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March 6, 2002

Ann Terbush
Office of Protected Resources – F/PR1
National Marine Fisheries Service
1315 East West Hwy – SSMC3
Silver Spring, MD 20910

Dear Ms. Terbush:

Attached is an application for a scientific research permit for studies of Steller sea lion population biology at rookeries and haul-out areas in the Pacific Northwest. The Oregon Department of Fish & Wildlife (ODFW) has been conducting research and monitoring activities on Steller sea lions in this area since 1985 (Research Permit Nos. 499, 835, and 854). Currently, aerial surveys, ground counts, and food habits sample collection activities are carried out under Research Permit No. 782-1446. As part of a new cooperative effort, ODFW and the National Marine Mammal Laboratory (NMML) have begun marking and monitoring the survival of Steller sea lion pups at rookeries in Oregon (under Research Permit No. 782-1532-00). The attached request would provide a separate permit for handling, marking, remote and on-site monitoring, estimation of survival rates, and related biological sampling activities specific to Steller sea lion rookeries in the Pacific Northwest. For administrative purposes, we are requesting that the lead authority to continue this work be granted specifically to ODFW (in cooperation with NMML). This does not represent a request for new types of research activities or takes that would not be authorized under existing permits.

We feel that a research permit specific to this segment of the eastern Steller stock is appropriate given the differences in population status and condition between the Pacific Northwest and many

Element 4 - Capture of Juveniles and Pups (Older than 4 Months)

i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need to monitor the health, condition, and vital parameters of sea lions (research task 4). More specifically, this included developing indices of condition (research task 432) and obtaining measurements and samples using non-lethal techniques (research task 445). The Recovery Plan also called for research to determine if biological parameters indicate different stocks of sea lions (research task 22).

The objective of this research is to collect condition data from the Pacific Northwest for comparisons with similar ongoing studies of the physical condition and distribution of pups and juveniles outside of the breeding season (particularly during the winter) in Alaska. Juvenile survival likely is a key element in the continuing decline there 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, especially during the winter. Assessing the condition, status, movements 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.

ii. Methods - We propose capturing older pups and juveniles by two methods: on-land and underwater. Pups captured under this task will be ≤4 months old, during fall, winter, and spring research expeditions. Juveniles will be up to 3 years old. We propose capturing ≤30 animals in any given year.

We propose to capture pups on land with a large hoop net (3 ft. diameter and 5 ft. long handle) and physically restrain them. One or two biologists sneak up as close as possible to the target animal before entrapping it in the net. NMML personnel have used hoop nets to capture Steller sea lion pups in Alaska during March 1999 under NMFS Permit #782-1447 and more than 100 adult California sea lion (*Zalophus californianus*) females in California under NMFS Permit #977 (Sharon Melin, NMML, personal communication). This technique has proven safe for both the researchers and the animals and has never resulted in the death of an animal. After we capture an animal in the net, we will slowly transfer it into a fabric restraining wrap used for weighing the animal. We will keep the animal restrained in this wrap during measurements and while collecting samples.

We may capture pups and juveniles in the water using the lasso technique developed by colleagues with the Alaska Department of Fish and Game. 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 accustomization, sea lions will approach close enough that a rope lasso tended by personnel in the skiff can be placed around them, slightly behind the

fore flippers, by the divers. The lasso is tightened and the rope is retrieved by the skiff crew. Animals are wrapped in a restraining net and pulled into the skiff and restrained by hand. This technique has proven to be effective and safe for divers and captured animals.

Captured animals will be weighed, measured, and tagged with numbered Allflex plastic tags, color-coded by area within the Pacific Northwest. Animals may be branded for permanent identification and would be anesthetized prior to marking (as described in **Element 2** above).We also propose to take a variety of tissue samples and cultures from these captured pups and juveniles, including blood, feces, and swabs (as described under **Element 3**, above).

We request the added authorization to administer a light dose of a tranquilizer (Valium or equivalent) to restrained, non-anesthetized animals as needed to calm them and minimize the potential for injury to animals and handlers. We propose to use Valium only in cases when we cannot draw blood because the animal is struggling in restraint. Dosages of Valium (5mg/ml concentration) are scaled according to size and age (5ml per 100kg) and injected intra-muscular in the rump area while the animal is restrained in the net. NMML personnel have used Valium at this dosage rate very successfully to aid in the physical restraint of more than 50 adult California sea lion females and more than 200 California sea lion pups ranging in age from 4 months to 11 months old (Sharon Melin, NMML, personal communication). ODFW staff have used light Valium doses on hundreds of harbor seals during capture and marking activities in the Pacific Northwest with great success and no associated mortalities. Low doses of Valium, as requested here, slightly relax animals after capture so that physical restraint is easier on both the animal and the field personnel. For California sea lions, the effect generally subsides 20 minutes after injection and the animals are fully functional at 20-30 minutes after injection, regardless of age or size. No mortalities of restrained California sea lions have ever been the result of the effects of Valium. Although different species may react differently to drugs, we believe that Valium is a safe drug to aid in the physical restraint of Steller sea lion pups and juveniles.

iii. Expected results - These data will provide information on the relative health of the population when compared to results from preceding years, known standards, and similar data collected from areas of population decline in Alaska. These data will particularly address seasonal changes in distribution, movements and the physical condition of young sea lions, which will contribute to assessing the potential impacts of commercial fisheries, environmental changes, and any management actions on the status of sea lions.

Element 5 - Attachment of Scientific Instruments to Juveniles and Pups (≥4 months old)

i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified

the need to identify habitat requirements and areas of biological significance for Steller sea lions and to investigate feeding ecology. Specific points in the step-down outline included the following: map, describe, and evaluate feeding areas (research task 112), determine seasonal use patterns (research task 12), identify and designate "Critical Habitat" areas (research task 15), identify feeding areas (research task 6131), and investigate diving behavior and feeding cycles (research task 6132). 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.

Satellite-linked time depth recorders (SLTDRs) are the only practicable tool for following the movements of Steller sea lions during foraging trips and for monitoring diving behavior. This work will be used to identify foraging areas, particularly during winter, and to further refine our knowledge of the foraging capabilities of young sea lions. In turn, this information will help define the characteristics of foraging areas, and the relationships of these areas to areas of known prey concentrations and to commercial fisheries. VHF transmitters will help describe attendance and movement between selected sites. Underwater Timed Picture Recorders (UTPR, Wild Insight Ltd.) may be deployed on these animals to record up to 3 hours of still, time-lapse, or movie images. UTPRs are integrated with an incorporated Wildlife Computers Mark 7 time-depth recorder (TDR) to record dive behavior and start/stop image recording according to program directions. ODFW would deploy an UTPR in conjunction with a VHF transmitter and optionally a simple PTT (Sirtrack or Wildlife Computer SPOT tag). In combination, this will provide the most detail possible for location, dive behavior, and prey interaction currently available. VHF and PTT transmitters would be attached following protocols currently in the permit. The UTPR would be attached with a remotely release (by radio signal) platform following typical attachment protocols for SLTDRs. UTPRs would thus be retrieved without a recapture of the sea lion required.

ii. Methods: ODFW proposes to attach scientific instruments to pups ≥4 months old and juveniles ≤ 3 years old. Details of takes and techniques for capture are described in **Element 4** of this application. We will attach SLTDRs, UTPRs, and VHF transmitters to the hair on the animal's back, just over the shoulders, with fast-setting epoxy glue. Signals from VHF transmitters will be monitored by land-based antenna systems; signals from SLTDRs are received by orbiting satellites, relayed to stations on Earth, recorded, and delivered to the investigators. This work will be conducted primarily in Oregon, but may occur region-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. We anticipate the maximum number of instrument packages that we will be able to attach in any given year is 10.

iii. Expected results - Data obtained from SLTDRs, UTPRs, and VHF transmitters will contribute to the ODFW's ongoing investigations into seasonal movements, diving behavior, habitat selection, and foraging ecology of Steller sea lions. 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 in assessing the potential effects of commercial fisheries on the status of Steller sea lions. These data will be of value for comparison to similar information collected in areas of Steller sea lion population decline.

Element 6 – Resight observations of marked sea lions at Rookeries and Haulouts (Provided for under NMFS Research Permit No. 782-1446)

i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the importance of visual marking and tagging studies (research tasks 211, 212, 443, and 444). A peer-review workshop on behavioral and rookery-based research, convened by the Recovery Team in December 1997, reiterated the need for longitudinal studies based on resighting permanently marked animals.

ii. Methods – The primary method for monitoring sea lions on Rogue Reef, Orford Reef, and St. George Reef rookeries will be remotely controlled video cameras (**Element 7** below). However, the equally important and directly related task of visiting other hauling and breeding sights in California, Oregon and Washington to obtain counts and resights of branded animals is essential to this work. Animals tend to move away from the primary rookery areas following the breeding season and these site visits will provide all of the information on movements and distribution of marked animals during the non-breeding season period. Approximately two weeks of each month will be spent observing sea lions on other sites from Northern California to Washington from shore, from boats or on site to collect these data (the remaining time will be used for recording observations via remote cameras at primary rookeries; see **Element 7** below). These activities are currently funded and underway, but will be supported and coordinated under the new ODFW/NMML work just initiated this year. All incidental disturbance related to these visits are currently provided for under Research Permit No. 782-1446. This effort will not duplicate any efforts, visits or disturbance to sea lion rookeries or haul-out areas.

iii. Expected results - These data will provide information on the distribution and abundance of sea lions at most of the rookeries and haul-out areas in the Pacific Northwest. Of particular importance will be the documentation of use of these areas seasonally and annually by individual animals by resights of marks or tags. These data can then be compared with historical data and with similar current data collected from other sites throughout the range to evaluate population status.

Element 7 - Establish and Maintain Remote Sensing Stations on Rookeries and Haulouts

i. Objectives – The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need for land-based observational studies to monitor health, condition, and vital parameters. This study seeks to extend the period of observation to cover the entire year, not just the duration of occupation of a field camp.

ii. Methods – The ODFW and NMML propose to set up video cameras on two or three rookeries in southern Oregon and northern California. Cameras will be fix-mounted and aimed at the haul-out area from several vantage points, with data being transmitted back to a receiving station in the office of ODFW in Gold Beach, Oregon. Remotely-operated cameras can be directed to scan the haul-out area or zoom in on animals of particular interest to read and record brands and tags on marked animals. When cameras are in-place and functioning properly, approximately two weeks of each month will be dedicated to use of remote camera systems and resighting of marked individuals (the remaining time will be used for recording observations at other sites; see **Element 6** above). These video systems are operating successfully on a sea lion haulouts in the Gulf of Alaska (operated by the Alaska Sea Life Center, Seward, Alaska) and at Pyramid Rock, Rogue Reef in southern Oregon The great value of the remote video systems is that allow data acquisition on a daily basis with little or no disturbance to animals. In addition to Rogue Reef we intend to install video camera on Southwest Rocks, St George Reef and possibly at Orford Reef.

iii. Expected results - Remote monitoring stations will provide a unique opportunity to data collect data on animal abundance and presence of marked individuals year-round. These monitoring stations will provide an opportunity to make behavioral observations under varying weather conditions throughout the year, to follow seasonal and annual movements and changes in abundance, and to record site attendance by branded and tagged individuals.

4. Intentional Lethal Takes: not applicable

8. Captive Removal: not applicable

9. Importation of Parts: 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.

E. Describe Anticipated Effects of Proposed Activity

1. Small adverse impacts may result from harassment associated with pup surveys, tagging, branding and effects of the tag or brand, and mortality due to handling. Using protocols developed over the past decades by ODFW AND NMML will minimize any adverse impacts to the greatest degree possible.

2. 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 the impact of the counts, our protocol includes the following:

   a. will not survey until the end of the pupping season (late June or later), after mother-pup bonds are well established;
   b. minimize the time that we are occupying the rookery (≤2 hrs for counting; ≤12 hrs for branding activities); and,
   c. use biologists experienced in herding to slowly move the adults out of the way and experienced counters and handlers to complete the surveys as quickly as possible.

3. With respect to pup handling (e.g., capture, tagging and branding, blood draws) ODFW and NMML staff have now handled over 1,000 younger than 2 months old during the past 15 years with only four accidental mortalities. This may be due to the large size of the pups (up to 50 kg) but we also attribute this to the following:

   a. Pups are processed in small groups. Prior to handling we round up a small pod of pups. These animals are allowed to rest before handling, are watched over for signs of distress, are kept cool (with water if necessary), and animals showing signs of distress are released.
   b. Pups and juveniles are restrained by hand, until the cone of the anesthesia machine is placed over the nose. Induction of anesthesia generally occurs within a minute of coning, depending on the breathing rate of the pup. Anesthesia will be administered by a qualified veterinarian or a trained person under the direct supervision of a qualified veterinarian. Following anesthesia, pups are released and watched until recovered sufficiently that they can move away on their own.

4. All blood draws, fecal loops, enemas, swabs, and disease screening samples will be collected while the animals are under anesthesia and will be performed by personnel experienced with these procedures. These are standard procedures that are not known to be related to any long term negative impacts on the animals.

5. We anticipate the effects of biopsy sampling (flipper tag punch) to be minimal.

6. Effects of Allflex tags on pups seem to be minimal.

7. The ODFW and NMML anticipates no long-term adverse effects resulting from the attachment of scientific instruments to juveniles and pups ≥4 months old. The NMML has attached SLTDRs to more than 60 adult female and juvenile Steller sea lions in Alaska, Russia, and Washington State since 1989 with no indication of adverse impact to the animal. ODFW attached two SLTDRs to adult female Steller sea lions at Rogue Reef in 1997. Recent technology has led to miniaturization of instrument packages, which helps minimize effects caused by the weight and added drag. Packages currently in use, <300gm with a cross sectional area of about 10cm^2, are substantially smaller than

those used previously. Care will be taken during attachment to adjust the proportions of resin and catalyst to prevent a "hot" mix and to use the minimum practical amount of epoxy to prevent burning the sea lion's skin.

8. The ODFW and NMML anticipate no long-term adverse effects resulting from the administration of Valium (0.5mg/kg at dilution of 5mg/ml) to juveniles and pups ≥4 months old. NMML personnel have administered Valium successfully and safely to adult and pup California sea lions under NMFS Permits #717, #782, and #977 and to adult and juvenile northern fur seals under NMFS Permits #837 and #782-1455. ODFW staff have used Valium to calm harbor seals during handling under Research Permit #782-1446. We will not administer Valium routinely, but rather only to particular individuals that we judge would benefit from slight sedation.

9. Branding: In 1993 the NMML submitted to the NMFS Office of Protected Resources an environmental assessment on hot branding as a marking technique for pinnipeds. Temporary adverse impacts can include disturbance and stress of capture and handling. Some discomfort is likely to accompany the application of the brand. Experience with California sea lions in California, Oregon, and Washington and with Steller sea lions in Oregon, Washington, Alaska, and Russia suggests that this discomfort is simultaneous with the activity and not expected to result in long-term adverse effects. There is no evidence suggesting increased mortality of pups after branding; some branded individuals have been observed over a period of decades (ODFW, unpubl. data; Merrick et al. 1996; Chumbley et al. 1997; Sharon Melin and Bob DeLong, NMML, personal communication and unpubl. data; ADF&G unpubl. data). In 2001 following branding operations at Rogue Reef, branded and non branded pup mortalities were recorded. There was no significant difference in the number of branded and non branded pups within the pups that died. Thus it was unclear whether the mortality of those pups was in any way related to the handling activity or branding.

10. Gas anesthesia (isoflurane): The ODFW and NMML anticipates no adverse effects from the administration of gas anesthesia to pups during branding. This technique has proven extremely safe and effective on Steller and California sea lion pups (Heath et al. 1997; Haulena and Heath, 2001). Pups should actually benefit from the anesthesia, as they will be unaware of the activity around them, substantially reducing the stress they experience. Pups awake from gas anesthesia very quickly and appear completely recovered within 5-8 minutes.

F. Where and When Results Will Be Published

Results from previous Steller sea lion research conducted by the ODFW have been presented at Recovery Team working meetings, the biennial meetings of the Society for Marine Mammalogy, and annual meetings of The Wildlife Society. Newly acquired data on vital rate estimates and other scientific findings will be published in Marine Mammal Science, the publication of the Society for Marine Mammalogy.

G. Captive Holding not applicable

H. Other Related Proposals, Permits

Steller sea lion aerial surveys conducted by the ODFW and NMML are carried out under NMFS Permit # 782-1446. Related NMML Steller research activities are conducted under NMFS Permit # 782-1532-00. Importation/exportation of tissues or samples will be carried out under the authority of the NMML's NMFS Permit # 782-1399.

The ODFW and NMML operate within the Oregon Coastal National Wildlife Refuge under the authority of Special Use Permits from the U.S. Fish and Wildlife Service.

V. FOREIGN APPLICANTS not applicable

VI. 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 the following statutes and the regulations promulgated thereunder, 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 or the Marine Mammal Protection Act of 1972.

RFBrown

Robin F. Brown, Program Leader
Oregon Department of Fish and Wildlife

3-7-02

Date

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Table 1.–Summary of proposed takes, age and sex of target animals, and areas of operation for specific components of the Steller sea lion research permit application by the Oregon Department of Fish & Wildlife, Corvallis, Oregon, Robin F. Brown, Applicant.

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
1 Disturbance During Pup-count Surveys					
a) ≤2 selected rookeries	June-July	region-wide	2003, 2004, 2005	≤1,800 non-pups ≤900 pups	≤9,000 non-pups ≤4,500 pups
b) all (3) rookeries	June-July	region-wide	2002, 2006	≤2,600 non-pups ≤1,200 pups	≤13,000 non-pups ≤6,000 pups
Ground-based pup counts, require disturbance/displacement of most animals on each rookery.					
2 Capture, Weigh, Measure, Tag, Brand Pups on Rookeries During Breeding Season					
a) At 1 of 3 rookeries	June-July	region-wide	every year	≤200 pups	≤1,000 pups
During ground pup-count surveys (**Element 1**), capture pups on rookery to weigh, measure, tag, brand and release up to 200 pups at one rookery each year. We will attempt to capture and sample male and female pups in approximately equal numbers. We will administer gas anesthesia (isoflurane) to pups to reduce stress and to completely immobilize pups during branding.					

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
3 Collect Blood & Tissue Samples from Pups and Juveniles					
a) At ≤2 selected rookeries	June-July	region-wide	every year	≤200 pups	≤1,000 pups
b) At any workable site	all year	region-wide	every year	≤30 juvs/older pups	≤150 juvs/older pups

From a subset of the ≤200 pups per year when branding in **Element 2** collect ≤25cc blood from ≤50 pups.
From all juveniles and pups ≥4 months old (**Elements 4**) collect a maximum of 40cc blood.
From all handled animals (200 pups/year; 20 juveniles and older pups/year collect tissue sample (flipper punch) for genetic analysis.
Fecal loop or rectal swab for uncontaminated fecal sample from most or all handled animals.
Swabs of dermal lesions and ocular, rectal, and/or vaginal areas, as appropriate, from any handled animals exhibiting external signs of disease.
Enemas for pups (≥4 months) and juveniles.

4 Capture of Juveniles and Pups (Older than 4 Months)					
At any workable site	all year	region-wide	every year	≤30 pups/juveniles ≤5,000 any age/sex	≤150 pups/juveniles ≤25,000 any age/sex

Includes two capture methods:
1) catching animals in hoop nets on land at rookeries and haulouts,
2) catching animals underwater with divers using a rope lasso, a technique developed by ADF&G.

For both methods : hand restraint of captured animals, and use of Valium or equivalent as needed to make animals more manageable. All captured animals will be weighed and measured. See **Element 3** for details of tissue samples; **Element 2** for tagging; **Element 3** for details of genetic samples; **Element 5** for attachment of SL-TDR, UTPRs and/or VHF transmitters.
Animals will be captured at any workable site region-wide.
We will administer gas anesthesia (isoflurane) to pups to reduce stress and to completely immobilize any animals branded.
Takes for disturbance of non-target animals at a site (any age/sex) are expected to be ≤5,000 in any one year. Such takes for disturbance of a site may be accounted for under NMFS Permit # 782-1446 for scat collection or ground/boat surveys to be conducted simultaneous to these activities (no duplication of disturbance for separate purposes will take place).

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
5 Attachment of Scientific Instruments to Older Pups and Juveniles					
At any workable site	all year	region-wide	every year	≤30 pups/juveniles	≤150 pups/juveniles
We will capture and handle ≤30 older pups (≥4 months old) and juveniles (≤3 years old) each year (**Element 4**) in order to attach scientific instruments, including satellite-linked time-depth recorders, UTPRs and/or VHF transmitters. Total of ≤10 attachments in a given year. Instruments will be attached to hair on the animal's back with quick-curing epoxy glue.					
6 Resight Observations of Marked Sea Lions at Rookeries and Haul-out Areas					
At any workable site	all year	region-wide	every year	Incidental disturbance takes are provided under NMFS Permit 782-1446 Ground/Boat Surveys	Incidental disturbance takes are provided under NMFS Permit 782-1446 Ground /Boat Surveys
7 Establish/Maintain Remote Monitoring Stations on Rookeries and Haulouts					
≤3 selected sites	all year	region-wide	every year	≤5,000 any age/sex	≤25,000 any age/sex
Set up ≤3 remote video camera systems on rookeries or haulouts. Equipment will be located outside of and/or above the area occupied by sea lions. In most cases, setting up equipment and 3 to 5 visits annually for maintenance will result in additional takes by disturbance. Many of these takes will be accounted for under NMFS Permit # 782-1446 for scat collection or ground/boat surveys to be conducted simultaneous to these activities (no duplication of disturbance for separate purposes will take place).					

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
8 Accidental Mortality During Field Operations					
all capture sites	all year	region-wide	every year	≤10 per year	≤30 during 5 years

ODFW and Co-investigators will do everything within our power to avoid accidental, handling-related mortalities of sea lions as a consequence of the proposed research. However, accidental mortality is not entirely predictable and even though unlikely, unexpected, and often unexplainable, mortalities do occasionally take place. In addition, such mortalities generally occur stochastically and/or in numbers greater than one at any time. As stated in "Factors Affecting the population and Stocks", during the past 17 years that ODFW has been conducting Steller sea lion research on Pacific Northwest rookeries, it has been typical to find 25-50 dead newborn pups by the end of the breeding season on a single rookery, suggesting that the natural mortality rate of pups at these sites is high compared to other parts of the range (T. Loughlin, pers. comm.). Therefore, it can be anticipated that some number of the young sea lions we may capture and handle will, by chance, be from that portion of newborn animals that will not survive. For these reasons, the ODFW requests the authority for no more than 10 mortalities during a given year, and no more than 30 during the duration of the permit. Should a mortality occur, ODFW and NMML personnel will immediately review the circumstances with the goal of preventing recurrence.

Table 2.--Counts of adult and juvenile (non-pup) Steller sea lions in Oregon during June and July aerial surveys from 1976 to 2001. Average annual rate of increase is 3.7% (95% CI=2.9-4.4%).

Year	Total	Year	Total
1976	1,486	1989	2,183
1977	1,461	1990	2,414
1978	1,805	1991	3,091
1979	1,542	1992	3,581
1980	1,632	1993	2,838
1981	2,105	1994	3,301
1982	2,604	1995	3,837
1983	2,106	1996	3,205
1984	1,870	1997	3,897
1985	2,210	1998	3,971
1986	2,289	1999	3,275
1987	2,709	2000	2,930
1988	2,825	2001	3,648

CURRICULUM VITAE

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EDUCATION

B.S., Wildlife, Humboldt State University, 1993. Magna cum laude.
M.S., Statistics. Oregon State University, 1999.

PROFESSIONAL RESEARCH INTERESTS

Finite population sampling; wildlife study design and analysis; computer simulation; GIS; wildlife ecology; pinniped-fishery interactions.

EMPLOYMENT AND EXPERIENCE

Natural Resource Specialist 3: Oregon Department of Fish and Wildlife, Corvallis, OR. Employed: 7/00-present. Responsible for providing statistical support for Marine Mammal Program including study design, data collection, database management, data analysis, and data presentation.

Statistician I: AScI Corporation, US Geological Survey, Columbia Environmental Research Center, Columbia, MO. Employed: 5/99-6/00. Analyzed data collected on freshwater fishes for the USGS's Biomonitoring of Environmental Status and Trends program.

Graduate Teaching Assistant: Department of Statistics, Oregon State University, Corvallis, OR. Employed: 1/97-3/99. Taught undergraduate and graduate computer laboratory sections for a variety of statistical courses.

Research Technician: Forest Science Laboratory, Oregon State University, Corvallis, OR. Employed: 6/97-9/97. Collected field data on forest bat ecology.

Research Assistant I, II, and Program Manager: Manomet Center for Conservation Sciences, Manomet, MA. Employed: 4/94-9/96. Assisted with estuarine biomonitoring research and wading bird conservation studies along the northeastern US coast.

Wildlife Technician: Louisiana Cooperative Fish and Wildlife Research Unit, Louisiana State University, Baton Rouge, LA. Employed: 11/93-3/94. Collected field data on American Woodcock ecology.

Fish and Wildlife Scientific Aide: California Department of Fish and Game, Sacramento, CA. Employed: 6/93-8/93. Collected field data on morning dove ecology.

Biological Science Technician: National Park Service, Northwest Alaska Areas, Kotzebue, AK. Employed: 5/92-8/92. Collected field data on shorebird ecology.

Analyst: EG&G, Inc., Environmental Sciences Department, Las Vegas, NV. Employed: 5/91-8/91. Collected field data on plant and animal ecology at the Nevada Nuclear Test Site.

Biological Science Technician: Forest Service, Redwood Sciences Laboratory, Arcata, CA. Employed: 5/90-8/90. Collected field data on dusky-footed woodrat ecology.

Student Conservation Association Resource Assistant: Bureau of Land Management, El Centro, CA. Employed: 5/89-7/89. Collected field data on horned lizard ecology.

PROFESSIONAL MEMBERSHIPS

American Statistical Association
International Environmetrics Society
The Wildlife Society

REFERENCES

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