I. TITLE OF APPLICATION

Application for a Permit for Scientific Research under the Marine Mammal Protection Act and the Fur Seal Act.

II. DATE OF APPLICATION

January 15, 2007

III. APPLICANT AND PERSONNEL

A. Contact Information for Applicant and Personnel:

Applicant and PI:

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Co-Investigators:

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B. Qualifications and Experience

Andrew Trites, Ph.D. directs the research of the North Pacific Universities Marine Mammal Research Consortium. He is a Professor and Director of the Marine Mammal Research Unit at the University of British Columbia, and has extensive experience studying northern fur seals and Steller sea lions. A copy of his CV is attached.

Curriculum Vitas for the Co-investigators listed in this application are on file with the office of Protected Resources.

All research, and contracts awarded for research under this permit, will be supervised by the Principal Investigator and Co-Investigators.

IV PROPOSAL

A. <u>Summary</u>

The North Pacific Universities Marine Mammal Research Consortium is conducting a long term research program into the decline of pinnipeds that has occurred throughout most of Alaska. A permit is requested for a period of five years from the date of issuance to test various hypotheses that might explain the decline of **Steller sea lions** (*Eumetopias jubatus*) and offer solutions for recovery. Permission is also sought to assess pain and distress associated with hot-iron branding of sea lions planned by other researchers. The proposed research includes but is not limited to studies of diets, distributions, life history traits, physiology and the timing of weaning. The range of research activities involves different kinds of takes including incidental disturbance during aerial surveys of sea lions, disturbance of animals on rookeries and haulouts during scat collection, resighting surveys and sample collection. These activities address the most pressing research needs as identified by the Steller Sea Lion Recovery Team (NMFS 2006). Field and laboratory work will take place during all seasons of the year and throughout the range of Steller sea lions in Alaska. All field operations will be supervised directly by the Principal Investigator or Co-Investigators listed above. This permit does not involve intentional lethal take.

Activity 1. Assessing pain and distress associated with hot-iron branding in Steller sea lions. Wildlife research often requires handling and marking animals to collect important long-term ecological data. However, there are often trade-offs associated with long-term markings, such as subjecting animals to potential pain, as well as possibly affecting behavior, health, reproduction and survival (Murray and Fuller 2000). We will apply objective pain assessment methods to evaluate pain experienced by Steller sea lions during hot-iron branding conducted by researchers from NMFS or ADF&G under separate permits. Behavioral responses to pain in mammals typically peak within five hours following a burn injury (Faulkner and Weary 2000; Vickers *et al.* 2005). Behavioral measures (including vocalization, locomotion, and tending the wound) will therefore be monitored for 6 hours after the animal regains consciousness from anesthesia in a fenced off area on the periphery of the rookery. Seven blood samples will also be drawn from each animal in order to measure plasma cortisol concentrations. Total blood drawn will be <1.5 ml per kg per individual. The study is designed to monitor the first 16 animals branded each day, such that all animals are released shortly after branding is concluded for each day. This research is needed to ensure that the most humane procedures are employed to gather critical biological data from Steller sea lions.

Activity 2. Behavioral and foraging ecology of Steller sea lions. Steller sea lions will be studied to identify causes of the western population decline and provide for the population's recovery. One of the principal components of the Steller Sea Lion Recovery Plan is to identify habitat requirements and investigate feeding ecology and factors affecting energetic status. Fine resolution data will be collected on diets, distributions, and behavior to understand how diets vary by time of year and region of Alaska, and how this variation is related to population trends and abundance, nutritional stress, and commercial fishing activities. Diets will be determined from fecal samples collected as frequently as once every two months at rookeries and haulouts. Age at weaning will be determined from behavioral observations at select haulouts. Distributional data will be obtained from digital cameras overlooking haulouts and rookeries, and from monthly aerial photographic counts. The monthly diet and distribution data will help to identify the most critical place and time of year for Steller sea lions, and whether there is a relationship between diet, stress, and population trend and distribution.

B. <u>Introduction</u>

1. Species

Steller sea lions (*Eumetopias jubatus*) from both the eastern and western stocks (east and west of 144° W longitude, respectively). We request authority for inadvertent disturbance of harbor seals (*Phoca vitulina richardsi*), northern fur seals (*Callorhinus ursinus*) and killer whales (*Orcinus orca*) during Steller sea lion research activities. Glaucus wing gulls sometimes consume sea lion scat and may be disturbed when approaching haulouts and rookeries. No other species are anticipated to be disturbed during the course of our activities.

Steller sea lions were listed as "threatened" under the U.S. Endangered Species Act (ESA) on 26 November 1990 (55 Federal Register 49204). The population includes two 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 classified as strategic. Steller sea lions are not listed under CITES.

Detailed reviews of Steller sea lion population status are contained in biological consultations for groundfish fisheries (NMFS 2001), supplemental environmental impact statements (NMFS 2002), and by the National Research Council (NRC 2003) and Steller Sea Lion Recovery Team (NMFS 2006). Annual updates of stock status are also presented in the Alaska Marine Mammal Stock Assessment Reports (Angliss and Lodge 2004).

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 1980's (Loughlin *et al.* 1992; Trites and Larkin 1996; Winship and Trites 2006). The decline was first detected in the eastern Aleutian Islands in the mid-1970s (Braham *et al.* 1980), then apparently spread 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; Trites and Larkin 1996). During 1990-2000, trend site counts indicated declines of 40% throughout the western stock, and average of about 5% per year (Sease et al. 2001). Counts since 2000 show a slight increase in numbers in some areas, but further declines in the western Aleutians and central Gulf of Alaska (Sease and Gudmundson 2002; Fritz and Stinchcomb. 2005; Winship and Trites 2006). The western stock population is believed to consist of a minimum of 35,000 sea lions in U.S. waters.

The eastern population of Steller sea lions encompasses southeast Alaska, British Columbia, Oregon and California. Overall, the population has increased during the past 25 years, with most of the increase in Alaska and British Columbia (Calkins *et al.* 1999; Olesiuk and Trites 2003; Pitcher *et al.* in press). The southeast Alaska sea lion population increased at 5.9% per year between 1979 and 1997, but was likely stable between 1989 and 1996 (Calkins *et al.* 1999). New rookeries established since 2000 have contributed to the continued growth of the Southeast Alaska population, which is believed to number at least 25,000 animals.

Both top-down and bottom-up mechanisms are believed to regulate Steller sea lion populations (Loughlin and York 2000; NRC 2003; Trites and Donnelly 2003; NMFS 2006; Trites *et al.* 2006a). These include nutritional limitation arising from changes in prey availability or quality because of climate change or commercial fisheries, predation by killer whales or sharks, disease or pollution, and anthropogenic effects such as harvest or fisheries entanglement. Causes of the decline were likely different depending on time and location. Management measures implemented since 2000 for groundfish fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska have attempted to reduce potential effects of commercial fisheries.

2. Background/Literature Review

Activity 1. Assessing pain and distress associated with hot-iron branding in Steller sea lions. Wildlife research often requires handling and marking animals to collect important long-term ecological data. Being able to clearly identify individuals allows for them to be followed over time so that data can be collected on social behavior, survival, reproduction, home range use, and resource selection (Murray and Fuller 2000). However, there are often trade-offs associated with long-term markings, such as subjecting animals to potential pain and compromising the animal and hence, the interpretation of data collected from marked individuals.

A variety of methods have been used to mark marine mammals including ear and flipper tags, internal radio devices, external satellite receivers, hot and cold branding, and subcutaneous implantations (Merrick *et al.* 1994; Horning *et al.* 1999; Murray and Fuller 2000; Wells 2002; Lander *et al.* 2005). Work on other wildlife species has shown that some marking methods can cause pain, as well as affect behavior, health, reproduction and survival (Murray and Fuller 2000). Marine mammals are subjected to procedures during field research which are likely to cause pain; however there are few data evaluating procedures in terms of pain and other effects on the individual. As argued by Baker and Johanos (Baker and Johanos 2002), previous researchers may have ignored the topic because control (unmarked) animals are difficult to follow in the wild, or simply because the researchers felt that the effects were negligible. Some studies have claimed that an animal's welfare does not appear to be compromised, or that there is no effect on the animal's long-term survival or health (Greena and Bradshaw 2004; McMahon *et al.* 2005). However, apart from research on the healing processes and effects on reproduction or survival (Daoust *et al.* 2006; Martin *et al.* 2006), no published research has specifically assessed pain and distress during capture and marking procedures for marine mammals. The research proposed here will develop assessment techniques, and apply these to evaluating pain and distress associated with routine handling and marking procedures.

Pain assessment research attempts to identify and quantify animal pain in order to find effective ways to reduce or alleviate it. Monitoring animals for changes in physical appearance and behavior is often suggested as a method of evaluating pain (Morton and Griffiths 1985). Previous pain assessment in animals has included research focused on measures of general body functioning (e.g. water or food intake), physiological measures such as changes in cortisol levels and heart rate, as well as various behavioral measures (Weary *et al.* 2006). Vocalizations have been used as indicators of distress and pain, such as during castration in pigs or branding in cattle (Watts and Stookey 1999; Taylor *et al.* 2001). These vocalizations can be greatly reduced with the use of anesthetics (White *et al.* 1995; Weary *et al.* 1998).

Marking procedures such as flipper and ear tagging and hot and cold branding are commonly performed without the use of an anesthetic and/or post-operative analgesic. Evidence indicates that cattle experience high levels of discomfort during hot-iron branding (Lay *et al.* 1992; Schwartzkopf-Genswein *et al.* 1997), and by analogy it seems plausible that these procedures cause pain in pinnipeds. However, marine mammals possess different physiological and life history characteristics and pain perception and intensity has not been properly evaluated for marine mammal marking procedures (Bekoff 2002; Daoust *et al.* 2006).

The research proposed here will be the first to evaluate pain and stress responses to hot-iron branding in Steller sea lions (*Eumetopias jubatus*). Refinements to the hot-iron branding methods, such as the use of a local anesthetic and post-operative pain medication, may assist in preventing and mitigating pain. In addition to developing a method that may reduce or prevent pain during hot-iron branding, an assessment of the various branding techniques used and the criteria under which they are employed will allow for a standardized branding method to be formulated. This will permit the necessary research criteria to be met, while minimizing the animal's discomfort and further reducing the risk of mortality associated with the procedure.

Activity 2. Behavioral and foraging ecology of Steller sea lions. One of the principal components of the Steller Sea Lion Recovery Plan is to identify habitat requirements and investigate feeding ecology and factors affecting energetic status. Fine resolution data is needed on diets, distributions, and behavior to understand how diets vary by time of year and region of Alaska, and how this variation is related to population trends. Data are also required to assess the physiological health of sea lions of all ages, as well as the nutritional status of young sea lions (i.e., timing of weaning). The research we are proposing to undertake builds on our previous work and is focused on the collection and analysis of fecal samples, and the direct and indirect observation of sea lions using cameras and field biologists.

Monitoring diet is one of the most important research activities needed to assess the decline and recovery of Steller sea lions. We have opportunistically collected a large number of scats in southeast Alaska over a number of different years. Approximately 70 samples are required per site or region to accurately describe diet from fecal samples (Trites and Joy 2005). Data collected to date indicate that there are distinct differences in diets between major rookeries and haulouts (Sinclair and Zeppelin 2002; Sinclair *et al.* 2005; Trites *et al.* 2006a; Trites *et al.* 2007a). Some sites have been sampled consistently since 1993 (such as Forrester Island), while others have been sampled occasionally (e.g, White Sisters and Graves Rock). Resighting marked sea lions is equally important and allows for life tables to be calculated to estimate survival rates.

Research into the physiological health of Steller sea lions is necessary to assess the decline or recovery of populations. Non-invasive fecal hormone analysis is a powerful technique that may provide early indication of population health and a means of comparing different regions, down to the individual (Kitaysky *et al.* 1999; Wasser *et al.* 2000; Foley *et al.* 2001).

We initiated a study in 2005 to test the nutritional stress hypothesis (Trites and Donnelly 2003) by identifying correlations between Steller sea lion physiological stress and the associated dietary and population trends. Subpopulations of gender and breeding status are being approached by genetic stock and collection location to detect patterns of nutritional stress from British Columbia to the western Aleutian Islands (Keech in prep).

The integration of thyroid analysis can isolate the stress source, given that various acute and chronic environmental factors may affect physiological stress levels. Whereas cortisol, produced in the adrenal cortex, can determine physiological stress levels, nutritional stress would also suppress secretion of the thyroid hormone triiodothyronine (T3), as well as increase cortisol. Decreased T3 would lower metabolic rates in order to conserve energy during periods of chronic nutritional stress. Cortisol, in turn, rises to mobilize glucose under conditions of nutritional stress.

The analytical combination of adrenal and thyroid hormone analyses can provide source specific insight into the characteristics of subpopulations of Steller sea lions in comparison to other segments. We were the first to apply fecal stress hormone analysis to Steller sea lions (Hunt *et al.* 2004) and are the sole architect of the integration of triiodothyronine analysis. Applying the T3 analysis in conjunction with cortisol is a novel approach to identify nutrition-specific stress within Steller sea lions and other pinniped species.

We propose to obtain representative samples of scats from each of the Steller sea lion metapopulations. Stress, diet, and the proportional impacts upon individuals within each metapopulation will be measured to evaluate the effectiveness of conservation measures. The study we are proposing will be the most precise and comprehensive test of the nutritional stress hypothesis to date due to the complementary thyroid analysis, verifying correlations of physiological stress to dietary differences among segments of the Steller sea lion populations in the wild.

We have undertaken a number of behavioral studies of Steller sea lions to document differences in the timing of weaning (Marcotte 2006; Trites *et al.* 2006b) and foraging ecology of Steller sea lions (Trites and Porter 2002; Milette and Trites 2003). We have demonstrated that weaning occurs when animals are approximately 12 months, 24 months or 36 months old, and that females tend to wean earlier than males. Most sea lions are believed to wean at 1 year in increasing populations, and at older ages in decreasing populations. We propose to directly observe sea lions at select haulouts throughout the sea lion range in Alaska to determine the age at weaning in increasing and decreasing populations. We also propose to install digital cameras programmed to take time-lapsed still photographs to document seasonal distributions of sea lions (as per Marcotte 2006). These data will be augmented by aerial photographs and combined with dietary information from scat collections to identify important feeding areas and seasonal changes in energy needs. The Recovery Plan (NMFS 2006) identifies the need to determine seasonal use patterns of sea lions. Aerial surveys are an effective tool for assessing seasonal changes in the distribution and relative abundance of sea lions.

Carcasses or parts of carcasses of Steller sea lions are occasionally seen on sea lion haulouts and rookeries. The Recovery Plan for Steller sea lions identifies the need to investigate carcasses and collect samples from natural death as well as subsistence harvest. Various tissue samples from carcasses of all age classes can provide information about disease, histology, parasitology and other indices of condition. We therefore propose to collect available carcasses in whole or in part for transport to a laboratory. When in the field, tissue samples will be collected and preserved according to set necropsy protocols. Analysis of fresh dead carcasses could provide rare glimpses into the causes of mortality of Steller sea lions. Carcasses are extremely rare and as such, very valuable from a scientific perspective. Subsistence-harvested animals allow very fresh samples to be obtained for use in cell cultures and virology investigations, and can also yield information on the baseline level of condition indices in an otherwise healthy animal.

3. Hypothesis/Objectives and Justification

The proposed research responds to the recommendations of the Steller Sea Lion Recovery Team, and addresses the major hypothesis that explain the decline and general lack of recovery of Steller sea lions in Alaska (Loughlin and York 2000; NRC 2003; Trites and Donnelly 2003; NMFS 2006; Trites *et al.* 2006a). The proposed research is specific to Steller sea lions. The study to assess pain and distress takes advantage of the opportunity presented by ongoing branding of Steller sea lions programs, and is preferable to unnecessarily branding other species. There exists no research data on the assessment of pain associated with hot-iron branding, therefore the current methods utilized (i.e. lack of post-operative pain medications) may not be the most humane method.

Activity 1. Assessing pain and distress associated with hot-iron branding in Steller sea lions. The goal of this study is to develop objective pain assessment methods for Steller sea lions and to apply these methods in identifying and reducing pain during hot-iron branding. Many branding procedures with marine mammals fail to use anesthetics, and almost no procedures include the use of post-operative pain medications. Therefore, to ensure the most humane methods are being utilized, it is crucial to identify which branding techniques, such as the ones currently used and refined over time by NMFS and ADF&G, are most effective in minimizing the amount of pain and discomfort experienced by the animal. The ability to recognize individual pinnipeds from their group members is difficult. Therefore, it is necessary to mark pinnipeds in order to identify individuals. This is done for the purposes of documenting behaviors (e.g., length of foraging trips, attendance patterns, timing of weaning), movement patterns, and estimating demographic parameters (survival and birth rates). Permanently marking animals in a way that causes the least number of disturbances to the animal and the rookery is a preferable alternative to intentional takes (where the animal cannot be followed over time) or to multiple re-tagging procedures (due to tag loss), but the permanent marking must be applied in a humane manner. This study will be undertaken using Steller sea lions that are branded as part of ongoing research programs conducted by NMFS or ADF&G.

Activity 2. Behavioral and foraging ecology of Steller sea lions. The central goal of this body of research is to assess the nutritional status and energetic needs of Steller sea lions using non-invasive techniques. In particular, we will collect seasonal fecal samples from Steller sea lions at rookeries and haulouts throughout Alaska (Table 2) to assess the relationship between diet, sea lion numbers and population trends, timing of weaning and physiological stress of individuals. One of the leading hypotheses to explain the decline of Steller sea lions is that there has been a shift in quality of prey. This hypothesis can be tested by comparing the behavioral and foraging ecology of Steller sea lions from declining and increasing populations in Alaska. Data from carcasses and the resighting of marked sea lions will be collected opportunistically to contribute to data sets being maintained by other researchers engaged in Steller sea lion research. Thus this research contributes to understanding the basic biology and ecology of Steller sea lions, and benefits the species by fulfilling critical research needs identified by the Steller Sea Lion Recovery Team.

C. <u>Methods</u>

1. Duration of the Project and Locations of Taking:

A five-year permit is requested from the date of issuance. Research will occur in all months and seasons, but will be concentrated in the months of June – November. Studies of Steller sea lion stress, diets, behaviors, and distribution may occur at any known or potential Steller sea lion haulout or rookery in coastal Alaska. Notification will be sent to NMFS prior to commencements noting the precise location of the proposed disturbances. The study to assess pain and distress associated with hot-iron branding would occur during the summers of 2007 and 2008, and would not occur if NMML and ADF&G do not brand or are unable to accommodate our research needs.

Table 1. Take Table

Species	Age Class	Sex	Number of indi-viduals taken per year	Number of takes per indi-vidual per year	Activity / Take Action	Transport	Location	Dates / Time Period
Activity 1								
Steller sea lions (*Eumetopias jubatus*)	Pups	both	24	7	Basic procedure = capture by hand, restraint via hand holding, initial health examination (physical exam including morphometrics and monitoring initial blood pressure, heart rate, respiration rate and body temperature), anesthesia, temporary confinement (<8 h), and 7 blood samples (at capture, time of anesthesia, and 30, 60, 120, 240, and 360 minutes after anesthesia)		Select rookeries in Alaska where branding occurs	June-July 2007 & 2008
			24	7	Basic procedure + branding			
			24	7	Basic procedure + post-operative analgesic			
			24	7	Basic procedure + branding + post-operative analgesic			

			1	1	Accidental mortality		Select rookeries in Alaska where branding occurs	June-July 2007 & 2008

Activity 2								
Steller sea lions (*Eumetopias jubatus*)	all	both	40,000 15,000	12 12	Disturbance during scat collection		Western stock AK Eastern stock AK	2007 - 2012
	all	both	40,000 15,000	12 12	Incidental disturbance during monitoring activities (aerial surveys and boat surveys) and camera placement, servicing and retrieval		Western stock AK Eastern stock AK	2007 - 2012
	all	both	40,000 15,000	12 12	Collect carcasses or parts of carcasses of Steller sea lions		Western stock AK Eastern stock AK	2007 - 2012
	all	both	10,000 5,000	365 365	Behavioral and Demographic Observations		Western stock AK Eastern stock AK	2007 - 2012

	all	both	2 2	1 1	Incidental mortality		Western stock AK Eastern stock AK	2007 - 2012
Northern fur seal *Callorhinus ursinus*	all	both	100 30	12 12	Possibly harassed during monitoring and observing activities		Western stock AK Eastern stock AK	2007 - 2012
California sea lion *Zalophus californianus*	all	both	10 10	12 12	Possibly harassed during monitoring and observing activities		Western stock AK Eastern stock AK	2007 - 2012
Northern elephant seal *Mirounga angustirostris*	all	both	5 5	12 12	Possibly harassed during monitoring and observing activities		Western stock AK Eastern stock AK	2007 - 2012
Harbor seal *Phoca vitulina*	all	both	30 30	12 12	Possibly harassed during monitoring and observing activities		Western stock AK Eastern stock AK	2007 - 2012
Killer whales *Orcinus orca*	all	both	10 5	12 12	Possibly harassed during monitoring and observing activities		Western stock AK Eastern stock AK	2007 - 2012

Table 2. Locations of most Steller sea lion rookeries and haulouts in Alaska.

Region	Location	Latitude	Longitude
SE AK	Benjamin	58.34	134.55
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 Fairweather	58.79	137.94
SE AK	Cape Ommaney	56.18	134.71
SE AK	Coronation	55.93	134.28
SE AK	Forrester	54.53	133.30
SE AK	Gran (Ledge) Point	59.13	135.24
SE AK	Grindall	55.44	132.11
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	South Marble	58.65	136.05
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	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	Cape St. Elias	59.79	144.60
E Gulf	Chiswell Islands	59.60	149.57
E Gulf	Danger	59.93	148.08
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
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	60.16	146.84
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
E Gulf	Wooded (Fish)	59.88	147.34
C Gulf	Afognak/Tonki Cape	58.35	151.99
C Gulf	Aghiyuk	56.16	156.81
C Gulf	Aiugnak Columns	56.88	156.57
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	Chirikof	55.78	155.66
C Gulf	Chowiet	56.01	156.69
C Gulf	East Chugach	59.11	151.44
C Gulf	Elizabeth/Cape Elizabeth	59.16	151.89
C Gulf	Flat	59.33	152.00
C Gulf	Gore Point	59.20	150.97
C Gulf	Kilokak Rocks	57.16	156.27
C Gulf	Kodiak/Cape Alitak	56.84	154.31
C Gulf	Kodiak/Cape Barnabas	57.17	152.88
C Gulf	Kodiak/Cape Chiniak	57.63	152.14
C Gulf	Kodiak/Cape Ikolik	57.29	154.79
C Gulf	Kodiak/Cape Kuliuk	57.81	153.93
C Gulf	Kodiak/Cape Paramanof	58.31	153.05
C Gulf	Kodiak/Cape Ugat	57.87	153.85
C Gulf	Kodiak/Gull Point	57.36	152.61
C Gulf	Kodiak/Malina Point	58.03	153.37
C Gulf	Kodiak/Steep Cape	58.21	153.19
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	Long Island	57.78	152.22
C Gulf	Marmot	58.23	151.80
C Gulf	Nagahut Rocks	59.10	151.77
C Gulf	Nagai Rocks	55.83	155.79
C Gulf	Noisy	57.93	153.56
C Gulf	Nuka Point	59.30	150.72
C Gulf	Outer (Pye)	59.34	150.38
C Gulf	Perl	59.10	151.66

C Gulf	Perl Rocks	59.09	151.69
C Gulf	Puale Bay	57.68	155.39
C Gulf	Rk Near Sea Otter	58.51	152.20
C Gulf	Sea Lion Rocks (Marmot)	58.34	151.81
C Gulf	Sea Otter	58.52	152.22
C Gulf	Shakun Rocks	58.55	153.69
C Gulf	Shaw	59.00	153.38
C Gulf	Sitkinak/Cape Sitkinak	56.57	153.85
C Gulf	Sud	58.90	152.21
C Gulf	Sugarloaf	58.89	152.04
C Gulf	Sutwik	56.52	157.34
C Gulf	Takli	58.03	154.52
C Gulf	Twoheaded	56.91	153.55
C Gulf	Ugaiushak	56.75	156.85
C Gulf	Ugak	57.39	152.29
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	West Amatuli	58.95	152.02
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
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
W Gulf	Wosnesenski	55.18	161.37
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	Amak+Rocks	55.40	163.16
E Aleu	Baby	53.99	166.07
E Aleu	Basalt Rock	54.11	165.38
E Aleu	Bogoslof/Fire Island	53.93	168.03
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	Sea Lion Rock (Amak)	55.46	163.20
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/Bishop Point	53.97	166.96
E Aleu	Unalaska/Cape Izigan	53.23	167.66
E Aleu	Unalaska/Cape Sedanka	53.84	166.08
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
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
E Aleu	Unalaska/Whalebone Cape	53.48	166.67
E Aleu	Unimak/Cape Lazaref	54.61	163.59
E Aleu	Unimak/Cape Lutke	54.47	164.35
E Aleu	Unimak/Cape Sarichef	54.57	164.95
E Aleu	Unimak/Scotch Cap	54.40	164.76
E Aleu	Unimak/Sennett Point	54.48	164.92
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/Crone Island	51.67	176.61
C Aleu	Adak/Lake Point	51.62	176.99
C Aleu	Agligadak	52.10	172.90
C Aleu	Amatignak/Knob Point	51.25	179.07
C Aleu	Amatignak/Nitrof Point	51.22	179.13
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	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	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
C Aleu	Amukta+Rocks	52.45	171.30
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	Ayugadak	51.76	178.41
C Aleu	Bobrof	51.90	177.45
C Aleu	Carlisle	52.93	170.08
C Aleu	Chagulak	52.57	171.18
C Aleu	Chuginadak	52.78	169.70
C Aleu	Chugul	51.92	175.77
C Aleu	Fenimore	51.98	175.54
C Aleu	Gramp Rock	51.48	178.34
C Aleu	Great Sitkin	52.10	176.18
C Aleu	Herbert	52.72	170.08
C Aleu	Igitkin/Sw Point	51.98	175.96
C Aleu	Ikiginak	51.98	175.48
C Aleu	Ilak	51.48	178.31
C Aleu	Kagalaska	51.87	176.31
C Aleu	Kagamil	53.04	169.68
C Aleu	Kanaga/Cape Chunu	51.66	177.64
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	Kavalga	51.58	178.86
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/South Head	51.95	177.61
C Aleu	Kiska/Witchcraft Point	52.05	177.49
C Aleu	Koniuji/North Point	52.23	175.14
C Aleu	Little Tanaga Strait	51.82	176.23
C Aleu	Ogliuga	51.62	178.66
C Aleu	Oglodak	51.98	175.44
C Aleu	Rat	51.83	178.21
C Aleu	Sagigik	52.01	173.16
C Aleu	Salt	52.18	174.64
C Aleu	Sea Lion Rock (Kiska)	51.88	177.98
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	Semisopochnoi/Petrel	52.02	179.62
C Aleu	Semisopochnoi/Pochnoi	51.96	179.77
C Aleu	Semisopochnoi/Sw Knob	51.91	179.51
C Aleu	Semisopochnoi/Tuman Point	51.96	179.48
C Aleu	Silak	51.82	176.25
C Aleu	Skagul/S. Point	51.58	178.57
C Aleu	Tag	51.56	178.58
C Aleu	Tagalak	51.96	175.62
C Aleu	Tanadak (Amlia)	52.07	172.96
C Aleu	Tanadak (Kiska)	51.95	177.78
C Aleu	Tanaga/Bumpy Point	51.92	177.98
C Aleu	Tanaga/Cape Sasmik	51.60	177.93
C Aleu	Twin Rocks (Kiska)	51.92	177.62
C Aleu	Ugidak 5	51.58	178.51
C Aleu	Ulak/Hasgox Point	51.32	178.98
C Aleu	Unalga+Dinkum Rocks	51.56	179.07
C Aleu	Yunaska	52.69	170.61
W Aleu	Agattu/Cape Sabak	52.38	173.72
W Aleu	Agattu/Gillon Point	52.40	173.36
W Aleu	Alaid	52.78	173.86
W Aleu	Attu/Cape Wrangell	52.91	172.47
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	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	Dan's Rocks	52.78	173.29
W Aleu	Ingenstrem Rocks	52.64	174.52
W Aleu	Nizki	52.75	173.98
W Aleu	Shemya	52.73	174.15

2. Types of Activities, Methods, and Numbers of Animals or Specimens to be Taken or Imported/Exported

This application requests different kinds of takes within a wide variety of inter-dependent research programs and activities. All requested takes occur in the wild and include the following:

a. incidental disturbance during aerial surveys, installation of cameras, or conducting of behavioral observations and mark-resight efforts;
b. incidental disturbance during scat collections;
c. collection of carcasses, tissues, blood, feces, skin, teeth, vibrissae, and blubber samples;
d. collection of blood from branded animals

Research activities are summarized in Table 1 with a narrative explanation. The greatest portion of the estimated number of takes consists of incidental disturbance, or unintended harassment. Estimates of both direct takes and incidental disturbance represent the maximum levels. Actual numbers incidentally disturbed are likely to be much lower.

Narrative Account of Research Methods

Activity 1. Assessing pain and distress associated with hot-iron branding in Steller sea lions. The research proposed here will measure pain responses in 96 Steller sea lions during hot iron branding using physiological factors such as respiration rate, cortisol concentrations, body temperature and blood pressure, as well as measuring behavioral elements such as movement and vocalizations.

The hot-iron branding programs conducted by the National Marine Fisheries Service and the Alaska Department of Fish and Game provide an ideal opportunity to accomplish the proposed research without having to unnecessarily brand individuals. Permits to hot-iron brand often are requested for >500 individuals a year. Therefore a sample size of 96 sea lions would be obtainable. The proposed research will be incorporated into field procedures involving hot-iron branding which typically begin during the pupping season in late June and end mid-July. Our study will take place during the first 6 days of the branding operations.

Assessment of pain will follow a classic 2 x 2 design: with and without the potentially painful treatment (branding), and with and without a post-operative non-steroidal anti-inflammatory analgesic, such as ketoprofen or carprofen, administered intramuscularly while under gas anesthesia at a dosage of 1mg/kg (Weary *et al.* 2006). Of the animals selected for branding each day by NMML or ADFG, the *first* 16 individuals will be randomly assigned treatments within blocks, such that each block consists of one animal on each of the 4 treatments. Thus, 4 animals would have no treatment other than handling, anesthesia and blood sampling, 4 would be given a similar treatment with the addition of a post-operative analgesic; 4 would be branded with no post-operative analgesic, and the remaining 4 would be branded and receive a post-operative analgesic. This means that only half of all pups we request be handled will be branded by NMML or ADF&G.

Research protocols typically involve branding at least 100 individuals a day, requiring approximately 6-8 hours on the rookery. Steller sea lion pups are herded together by groups of people, and then held in a confined area until the time of branding. Pups are picked up by hand and carried to the branding location where they are restrained prior to anesthesia. Steller sea lions are normally anesthetized with isoflurane for hot-iron branding. Animals awaken from the anesthesia and begin walking approximately 10 min after the procedure (Heath *et al.* 1997). In mammals, behavioral responses to pain peak, on average, within four hours following a burn injury (Faulkner and Weary 2000; Vickers *et al.* 2005). Our observations will last approximately 5-6 hours while the remaining animals are being branded. This minimized the amount time spent on the rookery without prolonging the time spent branding, while ensuring we capture the potential pain response period.

All 16 study animals handled each day will treated as though they are being branded (with the exception that half of them will receive no brand). Hair will be clipped on the half that is not branded to ensure that each is uniquely identifiable. The 16 pups will then be carried by hand and randomly placed in one of four separate fenced recovery areas located on the periphery of the rookery away from the branding area. Four observers (one per block and blind to the treatment) will monitor behavior using a combination of one-zero sampling and all-occurrence sampling of vocalizations, gross movements, and specific wound directed behaviors. Pups will be released near where they were captured. Past experience indicates that pups and mothers reunite following such events.

Cortisol responses will be measured in order to assess levels of acute activation of the HPA stress response system. Previous studies on cortisol responses to burn procedures in mammals have shown the pain-induced distress response far exceeds the distress response produced from capture and handling procedures (Sylvester *et al.* 1998; Stafford and Mellor 2005) and this pain-induced response appears within 2 hours after the procedure (Morisse *et al.* 1995; McMeekan *et al.* 1998; Sylvester *et al.* 1998; Stafford and Mellor 2005). Blood samples will allow for plasma cortisol concentrations to be measured, as well as additional hormone concentrations including adrenaline and noradrenaline, which are useful in assessing early distress responses (Mellor *et al.* 2000). Seven blood samples (200µl each sample, 1.4ml per animal) will be collected using a catheter. These samples will be collected at the time of capture, time of branding and at 30, 60, 120, 240 and 360 minutes after branding, with individuals belonging to the no branding and no analgesic treatment block providing the baseline measurement.

***Activity 2. Behavioral and foraging ecology of Steller sea lions**.* Scats will be collected from haulouts and rookeries (Table 2). Approximately 70 samples are required per site to have sufficient statistical power to detect differences in diet between sites and across time (Trites and Joy 2005) as well as to assess differences in hormone concentrations (Keech in prep). Most scats will be collected during summer, but some seasonal collections will be made from haulouts during fall, winter and spring.

Scats collected will be placed in plastic bags and shipped frozen inside 5-gallon plastic pails to the University of British Columbia. The frozen scats will be thawed at the University of British Columbia and placed in plastic jars filled with water. Depending upon the outcoming of new technologies that are currently being validated, subsamples (containing no prey hard parts) may be drawn and archived in vials for possible future analyses of stress hormones, reproductive hormones or DNA analysis.

The remaining scat containing the prey hard parts will be cleaned using an elutriator or clothes washing machine to remove water-soluble elements. The cleaned hard parts will be sent to Pacific IDentification. This company is currently identifying scat remains collected by researchers in Oregon, Washington, British Columbia and Alaska. They will identify species, minimum numbers and estimate the relative size of the prey consumed. Identification of prey remains requires a special expertise.

The diet information will be analyzed by haulout, region and season for species composition, diet diversity, numbers of prey per scat, number of species per scat, relative size of prey, and the probability of prey occurring alone or with other species.

Brand resights will be conducted following procedures developed by ADF&G. Brand numbers are first noted by direct observations (using binoculars) before slowly approaching the rookery or haulout by boat to take a digital photo of the marked animal (using a Nikon D70 camera with 80-400 mm lense). Resight data will be used to determine movement patterns of sea lions from the US to Canada, and will be used to determine survival rates.

Aerial survey protocols use a Cessna 206 or 185 fixed-wing flying at an altitude of 150-180 meters and using a Nikon D70 digital camera with an autofocus zoom lens to photograph hauled-out sea lions. The images are downloaded into a laptop computer and counted by creating a point theme in Arcview GIS 3.2 or similar software. The photos are counted three times, each count saved as an active theme and the average of each count is used as the total count for that survey. Survey flights are flown during mid-day between the hours of 1000 to 1400 when sea lions are most likely to be hauled out (Pitcher, ADF&G, pers. Comm.). Number of passes per site will range from 1-5 depending upon the size and complexity of the site being photographed. To estimate relative abundance, all sea lions observed during a survey flight are counted.

Fixed digital still cameras will be placed overlooking select haulouts and rookeries in Alaska at distances ranging from 5 to 100 meters. The camera system was testing in 2005-2006 and shown to produce reliable estimates of numbers of sea lions on shore (Marcotte 2006). Weather proof housing for the camera will be bolted to the rock or attached to a tree where feasible. Images will be downloaded periodically. This requires accessing the rookeries and haulouts and will typically be done during seasonal scat collections (approximately 4 times per year). Animals present at each site could be photographed as often as 365 days a year.

Behavioral observations will be performed from blinds with clear, unobstructed views of each haulout or rookery. Sites will be selected based on historical accounts and annual aerial count data, which indicate that high numbers of mature and immature animals were present during previous years (NMFS and ADF&G census data). The sites will also be selected for their ease of observation, as well as for observer safety and logistical considerations.

Time spent ashore and at sea by pups, yearlings and mature females with dependents, will be determined by the presence or absence of recognizable individuals during daily observations. Many mature females observed at haulout sites in the Gulf of Alaska can be readily identified from distinct natural fungal patches. Others will be identified from brands or tags applied by other researchers. The behavior and association of mothers and immature sea lions (pups and yearlings) will noted every 15 min using focal sampling (Martin and Bateson 1993). Behavioral observations will be restricted to daylight hours (maximum 0600-1900 h, average 0800-1630 h). Information will be obtained on the timing of weaning and the duration of foraging trips. In addition, changes in the population's sex ratio, age distribution, and pup production on rookeries will provide information on the status of the population and source of the decline. Presence of tagged and branded animals will be noted, as will observations of entangled or injured sea lions. Field assistants will camp or use existing cabins at select rookeries and haulouts in Alaska. Each camp will be manned by two people (observers) for approximately 2 weeks per site. As many as 4 camps could be engaged in making simultaneous observations at different sites in Alaska.

3. Additional Information for Removing Animals from the Wild into Captivity and Research or Enhancement on Captive or Rehabilitating Animals

No animals will be removed from the wild.

4. Lethal Take

No intentional lethal take is involved as part of the behavioral and foraging ecology studies of Steller sea lions. Unintentional mortality is possible of sea lion pups during the pain and distress study (but is highly unlikely). It is listed in Table 1 because there is always the remote possibility that an animal we might handle could die because of factors that have nothing to do with our protocols. Similarly an animal could die while behavioral observations are being made that has nothing to do with our study, but we would have no means of verifying this. We have therefore been pre-cautionary in listing unintentional mortalities.

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

No living marine mammals will be exported. However, permission is requested to transport fecal matter, blood samples and tissues and hard parts of Steller sea lions to the Marine Mammal Research Unit at the University of British Columbia, Vancouver BC.

D. Research Effects and Mitigation Measures

1. Effects

There are no anticipated effects of aerial surveys on the behavior and numbers of sea lions on shore. Steller sea lions are sensitive to being startled and can stampede into the water if not properly approached. Landing on haulouts to collect scats will cause most animals using the site to enter the water. Field observations indicate that most sea lions return to their haulouts and rookeries following such disturbances, while others may elect to move to another site earlier than they would have otherwise (Kucey 2005; Kucey and Trites 2006). Behavioral observations are designed to collect data on undisturbed animals. There is potential for slight disturbance when setting up a blind from which to make observations, or when installing land-based cameras. However, few animals are likely to enter the water given the distance with which such observation posts are placed. Holding Steller sea lion pups during the pain and distress study is also not expected to cause any lasting effect on the individuals. They normally remain on land at this age and have restricted movements. They also frequently spend 1-2 days fasting while their mothers are at sea feeding during summer (Milette and Trites 2003).

Observations of Steller sea lion pups brought from the wild to the Vancouver Aquarium further suggest there are no significant effects of captivity on their physiology or behavior.

2. Measures to Minimize Effects

The research teams have over 15 years of experience approaching, observing, and studying Steller sea lions at haulouts and rookeries, and will coordinate their site visits to ensure minimal disturbance of sea lions.

We have considerable experience at approaching haulouts and rookeries to ensure that a minimum number of animals enter the water. Scats will only be collected from a subset of rookeries and haulouts based on the prevailing weather conditions, ease of landing, the likelihood of obtaining 70 samples, the consistency with which diet information has been collected in the past (strenght of the time series), and whether the diet is likely to be representative of sea lions in the surrounding areas (Sinclair and Zeppelin 2002; Sinclair *et al.* 2005; Trites *et al.* 2007a; Trites *et al.* 2007b). Animals using sites chosen for dietary analysis will be slowly moved into the water using a combination of handwaving, clapping and whistles. Reseachers will then land to collect scats. Every procaution will be taken to minimize disturbance, and any site where there is a potential for pups to not reunite with their mothers will not be disturbed. All research with be coordinated with NMFS, ADF&G, Alaska SeaLife Center and other groups and individuals conducting Steller sea lion research in Alaska to minimize effects.

3. Monitoring Effects of Activities

No additional monitoring of the effects of activities is proposed. We have already undertaken research to assess the effects of disturbance on Steller sea lions, and believe that our findings of the effects of past disturbances are likely to hold for any future disturbances (Kucey 2005; Kucey and Trites 2006). The pain and distress study we are proposing is designed to assess the short term effects of branding on sea lion pups.

4. Alternatives

The studies we are proposing do not involve causing undue stress, discomfort, pain, suffering, injury or mortality. The research we are proposing is specific to Steller sea lions. There is no alternative species that can be substituted to yield relevant data. Nor are there alternative methods to conducting the research. Determining diet for example from bones or DNA still requires collecting the fecal sample.

E. Resources Needed to Accomplish Objectives

Funding to undertake the proposed research is anticipated from NOAA to the North Pacific Marine Science Foundation, which funds the North Pacific Universities Marine Mammal Research Consortium. The Consortium has been conducted research on Steller sea lions since 1992. Some of the research may be conducted in collaboration with research cruises run by other research organizations such as NMFS and ADF&G.

F. Publication of Results

Researchers associated with the North Pacific Universities Marine Mammal Research Consortium have published over 100 papers related to the decline of Steller sea lions. They have a strong record of publishing their findings (see www.marinemammal.org). Data collected on Steller sea lion pain and distress responses during hot-iron branding will be included in a PhD dissertation and published in a peer reviewed journals. Other data collected on diets, distributions, stress, foraging behavior and timing of behavior will also be published in peer reviewed journals. Opportunistic sightings of sea lions and collections of tissues and hard-parts will be shared with other researchers at ADF&G and NMFS.

V. NATIONAL ENVIRONMENTAL POLICY ACT CONSIDERATIONS (NEPA)

a) *The research involves new, innovative, controversial or experimental equipment or techniques;*

   No. All techniques have been previously carried out on Steller sea lions or other species of mammals.

b) *Does your activity involve the collection, handling or transport of potentially infectious agents or pathogens?*

   No

c) *Do any of the proposed activities occur in or near unique geographic areas?*

   Some of the rookeries and haulouts are located in National Forests and Wildlife Refuges. Some research will also occur in areas designated Critical Habitat for Steller sea lions. However our proposed research will not alter these areas and will not disrupt other species living in them.

d) *Would proposed work affect entities listed in or eligible for listing in the National Register of Historic Places, or cause loss or destruction of scientific, cultural or historic resources?*

   No

e) *Would any of the proposed activities include actions that might involve the transportation of any material, biological or otherwise, form one area to another?*

No.

VI. PREVIOUS AND OTHER PERMITS

A. Previous Permits: Permit 715-1784 was previously issued for the taking of species under NMFS jurisdiction.

B. Other Permits: All research carried out under this permit application must also be covered by permits issued by the UBC Animal Care Committee. Permits for conducting observations from some haulouts and rookeries must also be requested from federal and state agencies.

Special Considerations for Applicants Working Abroad:
n/a

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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 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/or

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

The Fur Seal Act of 1966 (16 U.S.C. 1151-1175).

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."

Signature of Applicant:

Andrew W. Trites, Ph.D.

Research Director
North Pacific Universities Marine Mammal Research Consortium

Date of Signature:

January 15, 2007