estimated to have increased at 5.9% per year between 1979 and 1997, but was likely stable between 1989 and 1996 (Calkins et al. 1999). Counts in 2000 indicated an annual increase of 1.9% during 1990-2000 (Sease et al. 2001). The most recent aerial survey of southeast Alaska in 2002 resulted in 9,951 non-pups, an underestimate of the actual population since an unknown number of animals were at sea during surveys. The total population of the eastern stock of Steller sea lions is estimated to be 44,996 individuals (Angliss and Outlaw 2005).

Many factors have been implicated as causes of Steller sea lion decline (overfishing, environmental change, disease, predation), but juvenile mortality resulting from nutritional stress due to competition with fisheries was one of the leading hypotheses for explaining the decline of the western stock. For this reason, several management restrictions were implemented in attempts to reduce or eliminate takes of Steller sea lions or to alleviate adverse impacts of fisheries. Following the ESA rule listing Steller sea lions as “threatened” in 1990, no-entry zones extending 3 nm seaward and 800 m landward were established around all major rookeries west of 144°W longitude (Fritz and Ferrero 1998). During 1993, specific areas designated as critical habitat and special foraging areas were developed with the intention to disperse trawl fisheries in time and space, excluding them from some important sea lion habitats, and minimizing the likelihood that groundfish fisheries would create localized depletions of sea lion prey (Fritz et al. 1995, Fritz and Ferrero 1998). Throughout the years, management measures to mitigate potential adverse fishing effects have also included a series of trawl closure areas and catch quotas (NRC 2003). Additional management measures implemented for groundfish fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska during 2000 have further attempted to reduce potential effects of commercial fisheries.

The listing of Steller sea lions under the ESA also resulted in the Steller Sea Lion Recovery Plan to promote the conservation of the species. During 1997-1999, the Steller

Sea Lion Recovery Team conducted peer-reviewed workshops to review research conducted to date in pursuit of the Recovery Plan, and to identify necessary changes in research program emphasis in four subject areas: land-based observational studies of behavior; telemetry studies; physiological studies; and feeding ecology studies (NMFS 1997a,b; 1999a,b). Recommendations for further research studies made by these review panels included: juvenile survival studies, in particular comparing declining versus stable areas; an extensive branding program (with evaluation of costs of associated disturbance and mortality) combined with satellite or other telemetry studies; more telemetry of weaned pups and yearlings; studies to determine lactation physiology and nursing behavior; and to make every effort to evaluate seasonal body condition of Steller sea lions throughout their range and at different times in their life history.

Additional recommendations for research directions were made in the Biological Opinion authorizing Bering Sea/Aleutian Island and Gulf of Alaska groundfish fisheries (NMFS 2000). In the Conservation Recommendations, NMFS recommended more research be conducted on the extent to which Steller sea lions utilize foraging habitat outside current critical habitat limits, and to expand programs to assess the effectiveness of reasonable and prudent measures presented in the Opinion, and to evaluate 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.

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. Despite this intrusiveness, the Plan recommends including such studies in conjunction with other activities, evaluating the potential benefits on a case-by-case basis using the best current information at the time of the permit application. The Plan encourages use of mitigation measures to minimize the impacts of research and recommends development of alternative, less intrusive, techniques for collecting data.

A new draft Recovery Plan issued in May 2006 (NMFS 2006) recommends the design and implementation of an adaptive management program to evaluate fishery conservation measures, and continuation of population monitoring and research on threats potentially impeding Steller sea lion recovery. A detailed outline of the types of research to assess population trends, habitat use, and evaluation of potential threats is presented in the draft Plan (NMFS 2006). The studies described in this permit application are directly pursuant to addressing those research goals.

In a review of fishery management actions proposed in the NMFS (2000) groundfish Biological Opinion by the Alaska Steller Sea Lion Restoration Team, the Team also presented research recommendations designed to obtain a greater understanding of sea lion biological and ecological processes, and to determine the probability of competition for food between sea lions and fisheries (Kruse et al., 2001). The team recommended that particular research emphasis be placed on adult females and subadults of both sexes, especially pre-weaning and during the first 1-2 years post-weaning. Among other recommendations, they specifically recommended studies to: estimate current age-

specific survival and reproduction rates; explore the potential impact of disease and contaminants on sea lion populations; continue genetic analyses to further determine population structure, determine the seasonal (breeding vs. non-breeding) use patterns of rookeries and haulouts; continue to develop additional indices of nutritional status; determine that sea lion body condition responds to changes in food availability (quantity and quality), and subsequent relationships with vital population parameters; and to develop techniques to identify when weaning occurs. In a separate review of this Opinion prepared for the North Pacific Fishery Management Council, Bowen et al. (2001) recommended priority be given to research on monitoring trends in population size and distribution, estimation of vital rates, understanding spatial and temporal scales of foraging, and estimating diet.

NRC (2003) reviewed available data in evaluating multiple hypotheses for the population decline, and provided recommendations for continued research and monitoring. They recommended directing research toward measuring vital rates and response variables most indicative of Steller sea lion population status. This included monitoring population trends utilizing aerial surveys of juveniles and adults combined with direct pup counts at rookeries; determination of vital rates (fecundity, age at first reproduction, age distribution, juvenile survival, adult survival, and growth rates) through increased branding and resighting efforts; and document at-sea distribution and foraging activity through use of telemetry devices including stomach telemetry tags.

Many of the requested activities represent the continuation of on-going research and monitoring programs, which have been conducted under previous permits. These activities are necessary to acquire a standardized, consistent, time series of data for understanding long-term population variability and detecting changes in population status and health. These data are essential for stock assessment reports, making required potential biological removal (PBR) and optimum sustainable population (OSP) determinations for all species under the MMPA, as well as for development of the Steller sea lion recovery plan required by the ESA. Some of the proposed activities also build upon some of our past research in an effort to obtain greater sample sizes. For example, substantial hematology and telemetry databases have been established over the years, but additional data are still necessary to have a clear understanding of regional, seasonal, and age class differences. Furthermore, paucity of data for older animals (a considerable portion of the population) has precluded an understanding of their health and habitat use. It is also necessary to continue monitoring the food habits of sea lions in the event their diet changes relative to changes in fishery regulations and environmental conditions. The combined effort of all activities will contribute to future implementation of management actions and will be used to assess the efficacy of previous/current management actions. Although recent population increase and stability in some areas may be a result of some fisheries management measures (Hennen 2006), it is still premature to conclude that the population is effectively recovering and conservation benefits remain uncertain. Considerable uncertainty remains regarding the likelihood of fisheries, environmental variability, predation, incidental take by fisheries, and toxic substances being potential threats to recovery of the western DPS (NMFS 2006). This uncertainty can only be alleviated with the acquisition of additional data.

b. References provided at end of application

3. Hypothesis/Objectives and Justification

a. Both top-down and bottom-up mechanisms have been suggested to regulate Steller sea lion populations in eight plausible hypotheses proposed to explain declines (NRC 2003, NMFS 2006). These include nutritional limitation arising from changes in prey availability or quality because of climate change or commercial fisheries, predation by killer whales (*Orcinus orca*) or sharks, disease, pollution, and anthropogenic effects such as harvest or fisheries entanglement. Unfortunately, there are insufficient data to conclusively identify the causes of decline (NRC 2003), which were likely different depending on time and location (Loughlin and York 2000) and probably a combination of multiple factors. Proximate causes of the decline seemed to be increased juvenile mortality (Holmes and York 2003), but a continuing decline in natality rates has become more limiting to population recovery as juvenile survival has apparently improved since 2000 (Holmes and York 2003, Holmes et al. in review).

This project represents continued implementation of the Final Recovery Plan for Steller sea lions, and the draft Revised Recovery Plan (NMFS 2006). Specific objectives of the proposed research and enhancement activities are to (1) identify habitat requirements and protect areas of special biological significance; (2) identify management stocks, (3) monitor status, trends and survivorship of sea lions; (4) monitor health, condition, and vital parameters; and (5) investigate feeding ecology and factors affecting energetic status. These data will be used to further understand possible causes of the decline, evaluate regional trends in population numbers, and the efficacy of management actions.

Research proposed here will address data gaps identified in the draft Revised Recovery Plan (NMFS 2006). These include the need to assess the potential for disease and parasitism in impeding recovery, understanding the role of toxins in affecting sea lion health and reproductive rates, demonstrating mechanistic links between prey availability, nutritional stress, and changes in survival and reproduction, and determining whether fecundity continues to decline and the responsible mechanism (prey availability, disease, contaminants, etc.). NMFS (2006) also states that more research is required to describe links between changes in the environment and population dynamics of Steller sea lions. Methodologies and sample sizes of studies addressing these objectives are discussed below under the Methods section.

All field studies will be coordinated with other researchers in our area of study (ADFG, ASLC, AEB, UAF, etc.) throughout each permit year to minimize the risk of cumulative impacts and maximize collaboration and cooperation among programs. All field work plans will be submitted to the Protected Resources Division of the Alaska Regional Office at least one month prior to the field work and provided to other researchers that may be operating in similar areas. The NMML and ADFG collaborated in the development of both applications to ensure our studies are fully coordinated. The NMML, WDFW, and ODFW will continue their collaborative efforts to monitor the current status of Steller sea lions in Washington, Oregon, and northern California. Level

B takes of Steller sea lions in California, Washington, and Oregon by NMML researchers will be reported under permit 782-1702 for activities conducted through September 2008. Thereafter, takes of Steller sea lions in California, Washington, and Oregon will be reported under the permit issued for this application.

b. Statutory and Regulatory Requirements for ESA-listed marine mammals, MMPA-depleted species and enhancement activities on marine mammals

Data needed for conservation of Steller sea lions and for evaluation of fisheries management actions must be taken from wild populations of Steller sea lions. These data are essential for stock assessment reports, making required potential biological removal (PBR) and optimum sustainable population (OSP) determinations under the MMPA, and for development and implementation of the Steller sea lion recovery plan required by the ESA. The use of alternative, sympatric species (i.e. California sea lions) or surrogate individuals such as live, stranded (or rehabilitated) Steller sea lions will not be sufficient for implementing the goals of the proposed project. For example, alternative species differ physiologically, whereas stranded animals would not provide a sufficient sample size for disease surveillance, nor are they a representative sample from the wild population (especially with respect to health and condition needs). The bulk of the proposed research is specific to the western stock of Steller sea lions and cannot be conducted using an alternative stock (i.e. eastern stock) because the two stocks are genetically and geographically distinct. Furthermore, the eastern stock is still an ESA-listed species, and because it has displayed opposite population trends (i.e. population increase) it will not provide sufficient information for the western stock. Thus, in order to understand population trends, vital rates, health, and behavior of the endangered western stock of Steller sea lions, it is essential to observe, monitor, and sample the stock directly.

As noted above, The Steller Sea Lion Recovery Plan (NMFS 1992), draft revised Recovery Plan (NMFS 2006), and the National Research Council (NRC 2003) all emphasize the importance of understanding critical habitat use, habitat requirements, and the foraging ecology (including diet and important feeding areas) of Steller sea lions. The Recovery Plans also identified the need to monitor the health and condition of Steller sea lions. This project responds directly to recommendations of the Steller Sea Lion Recovery Team, the National Research Council, and the Alaska Steller Sea Lion Restoration Team. The expected research results will further our understanding of the vitality, biology, and ecology of Steller sea lions and improve our understanding of management needs. In addition to fulfilling goals of the NMML, these data will be provided to additional agencies (e.g. U.S. Fish and Wildlife Service, NMFS Office of Protected Resources, North Pacific Fisheries Management Council, North Pacific Marine Science Organization, and the Indigenous People's Council for Marine Mammals) for management purposes, which will ultimately enhance the welfare of the species. Results of our previous projects have been considered in revisions of The Steller Sea Lion Recovery Plan, which is still designed to ensure the recovery of the species.

C. Methods

1. Duration of Project and Locations of Taking:

a. A five-year permit is requested for a term of five years from date of issuance. In summary, most activities will occur annually within Alaska and most activities will occur throughout the year. Exceptions include aerial surveys, which will be conducted during the months of May-August (depending on the survey), and ground counts for the western stock (including pup captures and corresponding sampling) will be conducted during June and July. Additional activities will occur in Washington, Oregon, and California. Tentative dates and locations are provided below and in accompanying tables. Because dates may change due to logistics, weather, and specific study needs, additional detailed information will be provided to the NMFS Alaska Regional Office or Northwest Regional Office and F/PR at the beginning of each permit year and at least two weeks prior to conducting each field-research activity. All research activities will be coordinated with the Alaska Department of Fish and Game, Aleutians East Borough, Alaska Sea Life Center, University of Alaska, North Pacific Universities Marine Mammal Research Consortium, Washington Department of Fish and Wildlife, Oregon Department of Fish and Game, and California Department of Fish and Game and other groups as needed to avoid duplication, minimize disturbance, and maximize research opportunities.

b. Locations in which activities will occur

For the duration of the permit, most Steller sea lion rookeries and haulouts throughout Alaska will be sampled at least once. Specific locations (islands, latitude/longitude, and specified geographic region) relative to proposed activities are provided below and in accompanying tables. Protected areas include the Alaska Maritime National Wildlife Refuge (AMNWR) and Steller sea lion critical habitat. The proposed activities cannot be effectively carried out at alternative locations because critical habitat is specifically structured around locations where Steller sea lions reside (i.e. rookeries and haulout sites). All proposed activities are consistent with the protective status of all areas and all activities conducted within the boundaries of the AMNWR are done so under the authority of a Special Use Permit issued to the NMML.

Personnel of the NMML will be working at designated rookeries and haulout sites within the U.S. Throughout the range of Steller sea lions, rookeries and haulout sites consist of exposed, rocky shoreline areas and offshore islands and rocks composed of sand, clay, cobblestone, boulders, or large rock slabs and ledges (Fiscus 1970, Call and Loughlin 2005). Steller sea lion sites are also associated with relatively shallow, well-mixed, waters (Ban 1999).

2. Types of Activities, Methods, and Numbers of Animals or Specimens to be taken or imported/exported

a. Take Table (Table 1)

Types of activities, methods, and numbers of animals or specimens to be collected are summarized in Table 1. Take activities are organized as authorized in past permits and amendments for the same research (782-1532, 782-1768). Requested takes related to

incidental disturbances of other marine mammal species as a consequence of the proposed research activities are also listed in Table 1.

b. Narrative Account of Research and Enhancement Methods

This permit application includes many different kinds of activities and takes within a wide variety of inter-dependent research programs and activities. All takes requested in this application occur in the wild. Types of activities and takes include the following:
a. incidental disturbance during aerial surveys;
b. incidental disturbance during pup counts, scat collections, captures, and brand-resight efforts;
c. capture of pups, juveniles, and adults on land, underwater, on floating pens, or at sea for marking, measuring, sampling, and instrument deployment;
d. capture of pups on rookeries for marking, measuring, and sampling;
e. collection of blood, skin, and blubber samples;
f. swabbing lesions, eyes, genitalia, or rectum of animals exhibiting symptoms of disease and collecting fecal loop samples; and
g. hot-branding of all age-classes.

Objectives, methods, and expected results for research activities are presented separately below for purposes of clarity.

Activity 1: Aerial surveys during the breeding season
Objectives: The objectives of this project are to continue collecting data necessary to assess the status and trends of the sea lion population and to collect other supporting information on sea lion hauling patterns. The final Recovery Plan for Steller sea lions (NMFS 1992) specifically identified the need for Alaska-wide surveys of adult and juvenile sea lions every year (research task 321) and a range-wide survey every fifth year (research task 341). Monitoring population trends via aerial surveys is a research priority (1.1) in the draft Revised Recovery Plan (NMFS 2006). After comprehensive reviews by scientists at the NMFS, AFSC and the NMFS Office of the Chief Scientist, and in consultation with the recovery team, the NMML changed the survey protocol to alternate-year, Alaska-wide, non-pup surveys and a four-year schedule for range-wide surveys. The status of the Alaskan Steller sea lion population is evaluated based on aerial surveys of adults and juveniles observed on rookeries and haul-outs during June. Biennial, Alaska-wide, non-pup surveys were previously conducted during even numbered years (e.g. 2000, 2002, 2004). In addition, aerial surveys to assess pups were scheduled for odd-numbered years (e.g. 2001, 2003, 2005) at rookeries only. The 2006 Alaska-wide aerial survey did not result in a complete assessment of numbers at trend sites across the Alaskan range of Steller sea lions because: 1) the start of the survey was delayed because of a court-ordered cessation (beginning 26 May 2006) of all Steller sea lion research authorized by permits issued by NMFS, and 2) bad weather (e.g., low clouds, fog) reduced the number of days on which it was possible to conduct a survey. Because of the incomplete nature of the 2006 aerial survey, the next range-wide survey will occur during 2007. Should complications occur with the permit process during

2007, the next Alaska-wide survey will occur during the breeding season after the permit is issued. Range-wide non-pup surveys will then be conducted every two years.

Methods: The Marine Mammal Division of the NMFS, SW Fisheries Science Center will conduct medium format aerial photographic surveys of non-pup and pup Steller sea lions in Alaska for the NMML and ADFG. Surveys are conducted with an AeroCommander aircraft (i.e., high-wing, low speed, survey plane) and photographs of rookeries and haul-outs are taken with a medium-format (5-inch) military reconnaissance camera (with image- motion compensation) that is mounted in the belly of the aircraft. Photographs are taken vertically at altitudes of at least 700 feet while making one pass over the rookery. Surveys of individual rookeries range from seconds to 10 minutes, depending on the size of the rookery. Because altitude and orientation are known, length of individual animals can be measured and animals can be assigned to age and sex classes. As with the oblique 35 mm aerial surveys conducted by NMML since the mid 1980s, medium format vertical surveys are also conducted in mid-day (0900-1700) when sea lions are most likely to be on land. Non-pup medium format aerial surveys will be conducted every two years during mid-June, continuing the time-series of NMML 35 mm surveys; every rookery and haulout in Alaska will be surveyed (Table 2). During opposite years, medium format surveys will be conducted later in the summer (late June to early July) to estimate pup production on rookeries only. These will be compared with pup counts obtained through ground counts at the same locations. Overall, surveys are completed in two to three weeks (weather permitting). Northern fur seals at Bogoslof Island, and harbor seals throughout Alaska may be incidentally disturbed during this activity (Table 1). Survey dates are coordinated with other research groups conducting aerial surveys within the study area.

The maximum number of Steller sea lions that may be taken by this activity annually is equal to NMFS most recent population abundance estimates for each stock as stated in the SAR. Because the ESA definition of take requires stating the number of animals that potentially may be taken by an activity, this number is expressed as the total number that may be hauled out during a survey. To the extent that these population abundance estimates may be revised by NMFS during the life of this permit, this number may change between reporting periods for this permit. For annual and final reports, NMML will report the actual number counted annually during surveys. However, the number actually disturbed, or "taken" by this activity is much less than the number of animals hauled out (see section D.1.a.). Because sea lions may move to different locations during the course of a survey, the number of takes/animal/year is unknown, though it is likely that only a single take for this activity will occur. However, some sites may be approached twice if a first pass did not result in adequate coverage, thus a maximum of 2 takes/animal/year for this is specified in Table 1. Sea lions taken under this activity may also be taken under Activities 2, 3, 4, and 6.

Expected Results: Data from these surveys are used to determine the current status of the sea lion population for evaluation relative to recovery criteria. These data are also used to evaluate trends of subareas and sites to study causes of the decline, and the efficacy of management actions. Survey results have provided the necessary baseline population

data required for estimating Potential Biological Removal PBR and OSP levels under the MMPA.

Activity 2: aerial surveys during the non-breeding season

Objectives: The final Recovery Plan (NMFS 1992) identified the need to determine seasonal use patterns of sea lions (research task 12). Aerial surveys conducted during the non-breeding season, using the same protocols and methods as the breeding surveys, are the most effective tool for assessing seasonal changes in the distribution and relative abundance of sea lions.

Methods: Survey protocols will be the same as for previous surveys (Sease et al. 1999, Sease and Loughlin 1999, Sease and Gudmundson 2002, and see Activity 1). We will survey adult and juvenile Steller sea lions hauled-out on rookeries and haulouts in Alaska. Surveys may be conducted during the non-breeding season (August through May) during each year the permit is in effect (Table 1). To date, we have not planned a large-scale survey, but rather we take advantage of opportunities for cooperative work with colleagues in other agencies. Occasionally biologists with the U.S. Fish and Wildlife Service have recorded observations of Steller sea lions during their aerial surveys for sea otters (*Enhydra lutris*) in the Aleutian Islands and along the Alaska Peninsula. Surveys will be conducted daily during the period between 1000 and 1600 hrs (as determined by the sun's position, not local time). Survey aircraft are flown at slow speeds (100-150 kts), at low altitude (150-200 m) and close to shore (500 m). Usually one pass is made on a site, although additional passes are occasionally conducted. These aerial surveys use oblique photography, using hand-held 35-mm SLR cameras with motordrive and 70-210 mm zoom lens, or with digital cameras. After the slides are developed, the images are projected onto a white background (NMML) or viewed through a binocular microscope (ADF&G) to count adults and juveniles (but not pups). Northern fur seals at Bogoslof Island, and harbor seals throughout Alaska may be incidentally disturbed during this activity (Table 1). Survey dates are coordinated with other research groups conducting aerial surveys within the study area. The maximum number of Steller sea lions that may be taken by this activity annually is equal to NMFS most recent population abundance estimates for each stock as stated in the SAR. Because the ESA definition of take requires stating the number of animals that potentially may be taken by an activity, this number is expressed as the total number that may be hauled out during a survey. To the extent that these population abundance estimates may be revised by NMFS during the life of this permit, this number may change between reporting periods for this permit. For annual and final reports, NMML will report the actual number counted annually during surveys. However, the number actually disturbed, or "taken" by this activity is much less than the number of animals hauled out (see section D.1.a.). Because sea lions may move to other locations during the course of a survey or between surveys, the number of takes/animal/year is unknown, though it is most likely only a single take for this activity will occur. However, since some sites will be surveyed multiple times in a year, a proxy maximum of 4 takes/animal/year is listed for this activity (Table 1). Sea lions taken under this activity may also be taken under Activities 1, 3, 4, and 6.

Expected Results: Results of non-breeding surveys, particularly when and compared to results of previous surveys, will help describe seasonal movements of sea lions throughout their range. This information will be especially important for assessing the potential impacts of winter groundfish fisheries on the prey resources of sea lions in Alaska.

Activity 3: ground counts and incidental scat collection

Objectives: The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need for surveys of sea lion pups at selected rookeries in Alaska every year (research task 322) and range-wide every fifth year (research task 342). The draft Revised Recovery Plan (NMFS 2006) also identifies the need for continued population monitoring (task 1.1) and estimation of prey consumption (task 2.3.1). The range-wide pup survey changed from a 5-year to a 4-year schedule in 1994, to correspond with the schedule for aerial surveys. Pup counts obtained during late June to mid-July provide supplemental information on population status (in conjunction with aerial surveys of non-pups). The objectives of this project are to continue collecting data necessary for assessing the status and trends of the sea lion population.

Methods: Counts of pups (n = 9,000 per year) during the breeding season will be conducted on approximately 28 rookeries during the range-wide survey of the western population. Because the range-wide survey scheduled for 2006 was cancelled, the next range-wide survey will occur during the first breeding season after NMML receives a validated permit (i.e. the next range-wide survey will occur during 2007 if NMML receives the permit prior to June, else will occur during June 2008). The year after the range-wide survey, 13 rookeries will be surveyed biennially and 19 rookeries will be surveyed two years after the range-wide survey (e.g. if the range-wide survey occurs during 2007, 13 rookeries will be surveyed during 2008 and 2010, the remaining rookeries will be surveyed during 2009, and another range-wide survey will occur during 2011. However, if the range-wide survey occurs during 2008, 13 rookeries will be surveyed during 2009 and 2011, and the remaining rookeries will be surveyed during 2010; Table 3). Approximately 7,100 pups per year will be counted during these surveys. All activities occur during June and July to coincide with past surveys. Additional locations may be added or dropped, due to logistics, funding, and sea lion behavior (i.e. the formation of new or changes in the use of existing rookeries).

Scat collections will be made at the same time of this disturbance. At some locations, pups may be subsequently captured and handled (Activity 6; Tables 3, 4) following counts. These activities only occur at a rookery once per year, but sea lions taken under this Activity may also be taken by Activities 1, 2, 3, 4, and 6. Non- pups (n = 21,000 during the range-wide survey and 18,000 during alternate surveys) will be incidentally disturbed during ground counts of all rookeries and northern fur seals on Bogoslof Island may be incidentally disturbed during this Activity (Table 1).

Survey protocols will be the same as in previous surveys (Sease et al. 1999, Sease and Loughlin 1999, Sease and Gudmundson 2002). Pup counts are conducted during the last week of June through the second week of July at on approximately an alternate-year

schedule (to minimize disturbance to rookeries). The next range-wide survey will include all rookeries in Alaska. Pups are counted by first clearing the rookery of non-pups. Biologists experienced in herding sea lions slowly move non-pups away from the pups. After the non-pups have retreated, two or more biologists make independent counts of live (and dead) pups on the beach and in the water.

Expected Results: Data from these surveys are used to determine the current status of the sea lion population for evaluation against recovery criteria. These data are also used to evaluate trends of subareas and sites to study causes of the decline and the efficacy of management actions.

Activity 4: incidental disturbance during scat collection, capture/sampling, or observational/monitoring activities

Objectives: This Activity accounts for disturbance incidental to accomplishing scat collections, capture and sampling of all age groups (Activity 6), except those captured in association with ground counts (Activity 3), observation of haulouts/rookeries for branded and marked sea lions, and installation or servicing of remotely operated camera systems. The Recovery Plan for Steller sea lions (NMFS 1992) identified the need to investigate feeding ecology and factors effecting energetic status (research task 6) and specifically to describe foods eaten by sea lions (research task 611) and to assess significance of various prey (research tasks 614). Likewise, the draft Revised Recovery Plan (NMFS 2006) identifies continued similar data needs (task 2) including the need to continue to estimate survival, fecundity, and immigration/emigration rates through a branding/resight program (task 1.2.1). Evaluation of the hypothesis that food limitation plays a major role in the decline of sea lions in the western stock requires knowledge of food habits by area, season, and sea lion age class. Our primary source of food habits data comes through identification of prey remains in fecal material (scats) collected at rookeries and haul-outs. Although the NMML has greatly expanded the geographic and temporal scope of scat collections during the last several years, numerous gaps persist in our understanding of feeding ecology. The objective of scat collections is to fill in these data gaps and continue monitoring diets. The objective of observing previously marked or branded sea lions is to estimate survival and other vital rates, and detect movement patterns. Observations of previously-handled sea lions also provide a means to evaluate impacts of studies requiring handling.

Methods: Regardless of the activity creating incidental disturbance, sea lions are cleared as slowly as possible to avoid causing stampedes or panic. We collect scats in conjunction with resight activities or when entering rookeries and haulouts for pup surveys or animal captures. Scats are individually bagged, tagged, and shipped to Seattle. Scats are washed and sieved at the NMFS labs in Seattle, and hard parts retained. These hard parts (typically cephalopod beaks, bones, and otoliths) are then identified to taxa.

Observations of branded or other previously marked sea lions are conducted from land, skiff, or ship. In all cases, observations are conducted to minimize disturbance. Marked sea lions are observed using binoculars (often image-stabilized) or spotting scopes, and

digital images obtained if possible. Observers' interpretation of marks are recorded in notebooks and compared to digital images.

Methods used in captures are described under Activity 6. Sea lions of all age classes (n = 23,000) in the western stock will be taken under this activity more than once per year, and may also be taken under Activities 1, 2, 3, and 6. The expected takes/year requested in Table 1 represent an estimate of the actual number of sea lions that may be taken by this activity. Because sea lions may move to other locations during the course of a survey or between surveys, the number of takes/animal/year is unknown, though it is most likely only a single take/individual/year for this activity will occur. However, since some sites will be visited multiple times in a year, a proxy maximum of 10 takes/individual/year for Alaska sites, and 5 takes/individual/year for WA/OR/CA sites are listed for this activity (Table 1). California sea lions (n = 3,000/yr) and harbor seals (n = 200/yr) in California, Oregon, and Washington may be incidentally disturbed during this activity (Table 1).

Expected Results: Scat analyses provide a description of diet diversity and the frequency of occurrence of various prey items by area and season. These data will then be compared with historical data on prey preferences and prey availability to evaluate the hypothesis that changes may have occurred in prey consumption. Observations of previously branded or marked sea lions will contribute to calculations of survival, fecundity, and other vital rates, and will be used to infer dispersal patterns including immigration and emigration rates.

Activity 5: Accidental mortality

Objectives: This Activity provides for accidental mortalities that may result from other research activities. Few mortalities are anticipated (see section 4.b., below).

Methods: Not applicable. When possible, necropsies will be performed on and samples collected from carcasses resulting from accidental mortalities.

Expected Results: Not applicable. However, opportunistic post-mortem results will provide insight into mechanisms of death, and an opportunity to make other measurements of health and condition that would not otherwise be available.

Activity 6: Capture (includes hand, hoop net, underwater noose, floating trap, at-sea net capture technique, and dart injection)

Objectives: The Recovery Plan for Steller sea lions (NMFS 1992) identified the need to monitor the health, condition, and vital parameters of sea lions, and this need has been reiterated by subsequent reviews to facilitate testing multiple hypotheses for the sea lion decline and in the draft revised Recovery Plan (NMFS 2006). Health and condition of the Alaskan sea lion population is important for monitoring the population status with respect to recovery, and for determining causes of population decline. Juvenile survival and female fecundity (York 1994, York et al. 1996, Holmes and York 2003) are likely factors in the continuing decline and will be key to the recovery of the western stock of Steller sea lions. Availability and quality of food resources is a likely mechanism for

influencing juvenile survival or female reproductive rates, especially during the winter. Assessing the condition, status, and foraging behavior of pups as they are weaned and of juvenile sea lions that are foraging for themselves is the most direct means to understand this critical time in a sea lion's life. More specifically, with respect to the draft revised Recovery Plan (NMFS 2006), this includes developing indices of health and body condition (task 1.3.2), developing improved live capture techniques for research needs (task 1.4.1), obtaining measurements and samples using non-lethal techniques (task 1.4.2), conducting epidemiological surveys (task 4.1.1), and tagging of pups on rookeries, and the continuation ongoing studies of the physical condition of all age classes of sea lions outside of the breeding season, particularly during the winter.

The Recovery Plan for Steller sea lions (NMFS 1992), draft Revised Recovery Plan (NMFS 2006), and the NRC (2003) identified the need to identify habitat requirements and areas of biological significance for Steller sea lions and to investigate feeding ecology. Specific points include deploying instruments to obtain finer scale data on sea lion foraging habitat (task 2.3.3) to map, describe, and evaluate feeding areas and needs (task 2.3.4), determine seasonal use patterns, refine understanding of Critical Habitat use, assess the relationships between oceanographic features and sea lion foraging ecology (task 2.4.1), and investigate feeding cycles and diving behavior/physiology (task 2.5.1). Participants in a telemetry workshop convened by the Recovery Team in December 1997 reiterated the importance of telemetry studies, especially those targeting feeding ecology and movements of juvenile sea lions.

A number of studies have been developed to obtain better measurements of health and condition, at-sea behavior, diet, and survival. All require capture, restraint, and sampling of sea lions. Capture, restraint, and external morphometric measurements are described for Activity 6 in general. Specific study methods for marking, tagging, and sampling have been subdivided into sub-Activities 6a-n. Sea lions taken under Activity 6 may also be taken under Activities 1, 2, 3, and 4.

Methods: Captures are accomplished by several techniques that differ for targeted age classes, and thus age groupings for requested takes (Table 1) are based on how and when animals are captured. Age is estimated based on a combination of measurements (mass, standard length, and axial girth), upper canine eruption, and established regression models (Pitcher et al. 2005, King et al. *in press*). However, it is difficult to determine the age or sex of a sea lion prior to capture and close examination, particularly while working underwater. Age classifications (Table 1) have been grouped to account for ages of animals that are likely to be captured during different capture scenarios. For instance, due to the behavioral ontogeny of sea lions it has been our experience during the past 5 years using the underwater capture technique that it is very unlikely for animals over the age of 3 years to interact with divers underwater. Given our experience, pups (>5 days to 2 months old) are easily captured by hand on rookeries, whereas juveniles (>2 months to 3 years old) have been captured by hand, or by using hoop nets, an underwater noose, or a floating pen, and juveniles/adults (>3 years old) have been captured using floating pens or remotely-delivered (darting) chemical anesthetic. In addition to these techniques, an at-sea net capture technique will also be used to capture

juveniles and adults Restraint techniques similarly vary by age class. Pups (< 2 months old) on rookeries are restrained by hand or by using gas anesthesia if hot-branding (Activity 6.h) is included in the handling/sampling procedure. Juveniles (2 months to 3 years old) are restrained physically (hand or restraint device) or chemically (valium or gas anesthesia). Adults are restrained physically (squeeze-cage) or with gas anesthesia administered by a veterinarian or personnel trained in veterinary anesthesia (by a veterinarian).

Capture Techniques

Up to 1100 pups (>5 days to 2 months old) in the western stock will be captured by hand, placed in a hoop net for weighing, and restrained by hand during measurement, sampling, and tagging (Tables 1, 4). Measurements include mass, standard length and axillary girth (immediately behind fore flippers). Pups that are not hot-iron branded (Activity 6.h) may be marked or tagged for future identification (Activity 6.g). Fifty pups per rookery (approximately 25 males and 25 females) provides a minimum sample size useful for statistical analyses of mass by sex class (sufficient to detect a 15% change in mass of males and a 10% change in the mass of females [α=0.05 and statistical power $(1-\beta)$=0.80].

A variety of techniques will be used to attempt to capture older pups and juveniles (>2 months through 3 years) in the western stock. Capture techniques will ultimately vary according to size of animal, time and location of capture, and the ability to capture animals using any given technique. Up to 120 sea lions of this age group will be captured per year. Juveniles on land will be captured with a large hoop net (3 ft. diameter and 5 ft. long handle). Up to three biologists sneak up as close as possible to the target animals before entrapping in nets. This technique has proven safe for both researchers and animals and has never resulted in the death of an animal during NMML capture trips (a single animal died in 2004 during an ADFG capture trip, Table 6). This age group is also successfully captured in the water using the noose technique developed by colleagues with the Alaska Department of Fish and Game (McAllister et al. 2001). Two or three divers, supported by a skiff and a larger vessel, approach a haulout under water. The natural curiosity of young sea lions draws them to the divers. After a brief period of acclimation, sea lions will closely approach the divers, enabling them to place a rope noose around them, slightly in front of the fore flippers. The noose is fitted with a stop to prevent the noose from tightening to the point of strangling the animal, and with a rachet-lock to prevent the noose from loosening and releasing the animal (McAllister et al. 2001). The stop location is adjusted to achieve an appropriate noose-diameter based on the size class of the sea lion likely to be captured. After the noose tightened, the adjoining rope and sea lion are retrieved by personnel in a skiff at the surface. The sea lion is not suspended out of the water by the noose and as such the risk of strangulation is minimal and has never occurred. Animals are floated onto a restraining net and rolled into padded, ventilated, capture boxes on a skiff. This technique has proven to be effective and safe for divers and captured animals, and has not resulted in mortality (Table 6). This age class will also be captured with floating pens or by using the at-sea net capture technique while attempting to capture adults (described below). Once

restrained (see below), measurements of weight and size (lengths, girths) are taken and samples obtained (as described below).

Up to 72 (n = 60 in the western population and 12 in the eastern population) juveniles and adults (>3 years old) per year will be captured using a floating trap (or pen), the at-sea net capture technique, or by administration of a chemical anesthetic via a self-propelled or blow dart. Platform traps consist of a buoy with a 12-foot square platform for a haul-out surface and a 6-foot high steel cage perimeter on three sides and an open gate on the fourth side, similar to traps that have been used to capture California sea lions (*Zalophus californianus*) in Washington (under Permits No. 835 and 782-1446). Sea lions are allowed free access to the cage until the gate is closed during capture. As many as 20 sea lions can be captured in the traps at a time, but only 5-6 individuals have used one of the new traps (Kodiak) thus far. However, this number is expected to increase as sea lions acclimate to the trap. Once sea lions are captured, they are individually transferred to, restrained, and sampled (average time ~ 30 minutes) in a stainless steel squeeze cage that restricts movement without the need for immobilizing drugs. The squeeze cage is adjacent to the trap, allowing personnel to monitor the remainder of the animals in the trap. Duration of time in the platform trap will depend upon the number of animals captured, however will be less than a maximum of 12 hours during which time researchers are sampling each sea lion captured. At least two locations will be utilized for floating trap captures, including Kodiak harbor and Resurrection Bay, AK. Capture of Steller sea lions incidental to the capture of California sea lions at Shilshole Bay, WA will also allow for the opportunity to sample a few individuals in Washington. Other sites may be used if logistically possible. Floating trap captures are limited to locations with sheltered waters where sea lions are used to hauling out on man-made structures, a combination unlikely to be found throughout most of the western stock.

Limitations with the trap captures and noosing technique have resulted in a paucity of data on the foraging behavior of sea lions > 3 years old, a group for which far more information is needed so potential effects of commercial fishery management measures can be evaluated (Capron and Fritz 2004, NMFS 2006). Thus, an at-sea net capture technique, which was developed by Simon Goldsworthy (La Trobe University, Victoria, Australia), will be used to capture larger juvenile and adult Steller sea lions in remote areas of Alaska. This technique was originally devised to investigate Australian sea lion (*Neophoca cinerea*) interactions with commercial fisheries. Because the interactions occurred in specific locations, rather than capturing sea lions on the beach and hoping the animals would go to the fishery grounds, Dr. Goldsworthy captured sea lions at-sea that were directly interacting with the fleet. Australian sea lions are attracted to catcher/processor vessels, so the capture team worked on board one of the commercial vessels during the fishing season. A pouched net of trawl mesh is strung from a square frame and fish are attached to the bottom of the inside netting (Figure 1A). The net assembly is lowered adjacent to the vessel using a boom (Figure 1A) and suspended just beneath the water surface, and sea lions become interested in getting to the fish at the bottom of the net (Figures 1B and 1C). When a single sea lion is at the bottom of the net, the boom operator lifts the net out of the water (Figure 1D), and the sea lion is brought on board (Figures 1E and 1F). The sea lion may then be sedated with an injectable drug

(Valium, i.m., 5 mg /mL at a rate of 1 mL/50 kg body mass) if needed to minimize struggling, lowered into a capture box, anesthetized with an inhalable agent such as isoflurane, outfitted with a transmitter, allowed to recover prior to release. Recovery is evident when the animals is alert and has regained full motor skills. This typically occurs within 15-30 minutes. This has proven to be a very successful technique and the only mortality that occurred during this procedure was drug-related (due to the injected sedative).

We believe this technique is directly transportable to Steller sea lions. Fishermen and fisheries biologists report that Steller sea lions approach vessels trawling or processing catch during certain times among some fisheries in the Aleutian Islands and Bering Sea. These sea lions attempt to take fish from the gear or offal that is flushed overboard during processing. Based on observations and incidental catch data, these sea lions are most likely older juveniles and adults. We will construct a net of trawl mesh strung beneath a square metal frame, using a mesh size sufficiently small to preclude insertion of sea lion noses or heads, and of material strong enough to support the weight of juvenile to adult sea lions. Fish obtained directly from the fishing vessels or from shore-based processors will be attached to the bottom of the net (for example, cod, pollock, Atka mackerel, salmon). Although fishing vessels commonly have been used as research platforms in the past and have never been a permitting issue, we currently plan to operate from chartered research vessels to minimize interference with fishing operations and accommodate sea lion handling and sampling (though captures directly from fishing or processor vessels will remain an option). Thus, in areas where sea lions are interacting with fishing gear or processors we will lower the net via a boom, either from the fishing vessel or from a vessel nearby the interaction. The net will be submerged just beneath the surface to a depth encouraging entrance by sea lions, but allowing visibility to the bottom of the net. When a sea lion is inside the net structure, the boom operator will lift the net with sea lion out of the water, and transfer it to the deck of the ship. The sea lion will be placed into a capture cage as is done for underwater noose captures, or placed within a pen (on the deck) and directed into a squeeze cage as is done for floating platform captures.

In the event that adult sea lions cannot be captured with floating traps or the at-sea net capture techniques, they will be captured by use of drugs delivered via propelled darts (lightweight, slow-injection darts), which are CO_2 fired and compressed-air actuated (Heath et al. 1996, Cattet et al. 2006) or blow darts (Telinject USA Inc., Saugas, CA; Haulena et al. 2000). After stalking as close to a target sea lion as possible, a dart is fired to deliver drugs *intra muscularly* (IM) preferentially over the hips and tibia lumbar muscle, or into muscle over the shoulders (Haulena and Heath 2001). Telazol (an injectable 1:1 mixture of Tiletamine and Zolazepam) is delivered at dosages of 1.8-2.5 mg/kg (Loughlin and Spraker 1984), though Medetomidine (an alpha-2-agonist sedative; 140 μg/kg) with ketamine (2.5 mg/kg) or telazol may also be used for initial sea lion capture (Haulena and Heath 2001). If needed, captured adults will also be restrained with inhalable isoflurane if adequate sedation is not achieved with the injectable agent alone (Haulena and Heath 2001; see below). Isoflurane is administered via a cone or

endotracheal tube for anesthesia if an animal is already otherwise restrained (physically or through injected agents) and is useful for restraint during lengthy handling procedures.

Restraint Techniques

Factors that dictate the choice of an appropriate restraint method (i.e. physical, mechanical, or chemical) include human safety, safety to the animal, and the ability to accomplish the desired objective (Gulland et al. 2001). Combinations of different types of methods are also used to facilitate restraint because any one method may not be appropriate. For example, chemical agents can be given to sea lions to augment physical restraint (Gulland et al. 2001). Physical restraint is often limited to the size and aggression of the animal, whereas mechanical restraint is limited by the availability of adequate equipment that can be used in remote field situations. Anesthesia is typically used for procedures requiring more than 30 minutes of handling time, or when some invasive procedures are conducted (see below). Hand-captured pups are physically restrained by hand, or with the use of inhalable isoflurane gas if they will be branded under Activity 6i. Gas anesthesia (isoflurane) reduces stress on pups and improves the quality of brands by preventing wiggling during branding. We use equipment and techniques developed and described in detail by Heath et al. (1996, 1997) and Johnson et al. (2004). This technique has been used extensively and with Steller and California sea lions, both adults and pups, and was in fact developed primarily for and during field operations on these species in collaboration with the NMML and the ADF&G. We will deliver anesthesia to hand-restrained pups through a mask, sufficient for the time requirements of branding. Gas anesthesia will be administered and monitored only by personnel thoroughly trained in its application. Recovery is evident when the animals is alert and has regained full motor skills. For pups this occurs within minutes, for larger animals typically within 15-30 minutes. Criteria for determining whether someone is adequately trained are based on previous experience, demonstrated expertise, and referrals of qualified colleagues and veterinarians.

Hoop-net captured juveniles may be physically restrained by slowly transferring them into fabric restraining wraps used for weighing. Sea lions are restrained in this wrap during measurements and sample collection. Injectable Valium (5 mg /mL at a rate of 1 mL/50 kg body mass), which is easily transported to the rookery or haulout, will be hand-injected to sea lions i.m. to reduce struggling, if struggling is unlikely to be limited solely by physical restraint. However, land-captured sea lions will be preferentially transferred to a research vessel and restrained with inhalable isoflurane, as are sea lions captured with underwater noosing. Sea lions are inducted using masks, then endotracheal tubes are inserted (Heath et al. 1997, Johnson et al. 2004) to continue administration during sampling procedures. Juveniles and adults captured in floating traps or via net captures at sea will be restrained physically by means of a squeeze cage. Additional restraint with isoflurane administered as above will be used if appropriate at the discretion of the attending principal investigator or veterinarian. Adults captured by darting will also be restrained with inhalable isoflurane if adequate sedation is not achieved with the injectable agent alone. In a review of isoflurane anesthesia for 403 juvenile Steller sea lions ranging in mass between 32-230 kg, Johnson et al. (2004) determined that for

intubated juveniles the mean anesthesia time was 52±17 minutes, and the mean elapsed time between turning off the anesthetic vaporizer and extubation was 4±3 minutes.

The following procedures may be performed on captured sea lions, as enumerated in Table 1. Overall, criteria for each procedure will be dependent on the specific study objectives at the time of capture. Furthermore, the number of procedures conducted on any one individual sea lion will dictate the amount of time an animal needs to be anesthetized. Recovery time from anesthesia during these procedures depends on agent types and dosages delivered.

a. Blood collection. Blood samples will be taken from up to 450 pups (<2 months old) captured annually on rookeries in the western population during the breeding season, from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1). Clinical blood chemistries are useful for examining the gross physiological status of individual animals. In other otariid species, electrolytes, oxygen carrying capacity (red blood cell indices), and immune system function (white blood cell indices) are highly useful for making inferences about the health of young animals. The NMML began analyzing blood from Steller sea lion pups in 1991. More thorough and regular monitoring of the clinical chemistries of pups began in 1998. Based on the observed variability in the samples from 1998 and 1999, samples sizes necessary for detecting differences between each rookery are prohibitively large. However, comparisons between rookery groups (e.g., western Aleutian Islands versus central Aleutian Islands versus western Gulf of Alaska, etc.) and between years requires approximately 85 samples per year for detecting differences in hematocrit, and 120 to 160 samples per year for detecting differences in most electrolytes [for α=0.05 and statistical power (1-β)=0.80]. Practically, it is feasible to collect blood from up to 25 pups on any given rookery during the time required to tag, weight, and measure our standard sample of 50 pups. Increasing the number of pups sampled for blood per rookery would prolong the disturbance of the rookery. During the more extended disturbance at rookeries necessary for branding, it will be feasible to sample blood from up to 50 pups. Thus, the maximal number of pups for blood sampling will be 450 pups per year. Volumes are drawn at a rate of 1.0 mL/kg per animal per capture event (typically no more than 120 mL whole blood total, depending upon body size). Blood draws will be collected from the caudal gluteal vein or interdigital veins of the hind flippers using sterile techniques by trained/experienced personnel. A minimum of 37 ml of serum (roughly equivalent to 75 ml of whole blood depending on hematocrit) is needed to perform the following analyses: hematology (hematocrit, hemoglobin, specific gravity, plasma and whole blood water content), clinical blood chemistry, fatty acid composition, deuterium analyses, metabolic chemistry, serology, virology assays, stable carbon and nitrogen isotope content, haptoglobin, serum iron content, growth hormone and dietary bioindicators (e.g. TMAO). Any additional serum or plasma is archived for future retrospective analyses and sample requests made by other researchers. If less than 75 ml of whole blood is drawn, then a subset of these analyses are prioritized.

b. Skin biopsy. A sample of skin, approximately 5mm in diameter, will be clipped from the webbing of the hind flipper for genetic analyses. Samples will be preserved in a saline/DMSO solution for future analysis of mitochondrial and nucleic DNA. Skin samples will be collected annually from up to 450 pups (<2 months old) captured on rookeries in the western population during the breeding season, from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1).

c. Blubber biopsy. We will sample blubber from Steller sea lions >2 months old for fatty acid analyses by taking a small biopsy from restrained or anesthetized animals. Blubber samples will be collected annually from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1). Using sterile techniques (hair trimmed from biopsy site, scrub with Betadine solution, sterile gloves and instruments used), skin and blubber samples will be collected near the hind flippers using a surgical biopsy punch 7 mm in diameter, resulting in a sample size of 7 mm wide x the blubber depth of the animal (< 5 cm). If not under general anesthesia, Lidocaine (1cc of 2% solution) will be injected in a rosette around the biopsy site as a local anesthetic and to reduce bleeding.

d. Fecal loops and culture swabs. We will collect fecal samples using a sterilized fecal loop for determination of parasites, disease, and hormone concentrations, and sterile culture swabs to sample dermal lesions, or ocular, rectal, and/or vaginal areas, as appropriate, from any handled sea lions for surveillance of disease. Swabs will be taken and cultured according to standard veterinary procedures from up to 450 pups (<2 months old) per year captured on rookeries in the western population during the breeding season, from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1).

e. Tooth extraction. For juveniles ranging from 2 months to 3 years of age (n = 120 in the western population and 12 in the eastern population) and adults older than 3 years of age (n = 60 in the western population and 12 in the eastern population) that cannot be aged utilizing preexisting marks (tags, dye marks, brands, etc.), tooth size measurements, or by size and time-of-year combinations, extraction of one 2nd pre-molar tooth from the right side would be accomplished by use of a scalpel to loosen attachments, and then extracted with a dental elevator on sea lions under general gas anesthesia. Sea lion age can then be determined by counting incremental growth layers on a longitudinal section using standard procedures at the NMML laboratory.

f. Pull vibrissae, clip hair and nails. One vibrissa may be pulled from sea lions >2 months old for stable isotope analysis to help identify the general trophic level at which an animal is feeding over prolonged periods. Pulling, rather than clipping, a vibrissa is preferable because clipping results in an unknown length remaining attached to the sea lion. Stable isotope ratios show regular, oscillating patterns in Steller sea lion vibrissae

of 1-3 cm, and changes in ratios can occur in less than 1 cm (Hirons et al. 1998). Thus, obtaining the root of the vibrissae, representing the most recent growth, for analysis is crucial. Vibrissae are pulled by gripping with forceps and pulling forcefully and rapidly in one smooth motion. From some of these animals we will collect two other tissue samples for stable isotope or contaminants analysis: a small sample of hair, clipped from an area approximately 3cm by 3cm; 1 or 2 vibrissae clipped close to the skin, and the tip of a nail from each fore flipper. Vibrissae, hair, and nail samples will be collected annually from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1).

g. Flipper tag or other mark. In cases where branding is not used to place a permanent mark on a captured sea lion (for example at rookeries where pups are not branded, or where land captures of juveniles or adults occur) and a short-term mark is desirable to reduce handling confusion or monitor sea lions for less than two years, alternatives to branding will be considered at the discretion of the investigator. All methods are commonly used in pinniped or wildlife biology, and include color-coded plastic flipper tags (for example made by All-Flex), hair dye (such as Lady Clairol) applied identifiers, non-toxic livestock markers (for example non-toxic, lead-free all-weather "paintstick" livestock markers by La-Co Industries), and neoprene patches. For example, pups that are captured in locations where they are likely to be resighted regularly may be flipper-tagged, whereas pups in remote locations lacking resight effort are often not flipper-tagged. Additionally, pups that are handled (weighed, measured, sampled, etc.) during capture operations, but not branded, are marked with paintsticks to identify individuals and prevent repetitive capture and sampling. Neoprene patches are a light-weight form of temporary marking and have been used to denote animals as controls relative to animals with heavier instrument packs.

Takes requested are a subset of the takes requested for captures under Activity 6. Flipper tags or other marks will be deployed annually on up to 700 pups (<2 months old) captured on rookeries in the western population during the breeding season, from up to 132 (n = 120 from the western DPS and 12 from the eastern DPS) juveniles (>2 months to 3 years old), and from up to 72 (n = 60 from the western DPS and 12 from the eastern DPS) adults >3 years old (Table 1).

h. Hot-brand. Pups (n = 400 per year) to be branded are a sub-set of those pups < 2 months old captured and measured on rookeries in the western population during the Steller sea lion breeding season (late June and early July; Tables 1 and 4). Small groups of pups (< 50 animals) are corralled against cliffs or boulders and taken one-by-one to be weighed, measured, anesthetized with isoflurane gas, and branded. Branding irons are made of cold-rolled steel (approximately 10mm stock); the dimensions of the largest digits are approximately 5cm wide and 8cm high (Merrick et al. 1996). Each iron is heated red-hot in a portable, propane-fired forge and applied perpendicularly to the animal's shoulder with light, even pressure (ca. 5 psi) for 2-4 seconds. Digits are 4-5 cm apart to insure clarity of numbers. A 4-digit brand requires about 1-2 minutes to complete. Pups are observed for deleterious effects during recovery from anesthesia,

then released. Very young pups (e.g., under 20 kg or umbilicus present) are not branded in order to obtain a sample of post-natal (>2 weeks old) viable pups for survival analyses. Sea lions >2 months old (if not previously branded as pups) are branded under anesthesia following the same protocols. See Appendix I for a detailed analysis of branding activities.

i. Attachment of scientific instruments. Scientific instruments will be attached to sea lions > 5 days old that are captured for the purposes of instrument deployment (Table 1). Sea lions < 2 months old will only be tagged with smaller instruments (i.e. VHF transmitters). Instruments are attached to the hair on the animal's back just over the shoulders, or onto the top of the head (if instrument and animal size are appropriate), with fast-setting epoxy glue. Attached instruments on older animals (i.e. > 2 months old) will allow tracking of sea lions at sea and measurement of behavior during dives, whereas instruments on younger animals will allow for tracking of behavior or survival on the rookery. For example, the Oregon Steller sea lion branding program conducted a study during 2005 to determine if the potential acute impact of branding affected survival of Steller sea lions by comparing the survival of branded and non-branded pups for the 2 months following branding. Their design included a simple treatment (branding) – control (non-branding) design with restricted random assignment of pups to treatment or control. Radio-transmitters with mortality sensors were attached to 80 pups (40 branded, 40 control) such that their status (live/dead) could be monitored with certainty while they were on the rookery. This sample size provided power of 0.8 to detect a 10% point difference in survival (non-brand survival 0.95; branded survival 0.85) with a one-sided test and alpha=0.10.

For older animals, we will deploy instruments such as satellite-linked dive recorders (SDR; 315 grams, 14.3 x 4.8 x 3.8 mm; Wildlife Computers, Redmond, WA), satellite-relayed data loggers (SRDL; 390 grams, 10.5 x 7.2 x 5.8 mm; Sea Mammal Research Unit, St. Andrews, Scotland), and very high frequency (VHF) transmitters (23-92 grams, dimensions vary; Advanced Telemetry Systems (ATS), Isanti, MN, or Telonics Inc., Mesa, AZ) that do not require instrument recovery to download position and/or diving data. Additional transmitters will be used as instrument technology improves and miniaturization of packages occurs. For example, recent advances have included the development of smaller satellite transmitters, including smart position or temperature transmitting tags (SPOT; > 30 grams) and SPLASH tags (> 65 grams; Wildlife Computers), which are available in a variety of shapes and sizes and can be custom made to accommodate study needs. These instruments are not only smaller, but allow for monitoring the underwater environment surrounding sea lions and will be useful for assessing the relationships between oceanographic conditions and sea lion foraging ecology (task 2.4.1, NMFS 2006). The new fast-GPS tag (Wildlife Computers), which is still undergoing field trials, will also allow for obtaining finer scale data on sea lion foraging behavior (task 2.3.3, NMFS 2006).

If remotely-releasable platforms (such as are under development by ATS) or other release mechanisms become suitably reliable, or recaptures become more feasible, we will also deploy a range of archival instruments to monitor the physiology and diving

behavior of sea lions, including underwater cameras (UTPR; 665 grams, 10.3 x 8.5 x 5.2 mm), time-depth recorders (TDR; 30-40 grams, 70 x 17 x 17 mm), heart rate (46 grams, 60 x 35 x 13 mm) and/or stomach temperature transmitters (63 mm length, 21.5 mm diameter) and recorders (60 grams, 10 x 50 x 70 mm), and perhaps acoustic recorders that require instrument retrieval. The maximum number of instruments attached to an individual sea lion will not exceed 2 to 5% of the animal's body weight (Kenward 1987, RIC 1998). This work will be conducted primarily in Alaska, but may occur range-wide in response to opportunities for collaboration with colleagues in other areas. The number of animals outfitted with instruments each year will be determined by budget limitations rather than more rigorous calculations of optimum or minimum sample sizes; hence, sufficient sample sizes will be obtained through multi-year studies.

j. *Deuterated water:* To determine total body water content and intracellular water space, deuterated water (D2O) will be injected in up to 120 pup/juveniles (> 2 mo. to 3 years) per year and 60 juvenile/adults (> 3 years) per year from the western stock. Sea lions under gas anesthesia will be administered an intramuscular injection of known volumes (1 g D2O/kg body mass) of deuterated water (99% enriched, Metabolic Solutions, Inc.) using a 20 g 1.5" hypodermic needle after the injection site is cleaned with alcohol. Equilibration of the isotope of two hours will occur while other procedures are being performed. A pre-final sample of serum will be drawn 20 min prior to the final sample, at 2 hours. Separate post samples are advantageous for determining that full equilibration of D2O has been accomplished. Mass spectrophotometric analysis of D2O in water distilled from blood samples will be conducted by a commercial laboratory (Metabolic Solutions, Inc.). Calculation of percent body fat will be made using equations from Bowen and Iverson (1998), and assuming a hydration of 0.73 (Wang et al. 1999).

k. Bioelectric impedance analysis. Bioelectric impedance analysis (BIA) will be used for 120 pup/juveniles (> 2 mo. to 3 years) and 60 juvenile/adults (> 3 years) a year from the western stock (Table 1). A rapid measure of body composition is possible using a bioelectric impedance analyzer (BIA). The conductivity of a whole body is related to the distribution of water and electrolytes, and by modeling the whole body as a conductor measurements of reactance and resistance can be converted into estimates of body fat (Lukaski 1987). This requires developing a mathematical relationship between values determined from BIA, and another measure of body composition, such as deuterated water dilution. This technique has been widely applied in marine mammals, with varying degrees of precision (Gales et al. 1994; Arnould 1995; Bowen et al. 1998; Bowen et al. 1999). Currently this technique looks very promising for assessing individual condition in Steller sea lions. An analysis by Castellini (2001) found an excellent relationship between deuterated water measures of total body water and BIA impedance measurements, and this study is currently being updated. Including this determination to our methodology will expand the data used in creating the model, and may prove to be an adequate predictor of body condition when other techniques are logistically unfeasible. The procedure is simple and quick. On a sedated sea lion, four 1 ½ inch 20 G needles are inserted subcutaneously (two anterior just behind the skull, two posterior near the tail) as electrodes. Leads from these electrodes attach to a portable BIA unit (RJL Enterprises Quantum II, or Model 101A) and instantaneous readings of resistance and reactance are

obtained. The electrodes are then removed. For best precision, the measures are repeated 2-5 times. Ultimately this technique may replace deuterated water injection as a method to determine body composition, particularly in situations where waiting for the lengthy equilibration period is unfeasible.

l. Stomach intubation or enemas. Enemas will be administered annually to 120 juveniles (> 2 mo. to 3 years) and 60 adult (> 3 years) sea lions from the western stock (Table 1) to recover remains of prey items from the lower digestive tract. 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. Fecal material is collected in a plastic bag for sieving and removal of prey remains in the laboratory. Alternatively, stomach intubation or lavage will be used if enemas are unsuccessful. 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, intubation may be preferable. Stomach intubation will also be used to test for the presence of and obtain a sample of milk (Beck et al. *in press*). A stomach tube is inserted into the mouth and throat of anesthetized animals and gently guided down through the esophagus. The length of tubing needed for lavage will be obtained by measuring the length from the animal's snout to the last rib (Townsend and Gage 2001). After inserting the stomach tube, personnel will gently blow into the tube and listen for the return of air to indicate the tube is actually in the stomach. It is more important to ensure the tube is in the stomach (vs. the lungs) than to ensure the tube does not go too deep, which generally will not occur (unless forced). A 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. All tubes will be cleaned in either a bleach solution, Novalsan, or glutaraldehyde and thoroughly rinsed with clean, fresh water to avoid cross-contamination of samples and the spread of diseases.

m. Ultrasonic imaging. We will use ultrasonography to measure blubber depth and to image internal organs of 120 juvenile (> 2 mo. to 3 years) and 60 adult (> 3 years) sea lions/year from the western stock (Table 1). Ultrasonography has become commonplace in wildlife and marine mammal medicine (Brook et al. 2001). On restrained sea lions, measurements of blubber depth will be obtained by directly imaging the blubber layer with a Sonosite 180 Plus with a general purpose curved transducer array used externally. If appropriately trained personnel are available, examination of internal organs (again with an external transducer) will be conducted.

n. Lesion biopsy.
In addition to swabs collected under Activity 6.d. above, biopsies will be taken of lesions from up to 120 juvenile (> 2 mo. to 3 years) and 60 adult (> 3 years) sea lions from the western stock (Table 1), if deemed appropriate by the attending veterinarian. Most of these biopsies will be of skin lesions, possibly oral lesions. The animal will be under anesthesia already. The biopsy site will be prepped by a light wipe with isopropyl alcohol. A 6 mm sterile biopsy punch will be used for the biopsy and the sample picked up with sterile forceps. Multiple biopsies (3-4) of a lesion will be taken for diagnostic purposes. Biopsies will be split, ½ placed in formalin, ½ in a cryovial and frozen

immediately for culture. Depending on the lesion, this will be submitted for viral, bacterial +/or fungal culture or PCR.

Expected Results: These data will provide information on the relative health of the western population (and to a smaller extent the eastern population) when compared with results from preceding years and among areas. Data obtained from deployed instruments will contribute to ongoing investigations into seasonal movements, diving behavior, habitat selection, and foraging ecology. This work will be particularly important for identifying winter foraging areas and refining our knowledge of the foraging capabilities of young sea lions. This information will be crucial for assessing the potential effects of commercial fisheries on the status of Steller sea lions. Resighting of hot-branded animals over time will provide critical information on survival and reproduction and genetic samples will contribute to the ongoing studies of stock structure.

Activities 7-9: incidental harassment during aerial surveys (Activity 7), sea lion pup counts (Activity 8), and during scat collection, capture/sampling activities, observational/monitoring activities (Activity 9).
See Table 1 and section D(1b) below for a narrative description.

Taking of Marine Mammal Parts or Specimen Samples: Scat samples obtained from haulouts or rookeries are labeled with date and location and transported to NMML for analysis. Scat sub-samples may be provided to other investigators as requested. Samples taken directly from sea lions handled under Activity 6 (blood, swabs, fecal, stomach contents, whiskers, blubber, hair, nails, skin, muscle) are labeled with an ID number (the brand or tag number, if appropriate), collection date, type of sample, and capture location. Blood samples (whole, serum or plasma) are analyzed by NMML and ADFG, while sub-samples may be provided to other researchers or laboratories for analysis as appropriate. Blubber and whiskers are provided to ADFG, and skin samples for genetic analysis are provided to NMFS and academic investigators.

3. Removing Animals from the Wild into Captivity and Research or Enhancement on Captive or Rehabilitating Animals: Not Applicable.

4. Lethal Take

a. Intentional Lethal Take: Not Applicable.
No intentional lethal takes are requested.

b. Unintentional Lethal Take
Unintentional mortality of Steller sea lions is possible, particularly during capture and handling operations. Because research is often focused on exploring the reasons for decline, sick and moribund animals may be intentionally captured to investigate the causes of disease. These individuals would be expected to have a greater average risk of mortality than a randomly caught member of the population. Nevertheless, mortalities are relatively infrequent events. In the six-year period during 2000-2005, a total of 5 mortalities occurred in the western stock (an average of 0.8 per year), and 20 in the

eastern stock (an average of 3.3 per year) among all research programs (Table 5). During five years of similar research under Permit No. 782-1532, two pups presumably died as a direct result of working on rookeries by NMML (Table 6). No mortalities of juveniles or adults occurred, though no capture attempts were made for adults under that permit. However, ADFG had two juvenile mortalities occur during a capture trip in 2004 (Table 6). Assuming a NMML pup mortality rate and a pooled NMML/ADFG capture mortality rate (Table 6), an average of 1.4 mortalities per year (with a 1SE range of 0.0-2.8 mortalities per year) could be expected as a result of our proposed pup and juvenile capture and handling activities. No mortalities are expected as a result of pen or at-sea captures, though post-capture anesthesia always has a potential for causing accidental mortality. During the past ten years, researchers at NMML have captured 1800 sea lions in floating pens at Shilshole Bay, Washington with only a single mortality (Pat Gearin, pers. comm.). Capture of sub-adult and adult sea lions using injectable drugs administered via remotely fired darts may result in mortalities. During 1990-1996, 1 of 53 (1.9%) sub-adult and adult sea lions that remained observable (that is, did not enter the water) following darting by NMML died (Table 7).

Because research-related mortalities are rare events compared to the number of sea lions taken from all activities, a calculated average rate may not be reached over several years, or may be exceeded within one year. Thus, we request accidental mortality takes of 10 (not to exceed 5 in the western stock) per year as authorized in our previous permit, however expect that this number may be modified by the permit office during the permit application and evaluation process.

5. Exports of Marine Mammals from the U.S.

a. Not Applicable

b. Not Applicable

Any importation of Steller sea lion parts or samples will be accomplished under the authority and conditions of existing NMML permit No. 782-1399 and its successors.

D. Research Effects and Mitigation Measures

A review of anticipated effects of these activities was presented in the environmental assessment for permitting research activities in 2002 (NMFS 2002).

1. Effects

a. Known or anticipated effects of each proposed activity

Activities 1 and 2: aerial surveys

Based on observations of sea lion responses to aircraft conducting surveys with appropriate mitigation measures, disturbance rates appear to be minimal. For example, the NMML final report for 782-1532 (for the years 2000-2004) reported 2,797 disturbed sea lions (similar to 'alerted') out of 216,821 counted during monthly aerial surveys in both western and eastern stocks, a rate of 0.013 sea lions alerted/counted. An objective of aerial surveys is to not disturb sea lions as that could negatively bias the sample if animals left the field of view. Observations from counters indicate it was very rare for seals to

actually spook or go into the water. The NMML final report for 782-1532 also reported that <10% of sea lions counted during breeding season aerial surveys reacted, and that few animals spooked off of a site. Observers at field camps in 2002 and 2004 observed little response to survey aircraft, but reported "mild spooks" at Ugamak Island though all animals remained on the beach. "Mild spooks" refers to a proportion of the animals (~10%) becoming alert and moving toward the water, but remaining on the beach. Reactions of animals to aerial survey aircraft differ depending on the acoustics of the site. A reaction similar to that observed at Ugamak Island is more likely at rookeries or haul-outs located at the base of a cliff or in an embayment. Little or no reaction of animals has been observed at sites on flat offshore islands. No pups have been observed to enter water in response to aerial surveys.

Activity 3: ground counts and incidental scat collection

All moving of non-pups from observer paths is performed slowly and no stampeding has occurred using current mitigation techniques. It is extremely unlikely that any animals are disturbed more than once. Adult and juvenile sea lions displaced from the rookery typically remained in the water immediately off shore. Sea lions begin returning to the beach before the scientific party departs (typically within 4-6 hours).

Activity 4: incidental disturbance during scat collection, capture/sampling, or observational/monitoring activities

Sea lions typically return to a haulout very soon after departure of the scientific party, and may return to the beach before a scientific party departs. Researcher presence among animals is expected to have different impacts depending on timing of the activity relative to the sea lion breeding cycle. Expected reactions of exposed sea lions include: 1) becoming alerted (includes physiological reactions that may not be externally expressed); 2) entering water; or 3) sustaining an injury because of the activity (for example, being trampled, or having an elevated physiological stress reaction).

On rookeries during breeding season-proportion reacting

Because these activities occur among animals on haulouts or rookeries, and requested takes for incidental disturbance are the number likely to be affected, it is assumed that all sea lions are at least alerted by this activity. Very few pups (estimated at 1/100) enter the water during rookery operations, but it is more common for non-pups to do so during presence among animals on rookeries in the breeding season.

Vessel surveys-proportion reacting

Because these activities occur among animals on haulouts or rookeries, and requested takes for incidental disturbance are the number likely to be affected, it is assumed that all sea lions are at least alerted by this activity. Approximately 30% of these sea lions may enter the water, based on observations numbers entering the water during surveys for marked animals in the Gulf of Alaska and Aleutian Islands in 2004-2006. Proportions of 0.0001 (1/10,000) for both pups and non-pups are estimated rates of injury per number of individuals potentially exposed based on NMML professional opinion.

Activity 5: Accidental mortality
Not Applicable.

Activity 6: Capture (includes hand, hoop net, underwater noose, floating trap, at-sea net capture technique, dart injection)
Although pups may struggle initially after capture, they typically calm down very quickly after being hand-restrained. There have been no instances at any site of abnormal reactions (e.g. open mouth breathing, catatonia, seizing, dive response, etc.), or reactions of concern (e.g. those requiring medical care or extended observation), to these activities. Much of our handling technique is designed to encourage pups to be calm (i.e. ceasing to struggle) while holding them firmly. The time spent on a rookery where pups were counted and handled, but not branded, averages 1.5 hours (range of 1.3-1.7 hours).

When noosed underwater, sea lions attempt to swim away, and resist being pulled toward the skiff. However, once in a capture box sea lions always stop struggling, and often fall asleep. Similarly, sea lions hoop netted on land struggle against the hoop net, but relax once physically restrained within a restraint jacket or hoop net. Time of handling for sea lions captured and handled on land is typically of a short duration at 0.2-1.1 hours. Elapsed time held for sea lions captured in water or on land, and taken to the research ship is longer, ranging between 3-13 hours. Holding time varies depending on how many sea lions are captured, and the time of day at which they are captured. The majority of that time, however, is spent resting in the capture box. Actual time of procedures, reflected by the elapsed time an animal was under gas anesthesia, ranged from 0.7-1.9 hours.

Immobilization of sea lions with remotely injected agents has multiple risks, including variable delivery volumes depending upon site of injection and dart function, potential inaccessibility of a darted animal, and drug-related complications. Mortalities due to Telazol-related complications seem to be a small proportion of the handling risk. In Table 7 of our application we summarized outcomes of darting events for 16 juveniles and 72 sub-adult or adult Steller sea lions during 1990-1996 using Telazol. Of those, two juveniles (13%) and one adult (1%) died presumably from drug interactions, though an additional 11 juveniles and 41 adults (59% of 88 darted) were not handled because they were never sedated, or moved to inaccessible locations. During 1992-1994, Heath et al. (1996) darted 73 adult female Steller sea lions, two of which (3%) died due to Telazol-related complications, and 22 (29%) were not sedated due to dart failure. Mortalities have been associated with giving additional doses of Telazol to animals not successfully inducted, or when attempting to extend the immobilization period (Haulena and Heath 2001).

h. Hot-brand
See Appendix I for an analysis of effects of this activity. The behavior of branded pups is not observably different from that of other handled and restrained pups. Elapsed time on rookeries where counting and branding operations occurred ranged from 4.7-7.0 hours. Observers at Ugamak Island detected no mortalities as a result of branding activities conducted at the Ugamak Bay and Ugamak North rookery locations.

b. Effects of Incidental Harassment:

Activity 7: Incidental harassment during aerial surveys of Steller sea lions

Northern fur seals on Bogoslof Island, and harbor seals at some locations may be incidentally disturbed by aerial surveys (Activities 1 and 2).

Activity 8 . Incidental harassment during sea lion pup counts

Northern fur seals on Bogoslof Island are disturbed during the ground count of Steller sea lions. In 2004, most disturbed fur seals appeared to be non-territorial animals.

Activity 9 Incidental disturbance during scat collection, capture/sampling activities, and observational/monitoring activities

Harbor seals and California sea lions may be disturbed during scat collection and observational activities in Washington, Oregon, and California.

Effects on Stocks:

A review of anticipated effects of these activities will be presented in the Environmental Impact Statement being prepared for all proposed permitted activities, and includes an analysis of potential impacts to each stock.

Activity 5: Accidental mortality

This Activity provides for accidental mortalities that may result from our research activities. During five years of similar research under Permit No. 782-1532, 2 pups were observed to have died presumably as a direct result of working on rookeries by NMML (Table 6). No mortalities of juveniles or adults were observed to have occurred, though no capture attempts were made for adults under that permit. However, ADFG had 2 juvenile mortalities occur during a capture trip in 2004, and another juvenile mortality occurred during a joint NMML/ADFG trip in 2005 (Table 6). Assuming a NMML pup mortality rate in the western stock, and a pooled NMML/ADFG capture mortality rate (Table 6), an average of 1.4 mortalities per year (with a 1SE range of 0-2.8 mortalities per year) could be expected as a result of our proposed pup and juvenile capture and handling activities. No mortalities are expected as a result of pen captures, though post-capture anesthesia always has a potential for causing accidental mortality. During the past ten years, researchers at NMML have captured 1800 sea lions in floating pens at Shilshole Bay, Washington with only a single mortality (Pat Gearin, pers. comm.). Capture of sub-adult and adult sea lions using injectable drugs administered via remotely fired darts may result in mortalities. During 1990-1996, 1 of 53 (1.9%) sub-adult and adult sea lions that remained observable (that is, did not enter the water) following darting by NMML died (Table 7). Because research-related mortalities are rare events compared to the number of sea lions taken from all activities, a calculated average rate may not be reached over several years, or may be exceeded within one year.

In the Environmental Assessment prepared for issuing Steller sea lion research permits in 2002, NMFS (2002) established an average annual mortality upper limit that was applied to the western stock at a level that even if reached would not cause a significant impact. NMFS (2002) stated that if accidental mortalities in the western stock reached 10 sea

lions (about 5% of the stock's PBR) then researchers were required to consult with one another to identify research practices prevent accidental mortalities in the western stock from exceeding 20 sea lions (10% of the stock's PBR). With this mitigation measure in place, NMFS (2002) concluded that accidental mortality from research activities would not have a significant adverse impact on the Steller sea lion population.

2. Measures to Minimize Effects

A review of anticipated effects of these activities was presented in the environmental assessment for permitting research activities in 2002 (NMFS 2002). As there are few new activities being proposed, only supplemental information is presented here.

All activities are coordinated with research activities of the Alaska Department of Fish and Game, Alaska SeaLife Center, University of Alaska, Aleutians East Borough, University of Washington, Texas A&M, Oregon Department of Fish and Wildlife, Washington Department of Fish and Game, and other researchers to minimize disturbance.

The Alaska Region is notified in advance of our research activity schedule.

Activity 1: Aerial surveys during the breeding season

Survey aircraft approach sites, when possible, from a kilometer or more offshore and without banking (the sound change associated with banking increases the likelihood of disturbing animals), and they typically are within hearing range for no more than 1-2 minutes. This protocol has reduced the effects of the approach and usually less than 1% of hauled out animals go into the water.

Activity 2: aerial surveys during the non-breeding season

Same as Activity 1.

Activity 3: ground counts and incidental scat collection

Impacts of the pup counts are potentially greater than from aerial surveys because most adult animals must be moved to the edge of the rookery or into the water to make the count. To minimize impact, our protocol states that we (1) will not survey until near the end of the pupping season (late June or later), after mother-pup bonds are well established; (2) will minimize the time that we are occupying the beach ($\leq$ 2 hrs for counting, $\leq$ 5 hrs if capturing 50 pups for measuring and weighing); and (3) will use biologists experienced in herding to slowly move the adults out of the way, and experienced counters to complete the surveys as quickly as possible.

Activity 4: incidental disturbance during scat collection, capture/sampling, or observational/monitoring activities

Activities are carried out efficiently, such that the total time researchers are occupying a rookery/haulout, and total number of times a site is disturbed are minimized. Multiple activities are combined for a site to minimize number of disturbances. As little of a site is disturbed as possible to accomplish an activity.

Activity 5: Accidental mortality
Extreme caution is exercised during all activities to reduce or prevent mortalities. For example, during ground counts adults are slowly herded and moved off the rookery to prevent stampeding and the crushing of pups. Moving the adults slowly allows time for pups to move away from the water, reducing the number of pups that go into the water when personnel enter the rookery. To prevent, crowding, asphyxia, or drowning during pup captures and related activities, small groups of pups (<50) are slowly rounded-up in areas free of cracks, crevices, or pools. Specific field crew members are tasked with monitoring pup groups, and will move pups around as necessary to prevent piling and to ensure their safety. Handlers monitor pups following procedures involving anesthesia to ensure complete recovery.

Activity 6: Capture (includes hand, hoop net, underwater noose, floating trap, dart injection and associated activities
Capture myopathies have not been documented to occur in pinnipeds, though we assume captures are a stressful event for sea lions, but no determination has been made of relative stress levels by technique. Captured animals are carefully monitored for signs of stress. If a captured animal shows signs of acute or protracted alarm reaction (e.g., overexertion, constant muscle tensions, abnormal respiration or heart rate) that may lead to serious injury, capture myopathy, other disease conditions, or death, research-related procedures are immediately ceased to focus on the animal, and treat the symptoms as determined appropriate by the PI, CI, or attending veterinarian. Crash kits containing doxapram, epinephrine, intubation tubes, ventilation bags, and additional reversal drugs are provided by the attending veterinarian for emergency purposes.

Animals are processed in groups small enough that all animals can be adequately monitored (*e.g.* two physically restrained but not chemically immobilized animals per observer), and handling/restraint time are kept to the minimum possible. When pups are handled, they are sufficiently monitored, and separated if necessary, to ensure that they are not suffocated, being crushed, or aspirating milk.

Activities are carried out efficiently, such that the total time researchers are occupying a rookery/haulout, and total number of times a site is disturbed is minimized.

Multiple activities are combined for a site to minimize number of disturbances.

Only the bare minimum area of any given site is disturbed to accomplish an activity.

Biologists experienced in capture and sampling techniques are used to complete the activities as quickly as possible.

Pups restrained are restrained by hand, without using a restraint board or drugs (except where the use of gas anesthesia is indicated for branding and other intrusive procedures), and handling time is kept to a minimum.

An experienced marine mammal veterinarian is present to carry out or provide direct on-site supervision of all activities involving the use of inhalable anesthesia.

Caution is exercised when approaching all pinnipeds, particularly mother/pup pairs, and efforts to approach and handle a particular animal or mother/pup pair are immediately terminated if there is any evidence that the activity(ies) may be life-threatening.

Reasonable steps will be taken to identify pups of lactating females before attempting to immobilize a lactating female. Because of Steller sea lion reproductive strategies, it is likely any female of reproductive age could be lactating. In the event a female dies or is seriously injured as a result of the activities, the orphaned pup shall, when it can be identified, be humanely provided for (i.e. salvaged [placed in a stranding facility for rehabilitation and eventual release], or if salvage is not possible, euthanized).

We ensure that animals that have been captured or are recovering from immobilizing drugs have an opportunity to recover without undue risk of injury from other animals by releasing them in an area void of other animals, yet in close proximity to the sampling stations where they can be monitored by personnel (or by recovering fully onboard a research vessel prior to release).

To the maximum extend practical without causing further disturbance of the rookery/haulout, animals are monitored post-handling for signs of acute stress or injury.

Mitigation for these risks will be accomplished by careful selection of target animals, immediate availability of revival agents (such as doxapram and epinephrine), reversal agents (atipamezole for medetomidine) and CPR measures, and by not utilizing injectable agents for prolonged anesthesia.

a. Blood collection
For this and other invasive procedures, only highly-experienced and well-trained personnel perform invasive procedures.

When blood sampling, needle insertions do not exceed 3 attempts (needle insertions) per animal, and not more than 1.0 ml of blood per kg body mass is drawn per capture event. If an animal cannot be adequately immobilized for blood sampling, efforts to collect blood are discontinued.

b. Skin biopsy
c. Blubber biopsy
j. Deuterated water
k. Bioelectric impedance analysis
l. Stomach intubation or enemas

Sterile, disposable needles or instruments are always used for blood sampling and injections of drugs or other approved substances. When disposables are not available, instruments (darts, stomach tubes, biopsy needles, etc) are thoroughly disinfected with a

bacteriocidal/virucidal agent in accordance with the product directions between animals and, as needed, immediately prior to each use. Field-sterile techniques are always utilized when collecting samples.

e. Tooth extraction
This procedure would be performed only if no other ageing technique is reliable, only while a sea lion is under general anesthesia, and only by trained personnel.

h. Hot-brand
To minimize disturbance related to branding activities, we follow clearing procedures as described under Activity 4. Unless a ground count was conducted in association with the branding operation, the portion of the rookery cleared is kept to the minimum necessary to round up the desired number of pups. Hot-brands are applied only when an animal is under general anesthesia. See Appendix I for additional details.

3. Monitoring effects of activities
During aerial surveys, personnel of the NMML were on the ground viewing the rookery beaches at Fish, Marmot, and Ugamak Islands during 2002 and at Marmot and Ugamak Islands during 2004. Disturbance caused during aerial surveys was minimal; most sea lions appeared unaware of the aircraft and probably less than 10% of the animals surveyed reacted at all. Observers on Ugamak Island noted a "mild spook of rookery," but all animals remained on the beach. In remote regions that experience little aircraft or vessel traffic, few animals were occasionally spooked off a site by the aircraft. No major disturbances, injuries, or mortalities were a consequence of aerial survey activities.

During the period of our previous permit (2000-2004), we monitored the effects of our activities during pup counts and handling at all rookeries visited, and independent observations were made by observers at two rookeries, including Ugamak and Marmot Islands. During 2000-2004, no stampeding occurred at any rookery visited, and non-pups displaced typically remained in the water immediately offshore and often began returning to the beach before the scientific party departed. No mortalities were observed to occur during the conduct of, or as a consequence of, any pup survey activities. Observers at Marmot Island likewise detected no apparent effect of disturbance on pup or non-pup counts subsequent to rookery activities during 2004.

Disturbances incidental to scat collection and brand resighting have averaged less than 28% of the sea lions exposed to the activity (NMML 2006 permit report), and the rate may be much less for protocols designed to assess behavioral relationships between mothers and pups.

During the period 2000-2005, observers at Ugamak Island detected no mortalities as a result of branding activities conducted at the Ugamak Bay and Ugamak North rookery locations. Observers at Marmot Island detected no apparent difference in mortality for branded and unbranded pups during weeks subsequent to branding. Observers at Marmot Island also detected no apparent difference in pup counts subsequent to branding

operations during 2004 (see Appendix I for a detailed description of post-branding monitoring).

4. Alternatives

a. See Appendix I

b. The NMFS does not have an IACUC.

E. Resources Needed to Accomplish Objectives

Formal Research Proposal: No formal research proposal has been prepared. Our research supports NOAA's strategic plan goal to protect, restore, and manage the use of coastal and ocean resources through ecosystem-based management, and directly addresses the strategic objective to recover protected species by conducting studies to fulfill the five mission strategy measures of success: 1) to provide basic information on Steller sea lions, their habitat, and the human activities that affect them; 2) to understand and describe the ecological and biological population aspects of Steller sea lions as a basis for sound management decisions; 3) to develop and implement models and integrated datasets to assess Steller sea lion populations and predict future abundance; 4) to inform decision makers and the public about the condition of, and adverse effects of human interactions with, Steller sea lions; and 5) to provide data necessary for development and implementation of appropriate plans, regulations, permits and enforcement activities for the conservation and recovery of Steller sea lions.

1. Sponsors and Cooperating Institutions:

1. Resource Ecology and Fisheries Management, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, 7600 Sand Point Way NE, Seattle, Washington
2. Resource Assessment and Conservation Engineering, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, 7600 Sand Point Way NE, Seattle, Washington
3. Protected Resources Management Division, Alaska Regional Office, National Marine Fisheries Service, Juneau, Alaska
4. Alaska Maritime National Wildlife Refuge, U.S. Fish and Wildlife Service, 95 Sterling Highway, Suite 1, Homer, Alaska 99603
5. Alaska Fish and Wildlife Research Center, U.S. Geologic Survey, 1011 E. Tudor Rd., Anchorage, Alaska
6. Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, Alaska
7. Institute of Marine Science, University of Alaska, Fairbanks, Alaska
8. Marine Advisory Program, University of Alaska Sea Grant, Kodiak, Alaska
9. Alaska Sea Life Center, Seward, Alaska
10. Department of Marine Biology, Texas A&M University, Galveston, Texas
11. Department of Fisheries and Wildlife, Texas A&M University, College Station, Texas
12. Marine Mammals Laboratory, VNIRO (All-Russian Scientific Research Institute of Fisheries and Oceanography), 17 V. Krasnoselskaya, Moscow, 107140, Russia

13. Marine Mammal Research, TINRO (Pacific Scientific Research Institute of Fisheries and Oceanography), Shevchenko Alley, 4, Vladivostok, 690600, Russia
14. Marine Mammal Research, KoTINRO (Kamchatka Branch Pacific Scientific Research Institute of Fisheries and Oceanography), Petropavlovsk-Kamchatskii, Russia
15. KAMCHATRYBVOD, Petropavlovsk-Kamchatskii, Russia
16. Far Seas Fisheries Research Lab, Japan Fisheries Agency, 7-1, 5-Chome Orido, Shimizu 424 Japan
17. Marine Mammal Section, Fisheries and Oceans Canada, Nanaimo, British Columbia, Canada
18. Canadian Wildlife Service, 115 Perimeter Road, Saskatoon, Saskatchewan, Canada
19. Auke Bay Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, Auke Bay, Alaska
20. Washington Department of Fish and Wildlife, Olympia, WA
21. Oregon Department of Fish and Wildlife, Marine Resources Program, Newport OR

F. Publication of Results

Results will be presented in peer-reviewed publications, as presentations at scientific and management meetings or conferences (e.g. Alaska Marine Science Symposium, Biennial Marine Mammal Conference, etc.), and in reports prepared for MMPA, ESA, or NEPA analyses of proposed federal actions.

V. National Environmental Policy Act (NEPA) Considerations:

1. The proposed project will involve the use of a new capture technique, which was presented by Simon Goldsworthy of La Trobe University, Victoria, Australia, at the 2004 Sea Lions of the World Conference in Anchorage, Alaska. The technique has been successful for S. Goldsworthy and colleagues and we believe the method can be used to capture larger, older Steller sea lions in remote areas of Alaska. If successful, this technique will surely be adopted by other researchers in the future.

2. Activities involve the collection, handling, and transport of blood and tissue samples. For this reason, all personnel wear latex gloves while collecting and handling blood or nitrile gloves when handling DMSO. Furthermore, chemicals such as formalin are stored in the lab and used under a fume hood or in well ventilated areas (i.e. outdoors). Proper hygiene and disinfectant procedures are followed after handling all pathogenic materials or chemicals. Additionally, blood samples are frozen and stored in freezers used solely for biological samples (i.e. samples are not stored with food for human consumption). All protocols are followed for shipping purposes (e.g. appropriate stickers with material safety data sheets included).

3. As stated in the methods (section 1b), activities will occur in Steller sea lion critical habitat and the AMNWR. All proposed activities minimally impact the physical environment (via anchoring vessels, running zodiacs or small skiffs with outboard motors, and landing personnel on shore).

4. None of the proposed activities should cause loss or destruction of scientific, cultural, or historic resources.

5. To prevent the possible introduction or spread of non-indigenous or invasive species (via the transportation of biological materials from one area to another when conducting activities aboard larger research vessels), the NMML will stipulate that all contracted vessels abide by regulations of the national ballast water management program. Furthermore, a large portion of our Steller sea lion research occurs aboard the M/V *Tiglax* (USFWS), which takes preventative measures in the accidental transport of invasive species (e.g. rats and small mammals).

VI. Previous and Other Permits

A. Previous Permits

Our previous permit for Steller sea lion research, Permit No. 782-1768-00, was issued on May 31, 2005. This permit was subsequently amended and reissued as Permit No 782-1768-01 (Amendment No. 1) on June 29, 2005. This permit was initially valid until 31 May 2010, but was vacated by Court order on 26 May, 2006.

All reports required to date have been submitted. A Final Report for 782-1768 was submitted on 1 December, 2006.

B. Other Permits

The NMML operates within the Alaska Maritime National Wildlife Refuge in the Gulf of Alaska and Aleutian Islands under the authority of Special Use Permit 51576 from the Alaska Maritime National Wildlife Refuge, Homer, Alaska. Collection of carcasses or tissues from carcasses, and exportation of samples is authorized under Permit No. 782-1694-00 to the National Marine Mammal Laboratory.

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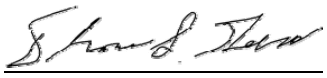
VIII. Certification and Signature

I hereby certify that the foregoing information is complete, true, and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under one or more of the following statutes and the regulations promulgated there under, as indicated in Section I. of this application:

The Endangered Species Act of 1973 (16 U.S.C. 1531-1543) and regulations (50 CFR 222.23(b)); and

The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407) and regulations (50 CFR Part 216).

I also understand that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties provided under the Endangered Species Act of 1973, the Marine Mammal Protection Act of 1972, or the Fur Seal Act of 1966, whichever are applicable."



Tom Gelatt, acting for
Dr. John Bengtson, Director
National Marine Mammal Laboratory

1 December 2006
Date

Table 1. Steller sea lion (*E. jubatus*) takes requested by the National Marine Mammal Laboratory Alaska Ecosystems Program for 2007-2011. The transport category is not included in the table, as it is not applicable to the proposed work. The annual maximum number of marine mammals that may be harassed incidental to activities are also included.

Species	Life Stage	sex	Expected take/year[1]	# Takes/ individual/ year	Take Action	Location	Frequency	Season
					1. Aerial survey: breeding season			
E. jubatus	pups	m/f	13,000	2		West of 144°W, AK (WS)	≤ 3x/5yrs	Jun-Jul
E. jubatus	non-pups	m/f	32,000	2		West of 144°W, AK (ES)	≤ 3x/5yrs	Jun-Jul
E. jubatus	pups	m/f	6,000	2		East of 144°W, AK (ES)	≤ 3x/5yrs	Jun-Jul
E. jubatus	non-pups	m/f	10,000	2		East of 144°W, AK (ES)	≤ 3x/5yrs	Jun-Jul
					2. Aerial survey: non-breeding season			
E. jubatus	all ages	m/f	28,000	4		West of 144°W, AK (WS)	≤ 3x/5yrs	Aug-May
E. jubatus	all ages	m/f	10,000	4		East of 144°W, AK (ES)	≤ 3x/5yrs	Aug-May
					3. Ground counts (and incidental scat collection)			
E. jubatus	pups	m/f	7,100	1		West of 144°W, AK (WS)	≤ 2x/5yrs	Jun-Jul
E. jubatus	non-pups	m/f	18,000	1		West of 144°W, AK (WS)	≤ 2x/5yrs	Jun-Jul
E. jubatus	pups	m/f	9,000	1		West of 144°W, AK (WS)	≤ 2x/5yrs	Jun-Jul
E. jubatus	non-pups	m/f	21,000	1		West of 144°W, AK (WS)	≤ 2x/5yrs	Jun-Jul
					4. Incidental disturbance during scat collection, capture/sampling activities, observational/monitoring activities			
E. jubatus	all ages	m/f	23,000	10		West of 144°W, AK (WS)	all years	all year
E. jubatus	all ages	m/f	5,000	5		WA, OR, and CA (ES)	all years	all year
					5. Accidental mortality			
E. jubatus	all ages	m/f	10*	1		West of 144°W, AK (WS)	unknown	all year
E. jubatus	all ages	m/f	1	1		WA, OR, and CA (ES)	unknown	all year
					6. Capture (includes hand, hoop net, underwater noose, floating trap, at-sea net capture technique, dart injection), Restraint (physical or chemical) and measurements			
E. jubatus	>5 days to 2 mo	m/f	1,100	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year

Table 1. Continued.

Species	Life Stage	sex	Expected take/year[1]	# Takes/ individual/ year	Take Action	Location	Frequency	Season
					6.a. Blood collection			
E. jubatus	>5 days to 2 mo	m/f	450	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year
					6.b. Skin biopsy			
E. jubatus	>5 days to 2 mo	m/f	450	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year
					6.c. Blubber biopsy			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year
					6.d. Fecal loops and culture swabs			
E. jubatus	>5 days to 2 mo	m/f	450	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year
					6.e. Tooth extraction			
E. jubatus	>2 mo to 3 yr	m/f	120	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year

Table 1. Continued.

Species	Life Stage	sex	Expected take/year[1]	# Takes/ individual/ year	Take Action	Location	Frequency	Season
					6.f. Pull vibrissae, clip hair and nails			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year
					6.g. Flipper tag or other mark			
E. jubatus	>5 days to 2 mo	m/f	700	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	4		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	2		WA, OR, and CA (ES)	all years	all year
					6.h. Hot-brand			
E. jubatus	>5 days to 2 mo	m/f	400	1		West of 144°W, AK (WS)	all years	Jun-Jul
E. jubatus	>2 mo to 3 yr	m/f	120	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	1		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year
E. jubatus	>3 yr	m/f	12	1		WA, OR, and CA (ES)	all years	all year
					6.i. Attachment of scientific instruments			
E. jubatus	>5 days to 2 mo	m/f	100	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
E. jubatus	>2 mo	m/f	12	4		WA, OR, and CA (ES)	all years	all year
					6.j. Deuterated water			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
					6.k. Bioelectric impedance analysis			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
					6.l. Stomach intubation or Enemas			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year

Table 1. Continued.

Species	Life Stage	sex	Expected take/year[1]	# Takes/ individual/ year	Take Action	Location	Frequency	Season
					6.m. Ultrasonic imaging			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
					6.n. Lesion biopsy			
E. jubatus	>2 mo to 3 yr	m/f	120	4		West of 144°W, AK (WS)	all years	all year
E. jubatus	>3 yr	m/f	60	2		West of 144°W, AK (WS)	all years	all year
					7. Incidental harassment during aerial surveys of sea lions			
C. ursinus	all ages	m/f	10,000	6		Bogoslof Is.	monthly	Jun-Oct
P. vitulina	all ages	m/f	5,000	6		Alaska	monthly	all year
					8. Incidental harassment during sea lion pup counts			
C. ursinus	all ages	m/f	5,000	1		Bogoslof Is.	all years	Jun-Jul
					9. Incidental harassment during scat collection, capture/sampling activities, observational/monitoring activities			
Z. californianus	all ages	m/f	3,000	5		WA, OR, and CA	monthly	all year
P. vitulina	all ages	m/f	200	5		WA, OR, and CA	monthly	all year

* This number is not to exceed 5 in western stock. These are not cumulative takes among permit holders, rather an upper limit for all mortalities

Table 2. Locations of Steller sea lion rookeries and haulout sites that will be counted during aerial surveys.

Region	Location	Latitude	Longitude
E GULF	AIALIK CAPE	59.71	-149.52
E GULF	CAPE FAIRFIELD	59.92	-148.81
E GULF	CAPE HINCHINBROOK	60.23	-146.64
E GULF	CAPE JUNKEN	59.91	-148.64
E GULF	CAPE PUGET	59.94	-148.45
E GULF	CAPE RESURRECTION	59.86	-149.28
E GULF	CHISWELL ISLANDS	59.60	-149.57
E GULF	DANGER	59.93	-148.08
C GULF	FLAT	59.33	-152.00
E GULF	GLACIER	60.86	-147.24
E GULF	GRANITE CAPE	59.61	-149.76
E GULF	HOOK POINT	60.33	-146.26
E GULF	MIDDLETON	59.47	-146.31
C GULF	NUKA POINT	59.30	-150.72
C GULF	OUTER (PYE)	59.34	-150.38
C GULF	PERL	59.10	-151.66
E GULF	POINT ELRINGTON	59.93	-148.25
E GULF	POINT LaTOUCHE	59.94	-148.05
E GULF	PROCESSION ROCKS	60.01	-148.29
E GULF	RABBIT	59.36	-150.38
E GULF	RUGGED	59.83	-149.39
E GULF	SEAL ROCKS (KENAI)	59.52	-149.63
E GULF	STEEP POINT	59.48	-150.26
E GULF	THE NEEDLE	60.11	-147.60
C GULF	CAPE DOUGLAS	58.86	-153.23
C GULF	CAPE GULL	58.19	-154.16
C GULF	CAPE NUKSHAK	58.39	-153.98
C GULF	CAPE UGYAK	58.28	-154.10
C GULF	EAST CHUGACH	59.11	-151.44
C GULF	GORE POINT	59.20	-150.97
C GULF	KODIAK/CAPE ALITAK	56.84	-154.31
C GULF	KODIAK/CAPE IKOLIK	57.29	-154.79
C GULF	KODIAK/CAPE KULIUK	57.81	-153.93
C GULF	KODIAK/SUNDSTROM	56.68	-154.15
C GULF	KODIAK/TOMBSTONE ROCKS	57.35	-154.82
C GULF	LATAX ROCKS	58.67	-152.52
C GULF	NAGAHUT ROCKS	59.10	-151.77
C GULF	PERL ROCKS	59.09	-151.69
C GULF	PUALE BAY	57.68	-155.39
C GULF	SHAKUN ROCKS	58.55	-153.69
C GULF	SHAW	59.00	-153.38
C GULF	SUD	58.90	-152.21
C GULF	TAKLI	58.03	-154.52

Table 2. continued

Region	Location	Latitude	Longitude
C GULF	WEST AMATULI	58.95	-152.02
C GULF	AGHIYUK	56.16	-156.81
W GULF	ATKINS	55.05	-159.29
W GULF	ATKULIK	56.28	-157.73
W GULF	BIG KONIUJI	55.25	-159.53
W GULF	BIRD	54.67	-163.29
W GULF	CASTLE ROCK	55.27	-159.50
W GULF	CATON	54.38	-162.36
W GULF	CHANKLIUT	56.13	-158.12
W GULF	CHERNABURA	54.75	-159.55
W GULF	CHERNI	54.63	-162.37
C GULF	CHOWIET	56.01	-156.69
W GULF	CLUBBING ROCKS	57.44	-143.63
W GULF	EGG (SAND POINT)	55.28	-160.52
W GULF	HAGUE ROCK	54.56	-162.40
W GULF	HUNT	54.76	-162.25
W GULF	JUDE	55.26	-161.10
W GULF	KAK	56.29	-157.84
W GULF	KUPREANOF POINT	55.56	-159.60
W GULF	LIGHTHOUSE ROCKS	55.78	-157.41
W GULF	MITROFANIA	55.84	-158.70
W GULF	NAGAI/MOUNTAIN POINT	54.90	-160.26
W GULF	NAGAI/RK W OF CAPE WEDGE	55.24	-159.96
W GULF	OLGA ROCKS NE	55.01	-161.50
W GULF	OLGA ROCKS SW	54.98	-161.51
W GULF	OMEGA	55.24	-161.24
W GULF	PINNACLE ROCK	54.77	-161.76
W GULF	ROCK	54.61	-163.63
W GULF	SANAK	54.38	-162.58
W GULF	SEA LION ROCKS (SHUMAGINS)	55.08	-160.52
W GULF	SEAL CAPE	56.00	-158.42
W GULF	SOUTH ROCKS	54.30	-162.69
W GULF	SOZAVARIKA	54.86	-162.52
W GULF	SPITZ	55.78	-158.90
W GULF	SUSHILNOI ROCKS	54.82	-161.71
W GULF	THE HAYSTACKS	55.27	-160.06
W GULF	THE WHALEBACK	55.28	-160.08
W GULF	TWINS	54.96	-159.88
W GULF	UMGA	54.80	-162.73
W GULF	UNGA/ACHEREDIN POINT	55.12	-160.82
W GULF	UNGA/CAPE UNGA	55.13	-160.54
E ALEU	UNIMAK/CAPE LAZAREF	54.61	-163.59
E ALEU	UNIMAK/CAPE LUTKE	54.47	-164.35
E ALEU	UNIMAK/SCOTCH CAP	54.40	-164.76
E ALEU	UNIMAK/SENNETT POINT	54.48	-164.92

Table 2. continued

Region	Location	Latitude	Longitude
W GULF	WOSNESENSKI	55.18	-161.37
C ALEU	ADAK/CRONE ISLAND	51.67	-176.61
E ALEU	ADUGAK	52.91	-169.18
E ALEU	AIKTAK	54.18	-164.85
E ALEU	AKUN/AKUN BAY	54.21	-165.41
E ALEU	AKUN/AKUN HEAD	54.30	-165.63
E ALEU	AKUN/BILLINGS HEAD	54.29	-165.53
E ALEU	AKUN/JACKASS POINT	54.11	-165.56
E ALEU	AKUTAN/BATTERY POINT	54.04	-165.89
E ALEU	AKUTAN/CAPE MORGAN	54.06	-165.99
E ALEU	AKUTAN/REEF-LAVA	54.14	-166.10
E ALEU	BABY	53.99	-166.07
E ALEU	BASALT ROCK	54.11	-165.38
E ALEU	EGG	53.87	-166.04
E ALEU	EMERALD	53.29	-167.86
E ALEU	INNER SIGNAL	53.79	-166.09
E ALEU	KALIGAGAN	54.14	-164.91
E ALEU	OGCHUL	53.00	-168.40
E ALEU	OLD MAN ROCKS	53.87	-166.08
E ALEU	OUTER SIGNAL	53.80	-166.05
E ALEU	POLIVNOI ROCK	53.27	-167.97
E ALEU	ROOTOK/EAST	54.05	-165.49
E ALEU	ROOTOK/NORTH	54.07	-165.53
E ALEU	SAMALGA	52.77	-169.25
E ALEU	TANGINAK	54.20	-165.32
E ALEU	THE PILLARS	53.19	-168.24
E ALEU	TIGALDA/ROCKS NE	54.16	-164.98
E ALEU	TIGALDA/SOUTH SIDE	54.07	-165.08
E ALEU	UGAMAK/NORTH	54.23	-164.79
E ALEU	UGAMAK/ROUND	54.20	-164.78
E ALEU	UGAMAK/UGAMAK BAY	54.21	-164.78
E ALEU	UMNAK/CAPE ASLIK	53.42	-168.41
E ALEU	UNALASKA/CAPE IZIGAN	53.23	-167.66
E ALEU	UNALASKA/CAPE SEDANKA	53.84	-166.08
E ALEU	UNALASKA/WHALEBONE CAPE	53.48	-166.67
E ALEU	UNIMAK/CAPE SARICHEF	54.57	-164.95
E ALEU	VSEVIDOF	52.98	-168.49
C ALEU	ADAK/ARGONNE POINT	51.83	-176.91
C ALEU	ADAK/CAPE MOFFET	51.97	-176.72
C ALEU	ADAK/CAPE YAKAK	51.59	-176.95
C ALEU	ADAK/LAKE POINT	51.62	-176.99
C ALEU	AGLIGADAK	52.10	-172.90
C ALEU	AMLIA/CAPE MISTY	52.04	-173.83
C ALEU	AMLIA/EAST CAPE	52.10	-172.98
C ALEU	AMLIA/SVIECH. HARBOR	52.03	-173.40

Table 2. continued

Region	Location	Latitude	Longitude
C ALEU	ANAGAKSIK	51.85	-175.88
C ALEU	ATKA/CAPE KOROVIN	52.31	-174.46
C ALEU	ATKA/NORTH CAPE	52.40	-174.30
C ALEU	CHUGUL	51.92	-175.77
C ALEU	FENIMORE	51.98	-175.54
C ALEU	GREAT SITKIN	52.10	-176.18
C ALEU	IGITKIN/SW POINT	51.98	-175.96
C ALEU	IKIGINAK	51.98	-175.48
C ALEU	KAGALASKA	51.87	-176.31
C ALEU	KANAGA/CAPE MIGA	51.94	-177.18
C ALEU	KANAGA/N CAPE	51.94	-177.15
C ALEU	KANAGA/SHIP ROCK	51.78	-177.35
C ALEU	KASATOCHI/NORTH POINT	52.19	-175.52
C ALEU	KONIUJI/NORTH POINT	52.23	-175.14
C ALEU	LITTLE TANAGA STRAIT	51.82	-176.23
C ALEU	OGLODAK	51.98	-175.44
C ALEU	SAGIGIK	52.01	-173.16
C ALEU	SALT	52.18	-174.64
C ALEU	SILAK	51.82	-176.25
C ALEU	TAGALAK	51.96	-175.62
C ALEU	TANADAK (AMLIA)	52.07	-172.96
W ALEU	ALAID	52.78	173.86
W ALEU	NIZKI	52.75	173.98
W ALEU	SHEMYA	52.73	174.15
W ALEU	ATTU/CHICHAGOF POINT	52.94	173.27
W ALEU	ATTU/CHIRIKOF POINT	52.83	173.43
W ALEU	ATTU/KRESTA POINT	53.00	172.63
W ALEU	ATTU/MASSACRE BAY	52.78	173.15
W ALEU	DAN'S ROCKS	52.78	173.29
C ALEU	AMCHITKA/BIRD	51.66	178.63
C ALEU	AMCHITKA/CAPE IVAKIN	51.41	179.40
C ALEU	AMCHITKA/CHITKA POINT	51.59	179.01
C ALEU	AMCHITKA/COLUMN ROCK	51.54	178.82
C ALEU	AYUGADAK	51.76	178.41
C ALEU	KISKA/CAPE ST STEPHEN	51.88	177.21
C ALEU	KISKA/GERTRUDE-BUKHTI	51.91	177.48
C ALEU	KISKA/LIEF COVE	51.95	177.34
C ALEU	KISKA/PILLAR ROCK	52.12	177.36
C ALEU	KISKA/SOBAKA-VEGA	51.83	177.32
C ALEU	KISKA/WITCHCRAFT POINT	52.05	177.49
C ALEU	RAT	51.83	178.21
C ALEU	SEA LION ROCK (KISKA)	51.88	177.98
C ALEU	SEMISOPOCHNOI/PETREL	52.02	179.62
C ALEU	SEMISOPOCHNOI/POCHNOI	51.96	179.77
C ALEU	SEMISOPOCHNOI/SW KNOB	51.91	179.51

Table 2. continued

Region	Location	Latitude	Longitude
C ALEU	SEMISOPOCHNOI/TUMAN POINT	51.96	179.48
C ALEU	TANADAK (KISKA)	51.95	177.78
C ALEU	TWIN ROCKS (KISKA)	51.92	177.62
W ALEU	AGATTU/CAPE SABAK	52.38	173.72
W ALEU	AGATTU/GILLON POINT	52.40	173.36
W ALEU	ATTU/CAPE WRANGELL	52.91	172.47
W ALEU	BULDIR/EAST CAPE	52.36	175.97
W ALEU	BULDIR/NW ROCKS	52.39	175.85
W ALEU	BULDIR/ROOKERY	52.34	175.90
W ALEU	INGENSTREM ROCKS	52.64	174.52
C ALEU	AMATIGNAK/KNOB POINT	51.25	-179.07
C ALEU	AMATIGNAK/NITROF POINT	51.22	-179.13
C ALEU	AMCHITKA/EAST CAPE	51.37	179.47
C ALEU	AMCHITKA/OMEGA POINT	51.36	179.39
C ALEU	AMCHITKA/ST. MAKARIUS	51.35	179.23
C ALEU	AMUKTA+ROCKS	52.45	-171.30
C ALEU	BOBROF	51.90	-177.45
E ALEU	BOGOSLOF/FIRE ISLAND	53.93	-168.03
C ALEU	CARLISLE	52.93	-170.08
C ALEU	CHAGULAK	52.57	-171.18
C ALEU	CHUGINADAK	52.78	-169.70
C ALEU	GRAMP ROCK	51.48	-178.34
C ALEU	HERBERT	52.72	-170.08
C ALEU	ILAK	51.48	-178.31
C ALEU	KAGAMIL	53.04	-169.68
C ALEU	KANAGA/CAPE CHUNU	51.66	-177.64
C ALEU	KAVALGA	51.58	-178.86
C ALEU	OGLIUGA	51.62	-178.66
C ALEU	SEGUAM/FINCH POINT	52.39	-172.46
C ALEU	SEGUAM/LAVA COVE	52.27	-172.48
C ALEU	SEGUAM/LAVA POINT	52.28	-172.40
C ALEU	SEGUAM/SADDLERIDGE	52.35	-172.57
C ALEU	SEGUAM/SW RIP	52.26	-172.63
C ALEU	SEGUAM/TURF POINT	52.26	-172.52
C ALEU	SEGUAM/WHARF POINT	52.36	-172.32
C ALEU	SKAGUL/S. POINT	51.58	-178.57
C ALEU	TAG	51.56	-178.58
C ALEU	TANAGA/BUMPY POINT	51.92	-177.98
C ALEU	TANAGA/CAPE SASMIK	51.60	-177.93
C ALEU	UGIDAK	51.58	-178.51
C ALEU	ULAK/HASGOX POINT	51.32	-178.98
E ALEU	UNALASKA/BISHOP POINT	53.97	-166.96
E ALEU	UNALASKA/CAPE STARICHKOF	53.69	-167.07
E ALEU	UNALASKA/CAPE WISLOW	54.02	-166.75
E ALEU	UNALASKA/KOVRIZHKA	53.85	-167.17

Table 2. continued

Region	Location	Latitude	Longitude
E ALEU	UNALASKA/MAKUSHIN BAY	53.71	-167.02
E ALEU	UNALASKA/PRIEST ROCK	54.01	-166.38
E ALEU	UNALASKA/SPRAY CAPE	53.62	-167.16
C ALEU	UNALGA+DINKUM ROCKS	51.56	-179.07
C ALEU	YUNASKA	52.69	-170.61
C GULF	AFOGNAK/TONKI CAPE	58.35	-151.99
E ALEU	AMAK+ROCKS	55.40	-163.16
C ALEU	KISKA/SOUTH HEAD	51.95	177.61
C GULF	KODIAK/CAPE PARAMANOF	58.31	-153.05
C GULF	KODIAK/CAPE UGAT	57.87	-153.85
C GULF	KODIAK/MALINA POINT	58.03	-153.37
C GULF	KODIAK/STEEP CAPE	58.21	-153.19
C GULF	LONG ISLAND	57.78	-152.22
C GULF	NOISY	57.93	-153.56
C GULF	RK NEAR SEA OTTER	58.51	-152.20
E ALEU	SEA LION ROCK (AMAK)	55.46	-163.20
C GULF	SEA OTTER	58.52	-152.22
C GULF	KODIAK/CAPE CHINIAK	57.63	-152.14
C GULF	SEA LION ROCKS (MARMOT)	58.34	-151.81
C GULF	SUGARLOAF	58.89	-152.04
C GULF	USHAGAT/NW	58.97	-152.32
C GULF	USHAGAT/ROCKS SOUTH	58.88	-152.32
C GULF	USHAGAT/SW	58.91	-152.37
C GULF	AIUGNAK COLUMNS	56.88	-156.57
C GULF	CHIRIKOF	55.78	-155.66
C GULF	ELIZABETH/CAPE ELIZABETH	59.16	-151.89
C GULF	KILOKAK ROCKS	57.16	-156.27
C GULF	KODIAK/CAPE BARNABAS	57.17	-152.88
C GULF	KODIAK/GULL POINT	57.36	-152.61
C GULF	MARMOT	58.23	-151.80
C GULF	NAGAI ROCKS	55.83	-155.79
C GULF	SITKINAK/CAPE SITKINAK	56.57	-153.85
C GULF	SUTWIK	56.52	-157.34
C GULF	TWOHEADED	56.91	-153.55
C GULF	UGAIUSHAK	56.75	-156.85
C GULF	UGAK	57.39	-152.29
SE AK	CAPE FAIRWEATHER	58.79	-137.94
SE AK	GRAN (LEDGE) POINT	59.13	-135.24
SE AK	SOUTH MARBLE	58.65	-136.05
SE AK	BIALI ROCK	56.71	-135.34
SE AK	CAPE ADDINGTON	55.44	-133.82
SE AK	CAPE BARTOLOME	55.23	-133.62
SE AK	CAPE OMMANEY	56.18	-134.71
SE AK	CORONATION	55.93	-134.28
SE AK	GRINDALL	55.44	-132.11

Table 2. continued

Region	Location	Latitude	Longitude
SE AK	HAZY	55.87	-134.57
SE AK	JACOB ROCK	56.79	-135.50
SE AK	KAIUCHALI (BIORKA)	56.83	-135.56
SE AK	LARCH BAY	56.21	-134.74
SE AK	POINT MARSH	54.71	-132.29
SE AK	SEA LION ISLANDS	57.28	-135.88
SE AK	SEA LION ROCK (PUFFIN BAY)	56.25	-134.83
SE AK	SUNSET	57.50	-133.59
SE AK	TIMBERED	55.70	-133.80
SE AK	WEST ROCK	54.81	-131.50
SE AK	WHITE SISTERS	57.64	-136.26
SE AK	WOLF ROCK	55.02	-133.49
E GULF	CAPE ST. ELIAS	59.79	-144.60
E GULF	SEAL ROCKS	60.16	-146.84
E GULF	WOODED (FISH)	59.88	-147.34

Table 3. Likely rookeries of: 1) pup ground counts only (Activity 3); 2) pup counts (Activity 3) with handling of up to 50 pups at each site (Activities 6a,b,d, g, i, and n); 3) pup counts (Activity 4) with handling of up to 200 pups at each site for hot-branding and sampling (Activities 6a,b,d, h, i, and n); and 4) hot-branding and handling only (Activities 6a,b,d,h, i, and n). Activities occur during June and July. Additional locations may be addeddropped, due to logistics, funding, and sea lion behavior. Years are listed by permit-year.

Region	Site	Latitude	Longitude	First year	Second year	Third year	Fourth year	Fifth Year
W ALEU	ATTU/CAPE WRANGELL	52.910	171.535 E	2				2
	AGATTU/CAPE SABAK	52.375	172.278 E	2				2
	BULDIR	52.360	174.027 E	2				2
C ALEU	KISKA/LIEF COVE	51.953	176.660 E	2				2
	KISKA/CAPE ST STEPHEN	51.875	176.788 E	2				2
	AMCHITKA/COLUMN ROCK	51.539	177.179 E	1				1
	AYUGADAK	51.756	177.595 E	1				1
	SEMISOPOCHNOI	51.955	178.233 E	1				1
	GRAMP ROCK	51.481	177.657 W	1				1
	TAG	51.558	177.425 W	1		1		1
	ULAK/HASGOX POINT	51.315	177.018 W	2		2		2
	ADAK/LAKE POINT	51.623	175.007 W	2		2		2
	KASATOCHI/NORTH POINT	52.185	174.483 W	2				2
	SEGUAM/TURF POINT	52.259	171.480 W	1		1		1
	SEGUAM/SADDLERIDGE	52.351	171.427 W	2		2		2
	YUNASKA	52.690	169.394 W	2		2		2
BERING	WALRUS	57.183	168.067 W		1		1	
E ALEU	ADUGAK	52.912	168.825 W	2		2		2
	BOGOSLOF/FIRE ISLAND	53.928	167.966 W	1		1		1
	OGCHUL	52.995	167.596 W		1		1	
	AKUN/BILLINGS HEAD	54.294	164.466 W	2		2		2
	AKUTAN/CAPE MORGAN	54.056	164.006 W		2		2	
	UGAMAK/ROUND	54.201	163.223 W		1		1	
	UGAMAK/UGAMAK BAY	54.208	163.223 W		3		3	
	UGAMAK/NORTH	54.225	163.208 W		3		3	
	SEA LION ROCK (AMAK)	55.464	162.798 W	2		2		2
W GULF	CLUBBING ROCKS NORTH	54.713	161.555 W		1		1	
	CLUBBING ROCKS SOUTH	54.700	161.554 W		2		2	
	JUDE	55.263	160.895 W	1		1		1
	PINNACLE ROCK	54.768	160.236 W	2		2		2
	THE WHALEBACK	55.280	159.916 W	1		1		1
	ATKINS	55.053	158.710 W	2		2		2
	CHERNABURA	54.753	158.450 W		1		1	
	LIGHTHOUSE ROCKS	55.780	156.585 W	1		1		1
C GULF	CHOWIET	56.009	155.310 W		2		2	
	CHIRIKOF	55.775	154.342 W	2		2		2
	SUGARLOAF	58.888	151.960 W	3		3		3
	MARMOT	58.228	151.797 W	4		4		4
	SEA OTTER	58.519	151.778 W		1		1	
	OUTER (PYE)	59.342	149.617 W	1		1		1
E GULF	WOODED (FISH)	59.882	146.656 W		1		1	
	SEAL ROCKS	60.163	145.162 W	3		3		3

Table 4. Locations of pup captures (Activity 6) for measurements, hot-branding, and sampling (Activities 6a,b, d, e,h,i, and n) requested for 2007-2011 (or 5 years from date of issuance). Rookeries in the central Gulf of Alaska will be sampled during the first breeding season after the permit is issued, whereas rookeries in the eastern Gulf of Alaska and eastern Aleutian Islands will be sampled during alternate years. Thereafter, sites will be sampled biennially for the remainder of the permit period. Years are listed by permit-year.

Region	Site	Latitude	Longitude	First year	Second year	Third year	Fourth Year	Fifth Year
E ALEU	UGAMAK/NORTH	54.225 N	164.792 W		x		x	
	UGAMAK/UGAMAK BAY	54.208 N	164.777 W		x		x	
C GULF	SUGARLOAF	58.888 N	152.040 W	x		x		x
	MARMOT	58.228 N	151.796 W	x		x		x
E GULF	SEAL ROCKS	60.163 N	146.838 W	x		x		

Table 5. Steller sea lion mortalities attributable to research activities in the United States during 2000-2006. Mortality rates for this six year period were 0.8 mortalities per year from the western stock, and 3.3 mortalities per year from the eastern stock. Data from National Marine Mammal Laboratory (NMFS), Alaska Department of Fish and Game, Oregon Department of Fish and Wildlife, and Alaska SeaLife Center.

	Stock		
Year	Eastern	Western	Total
2000	0	0	0
2001	5	2	7
2002	4	0	4
2003	7	0	7
2004	3	2	5
2005	1	1	2
Total	20	5	25

Table 6. Estimates of mortality rates (*m*, mortalities per animal handled) for Steller sea lions as a consequence of capture and handling activities. Mortalities associated with branding work resulted from suffocation or drowning from pups piling when corralled, none resulted from branding (see Appendix I). Mortalities during juvenile captures occurred during hoop net capture (1) and initial gas anesthesia (1). Mortality rate and standard error were determined using a ratio estimator method. "Events" are the number of rookery visits for pup handling, or separate trips for juvenile captures.

Activity/group	Stock	Period	Mortalities	Handled	*m*	*SE (r)*	Events
Capture and restraint for measurements, sampling, and flipper tagging of pups							
NMML	western	2000-2004	0	1528	0	-	27
Capture and restraint for branding of pups <1.5 mo old							
NMML-AEP[1]	western	2000-2004	2	1169	0.002	0.002	13
NMML/ODFW[2]	eastern	2001-2003	2	511	0.004	0.002	3
ADFG[3]	eastern	2001-2003	14	1208	0.010	0.005	7
Pooled			*18*	*2703*	*0.007*	*0.002*	*23*
Capture and restraint of >4 mo old							
NMML/ADFG	CAI-SEA	2000-2005	3	464	0.006	0.005	24

[1]National Marine Mammal Laboratory-Alaska Ecosystems Program
[2]Oregon Department of Fish and Wildlife
[3]Alaska Department of Fish and Game

Table 7. Summary of outcomes for Steller sea lions darted by NMML during 1990-1996. Drug administered by dart was Telazol.

	YOY	Juveniles	SA/Adult	Total
Never down	5	2	13	20
Inaccessible location	2	4	9	15
Into water	5	5	19	29
Death	3	2	1	6
Instrumented/sampled	12	3	30	45
Total	27	16	72	115

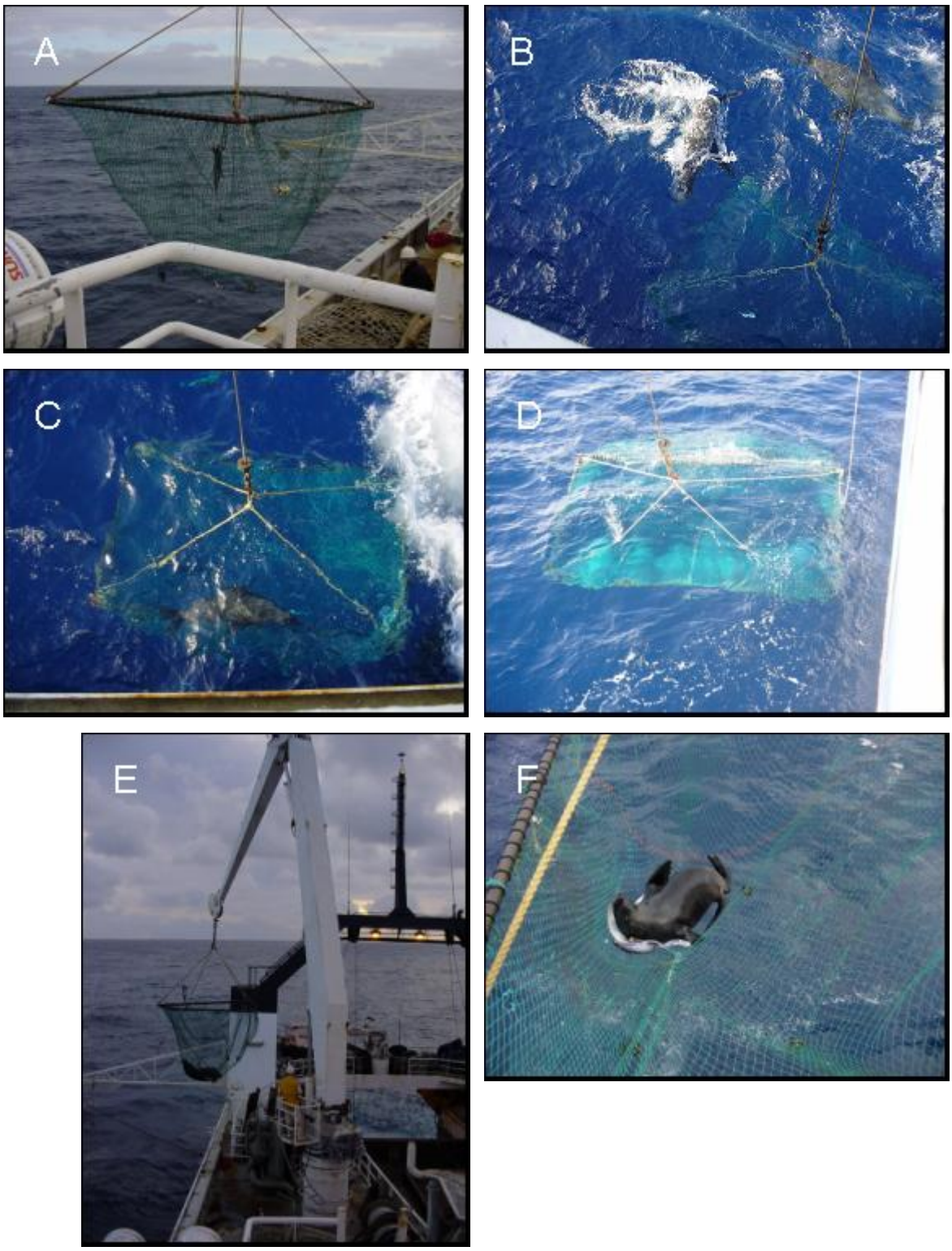


Figure 1. Series of photos depicting at-sea net capture process of Australian sea lions. A) net assembly is lowered over side of ship; B) sea lions swim around submerged net; C) sea lions dive into net to retrieve fish; D) net is then hoisted; E) net with sea lion is boomed aboard; F) sea lion in net. Photographs by Simon Goldsworthy.