

# Endangered Species Act - Section 7 Consultation Biological Opinion

Rat Eradication,  
Rat Island, Alaska

Action Agency: U.S. Fish and Wildlife Service  
National Marine Fisheries Service

Consultation  
Conducted By: NOAA's National Marine Fisheries Service,  
Alaska Region

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# 1. INTRODUCTION

## 1.1. Background

Rats were first introduced to Alaska over 200 years ago at Rat Island. Prior to this introduction, the island likely supported significant populations of breeding seabirds and other ground nesting birds which evolved in the absence of mammalian predators. Since their introduction, rats and foxes have extirpated breeding seabirds and had detrimental impacts on vegetation and intertidal life on the island. The U.S. Fish and Wildlife Service (FWS), Alaska Maritime National Wildlife Refuge (AMNWR), removed foxes from Rat Island in 1984. Now, working with others, the Service proposes to eradicate rats from the island using removal techniques implemented successfully on islands elsewhere in the United States and globally. The endangered western distinct population segment of Steller sea lions (*Eumetopias jubatus*) can be found hauled out on Rat Island and breeds on the small islet off the southeast corner of Rat Island known as Ayugadak Point (designated critical habitat).

## 1.2. Consultation History

In December 2007 National Marine Fisheries Service (NMFS) staff met with staff from the FWS to discuss the proposed plan for eradicating rats from Rat Island, and the potential harassment of Steller sea lions during this project. During the course of the meeting, NMFS recommended that the action agencies and/or applicant apply for a Marine Mammal Protection Act (MMPA) authorization to address incidental harassment of marine mammals in association with project activities. Without an MMPA authorization, there is no authorization for take under the MMPA. Likewise, an incidental take statement (ITS) cannot be issued with the biological opinion to protect against ESA section 9 take without a corresponding authorization under the MMPA. A subsequent meeting between NMFS and FWS staff in January 2008 further clarified the IHA application process.

A draft Environmental Assessment (EA) was reviewed by NMFS and comments about the potential for incidental taking of Steller sea lions and harbor seals (*Phoca vitulina*) were provided to the AMNWR on January 14, 2008. In that letter NMFS advised AMNWR of the need for formal consultation under Section 7 of the Endangered Species Act (ESA) and application for incidental taking under section 101 (a)(5) of the MMPA. An EA was prepared for the proposed action, made available for public comment, and approved with a Finding of No Significant Impact (FONSI) signed on March 14, 2008.

In February 2008, the AMNWR submitted an application for an Incidental Harassment Authorization (IHA) to authorize the unintentional and incidental taking of small numbers of Steller sea lions and harbor seals that are likely to be present on or around Rat Island and may be affected by the proposed action. The IHA application was processed by the NMFS Office of Protected Resources (OPR) in Silver Spring, MD. A notice of receipt of an IHA and public comment period was published in the Federal Register on 18 June 2008 (73 FR 34705). The Alaska Region of NMFS received a request by NMFS OPR for formal consultation under section 7 of the ESA on June 7, 2008 for the issuance of an IHA. Incidental takes of endangered species which are associated with the proposed AMNWR action on Rat Island would be authorized through the release of an Incidental Take Statement (ITS), prepared by NOAA Fisheries. Under current regulations, an ITS can only be issued after a biological opinion has been prepared for

the action. Subsequently, the AMNWR prepared a biological assessment (BA) of the action dated May 15, 2008. This Opinion is based upon this BA, as well as the IHA application (AMNWR 2008) and the best available scientific information. The IHA will be issued under section 101 (a)(5) of the MMPA, and because it constitutes a Federal action which may affect listed species, is included within this Opinion.

NOAA Fisheries prepared this Opinion to address impacts to the Steller sea lion resulting from two federal actions: the issuance of an IHA by NMFS and rat eradication on Rat Island by the FWS. The objective of this Opinion is to determine whether the actions are likely to jeopardize the continued existence of the Steller sea lion, or result in the destruction or adverse modification of critical habitat.

## **2. PROPOSED ACTION**

The U.S. Fish and Wildlife Service (USFWS) Alaska Maritime National Wildlife Refuge (AMNWR) proposes to eradicate rats from Rat Island (situated at approximately 51° 80' North, 178°30' West) and the Ayugadak Point Steller sea lion rookery (approximately one mile southeast of Rat Island at 51°45.5' North, 178°24.5' East) to conserve, protect and enhance habitat for native wildlife species, especially nesting habitat for seabirds, and to restore the biotic integrity of the island. The overarching goal in a successful rodent eradication is to ensure the delivery of a lethal dose of toxicant to every rodent on the island. The primary method for eradicating rats from Rat Island is delivery of compressed-grain bait pellets containing rodenticide to every rat territory on the island through aerial broadcast. The bait pellets will contain 25 ppm brodifacoum and will be applied by helicopter consistent with label directions approved by the Environmental Protection Agency..

USFWS field crew will complete pre-eradication biological surveys for about two weeks in June 2008. Field crews will attempt to reach the islet off Ayugadak Point in August to deploy the bait stations, weather and seas permitting. The R/V Tiglax is providing vessel support for the June and August 2008 activities. No helicopters will be used in June and August 2008.

The staging and preparation activities for the subsequent eradication work on Rat Island are expected to take about 5 days during the week of September 22- 27. Helicopter support during this period is estimated to take two days. Wooden storage boxes and platform construction materials will be staged at three areas, as indicated in Figure 1. Fuel and all other camp materials will be delivered to the Gunner's Cove field camp location.

Bait application by helicopter will commence once staging and preparation are complete. The bait application will occur during a 45 day time period from September 28 – November 11. The bait application is estimated to take approximately 35 hours total flight time, however the implementation will likely be interrupted by typical fall weather patterns in the central Aleutians. Therefore a maximum of 45 days will be allotted to achieve the 35 hour operation window.

Demobilization and clean-up activities will commence once the eradication operation is complete. The demobilization is estimated to take five days and is scheduled for the week of November 1-7. If favorable weather conditions allow the eradication operation to be completed prior to October 31st, demobilization could begin during the month of October.

A second associated action is the issuance of an incidental harassment authorization (IHA) by NMFS for these activities, under section 101(a)(5) of the MMPA

### **2.1. Surveys and Staging Activities**

USFWS will visit Rat Island in June 2008 prior to the rat eradication to complete biological surveys. Surveyors circumnavigated Rat Island on foot and observed the offshore rocks and Ayugadak Point islet by vessel to census seabirds and marine mammals. Field crews plan to reach the islet off Ayugadak Point in August 2008 to deploy enclosed bait stations rather than disperse the bait via helicopter broadcast, weather and seas permitting. The R/V Tiglax is

providing vessel support for the June and August 2008 activities. No helicopters will be used in June and August 2008. Bait station deployment is scheduled for one day.

Field crews will complete staging on Rat Island 22-27 September 2008 prior to the rat eradication to install temporary infrastructure and storage sites (Figure 1). These will include:

- A camp site capable of supporting 20 people for up to seven weeks;
- Three bait staging areas (loading zones), where bait will be contained in up to 200 storage units at each staging area; and
- A fuel storage site that will comply with all appropriate safety standards and regulations.

Helicopters will deliver most of the necessary materials to each loading zone and camp on the island along direct flight paths from a vessel anchored nearby in September 2008.



Figure 1. Rat Island field camp, staging areas, and Steller sea lion rookery and haul out.

## 2.2. Bait Application

Bait will be applied using two single primary-rotor/single tail-rotor helicopters. Bait will be applied from specialized bait hoppers slung 15 – 20 m (49 – 66 ft) beneath the helicopter. Helicopter operations for the bait application will necessitate low-altitude overflights of the entire land area of Rat Island and adjacent vegetated islets. The helicopter will fly at a speed ranging from 25 – 50 knots (46 – 93 km/hr or 29 – 58 mph) at an average altitude of approximately 50 m (164 ft.) above the ground.

To make bait available to all possible rat home ranges on the island, bait will need to be applied evenly across emergent land area, with every reasonable effort made to prevent bait spread into

the marine environment. The baiting regime will follow common practice in which parallel, overlapping flight swaths are flown across the interior island area and overlapping swaths with a deflector attached to the hopper (to prevent bait spread into the marine environment) flown around the coastal perimeter. Flight swaths will be defined by the uniform distance of bait broadcast from the hopper, ranging from 50 – 75 m (164 – 246 ft). Flight swaths will be flown in a parallel pattern, with subsequent flight swaths overlapping the previous by approximately 25-50% to ensure no gaps in bait coverage.

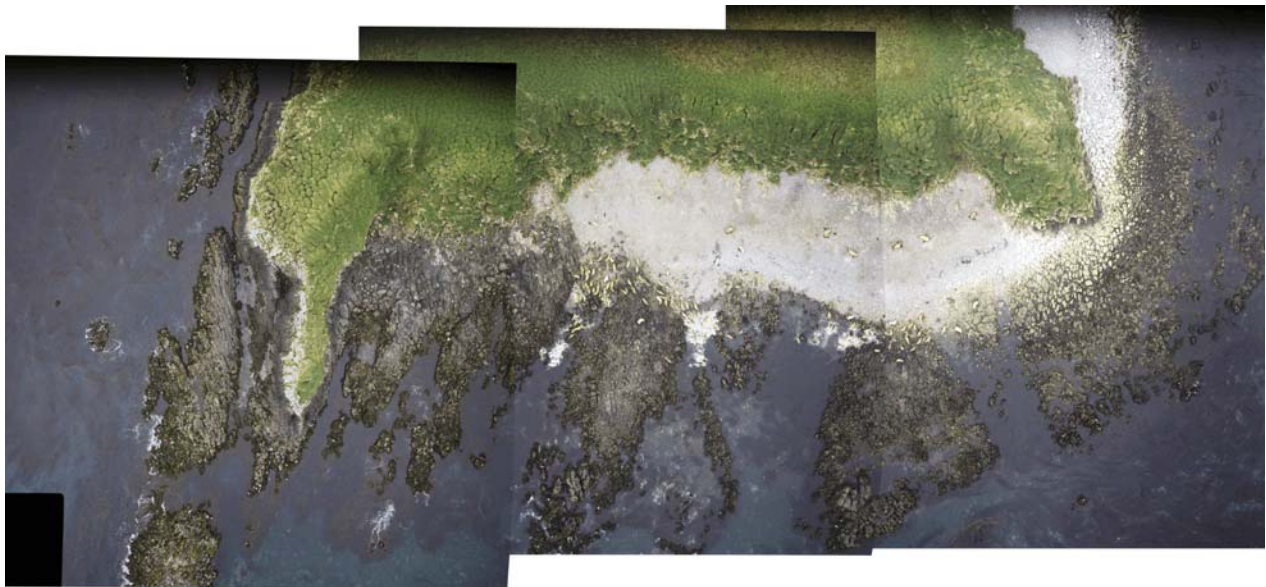
The need for caution near the marine and freshwater environments requires a 3 m buffer when broadcasting the rodenticide. As a result, some areas may not receive the optimal bait coverage with helicopter broadcast. In cases where it is evident or suspected that any land area on Rat Island or offshore islets did not receive full coverage, there will be supplemental systematic hand broadcast either by foot, boat, helicopter, or any combination of the above. All bait application activities will be conducted by, or under the supervision of, a Pesticide Applicator certified by the State of Alaska.

### **2.3. Special Treatment of Ayugadak Point Steller sea lion rookery**

The islet located 1.6 km (1 mi) off Ayugadak Point is a Steller sea lion rookery, designated as Critical Habitat under the ESA (Figure 2). The islet is also potential rat habitat and the thick kelp beds between the main island and this islet make rat migration to and from the islet possible. Bait will be delivered to the islet off Ayugadak Point with an adaptive alternative-baiting strategy designed to minimize helicopter disturbance to Steller sea lions breeding and resting there.

During the month of August, project crews will attempt to access the islet by boat during a one-day operation window. If successful, the crew will land on a beach that is out of view of the Steller sea lion rookery. Personnel will install multiple enclosed bait stations on the islet. The stations are designed to provide rats easy access to the bait inside while minimizing non-target species bait access, including song sparrows. Stations will be anchored securely in place, and filled with enough bait to ensure that any rats on the island will have bait available for many weeks. USFWS will attempt vessel access for the islet again in Oct/Nov 2008 if the islet cannot be reached in August. If the islet is reached in Oct/Nov 2008, then bait stations and hand-broadcast will be used to administer the bait. If all vessel access is unsuccessful then the helicopter will be used for baiting the islet.

If successful bait station deployment occurs in August, project crews will attempt to access the islet by boat again during the major bait application operation in the fall. The sea state in the fall may make access more difficult than in the summer. If personnel can access the island by boat, they will check the bait stations installed earlier for signs of bait consumption or other rat activity. Bait stations will be refilled as necessary during this visit. If rats are detected or suspected, personnel may additionally hand-broadcast bait pellets on the islet according to label instructions. This work is estimated to take between four and six hours.



*Figure 2. Ayugadak Point Steller sea lion rookery and designated critical habitat located on the islet southeast of Rat Island. (NOTE: sea lions in center and right images)*

If project crews are not able to access the islet in August or during the Rat Island bait application in October, it will be treated by aerial broadcast. This would take place during the October 1 – November 11 time frame and require approximately 15 minutes of helicopter flight time.

#### **2.4. Demobilization**

USFWS staff will begin demobilization and clean-up of the camp and work areas once the eradication has been completed. A charter vessel will be employed to transport all crew and equipment off the island. Demobilization and clean-up will include deconstructing and removing:

- Field camp
- Garbage and human waste
- Staging areas
- Fuel

All tents, weatherports and other field camp equipment will be disassembled, packed, and returned to the vessel by helicopter. All equipment will be removed from bait staging areas and



transported off the island. The wooden storage boxes will be disassembled, bound, and transported by helicopter back to the vessel. Excess fuel will also be transported back to the vessel by helicopter.

Additional details regarding the proposed rat eradication can also be found on-line at: <http://alaskamaritime.fws.gov/news.htm>

### **3. STATUS OF LISTED RESOURCES**

NMFS has determined that the action being considered in the Opinion may adversely affect the endangered western population of Steller sea lion.

The following is a brief summary of Steller sea lion life history, population status and trend. Detailed information about the broader status and biology of the Steller sea lion may be found in several documents, including the April 2008 Steller sea lion Recovery Plan, the June 2007 Biological Opinion on Activities Authorized on Steller sea lions and northern fur seals, the October 1, 2001 Biological Opinion on Authorization of 2002 Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fisheries based on the Fishery Management Plans for the Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish as modified by amendments 61 and 70, and on the NOAA Fisheries Alaska Region website at <http://www.alaskafisheries.noaa.gov/>. This information as summarized represents the best scientific and commercial data available.

The action area is defined by NOAA Fisheries' section 7 regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area includes Rat Island, the small islet located southeast of Ayugadak Point, all nearby offshore rocks, and the nearshore waters within 75 meters of all coastline.

#### **3.1. Species/critical habitat description**

The Steller sea lion (*Eumetopias jubatus*) is the only species of the genus *Eumetopias*, and is a member of the family Otariidae, order Pinnipedia. Steller sea lions likely evolved in the North Pacific (Repenning 1976). Steller sea lions range along the North Pacific Rim from northern Japan to California. They are most abundant in the Gulf of Alaska and Aleutian Islands (NMFS 2008). Two separate stocks of Steller sea lions are recognized in U.S. waters; an eastern U.S. waters stock that includes animals east of Cape Suckling, Alaska (144° W), and a western U.S. stock which includes animals west of Cape Suckling. Steller sea lions are land-based marine predators. All of their reproductive and many of their social activities occur on land, but all feeding occurs at sea.

On August 27, 1993 NMFS designated critical habitat for the threatened eastern and endangered western populations of Steller sea lions (58 FR 45269; 50 CFR §226.202). Critical habitat designations are based on primary constituent elements that make the habitat essential for

conservation of the species. In the case of Steller sea lion critical habitat, primary constituent elements were not identified specifically as such, but the designation was based on the terrestrial and aquatic needs of the species. Haulouts with more than 200 animals on average, and all rookeries (breeding areas), were designated as critical habitat. Rookeries are often used as haulouts during the non-breeding season, but haulouts are rarely used for breeding or reproduction. Marine foraging habitat designated as critical for Steller sea lions includes areas immediately around rookeries and haulouts based on evidence that lactating adult females took relatively short foraging trips during the summer and were feeding close to their rookeries and haulouts (20 km or less; Merrick and Loughlin 1997). These areas were also considered to be important because young-of-the-year sea lions took relatively short foraging trips in the winter (about 30 km; Merrick and Loughlin 1997). Prey resources are the most important feature of marine critical habitat for Steller sea lions. Marine areas may be used for a variety of other reasons (e.g., social interaction, rafting or resting), but foraging is the most important sea lion activity that occurs when the animals are at sea.

### **3.2. Reasons for listing**

Due to a significant decline in total numbers of 64% over a 30-year period, on November 26, 1990, an emergency rule listed the Steller sea lion as threatened under the ESA (55 FR 40204). On August 27, 1993 (58 FR 45269) critical habitat was designated based on observed movement patterns. In 1997 the Steller sea lion population was split into two separate populations (western and eastern populations) based on demographic and genetic dissimilarities (Bickham et al. 1996, Loughlin 1997b) (62 FR 30772). Population Viability Analysis (PVA) models indicated a continued decline at the 1985-1994 rate would result in extinction of the western population in 100 years or a 65% chance of extinction if the 1989-1994 trend continued (62 FR 24354), therefore the status of the western population was changed to endangered.

### **3.3. Life history**

Steller sea lions are considered non-migratory with dispersal generally limited to juveniles and adult males. In the Aleutian Islands, Steller sea lions generally breed and give birth from late May to early July (Pitcher and Calkins 1981), and pups remain at rookeries until about early to mid-September (Calkins et al. 1999). After giving birth, females remain with the pup for 11-14 days and then begin alternating nursing periods on land with periods at sea to forage. Non-reproductive animals can congregate at haul out sites at all times of the year.

Telemetry and tagging studies suggest adult females with pups, pups, and juveniles are found <20 km from rookeries and haulout sites during the summer and early fall, and much larger areas (>20 km) where these and other animals may range to find optimal foraging conditions once they are no longer tied to rookeries and haulout sites for nursing and reproduction. Loughlin (1993) observed large seasonal differences in foraging ranges that may have been associated with seasonal movements of prey, and Merrick (1995) concluded on the basis of available telemetry data that seasonal changes in home range were related to prey availability.

### 3.4. Population status and trend

The western Distinct Population Segment (DPS) of Steller sea lions has experienced a major decline of 75% over the past 20 years (Calkins et al. 1999; USFWS 1997; NMFS 2008). Consequently, the western DPS of Steller sea lions was listed as Endangered under the Endangered Species Act (ESA) in 1997. The reasons for this decline are not entirely known and are currently under investigation.

Aerial survey data from 2004-2005 were used to calculate a minimum population estimate of 39,988 animals for the western U.S. waters stock, and about half of the stock can be found in the Bering Sea/Aleutian Islands area (NMFS 2008). The sea lions breeding on Ayugadak Point represent less than 1% of the western stock.

Steller sea lions breed on the small islet southeast of Ayugadak Point on Rat Island. Steller sea lions are seasonally-abundant, but may occur during all months of the year. The most recent survey results for the Rat Island area are summarized in Table 1.

**Table 1. Recent survey results for Steller sea lions in the Rat Island area.**

<b>Species</b>	<b>Number</b>	<b>Year</b>	<b>Source</b>	<b>Comments</b>
<b>Steller sea lion</b>	<b>45</b>	<b>2004</b>	<b>NMFS database</b>	<b>Aerial Survey of Rat Is. (adults &amp; juveniles)</b>
<b>Steller sea lion</b>	<b>254</b>	<b>2005</b>	<b>NMFS database</b>	<b>Aerial Survey of Ayugadak Pt. Rookery (includes 83 pups)</b>
<b>Steller sea lion</b>	<b>present</b>	<b>2006</b>	<b>Buckelew et al 2007</b>	<b>Seen from boat offshore at Rat Is. &amp; Ayugadak Pt.</b>

## 4. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human-caused and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. Environmental baselines for biological opinions include past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). Future Federal actions that are unrelated to the

proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

#### **4.1. Steller Sea Lion Occurrence in the Action Area**

NMFS designated Ayugadak Point Rookery as critical habitat for Steller sea lions. Critical habitat is located on an islet about 1 mile southeast of Rat Island. Steller sea lions also haul-out on Rat Island. At Rat Island, a persistent haul-out site is known at the west end of the island near Krysi Point (Figure 1, Table 1). Both sites were active in 2007 (Buckelew et al. 2007), and only non-pup Steller sea lions were observed at the rookery in June 2008 (W. Meeks pers. comm.).

#### **4.2. Natural Factors Affecting the Status of Listed Species in the Action Area**

Variability in prey availability and distribution have most detectable effects on the distribution and abundance of Steller sea lions (Merrick 1995). Weather and climate variability also influence the presence of Steller sea lions on land, but the extent to which those influences are predictable is unknown. Steller sea lion predators also influence the presence of Steller sea lions on rookeries and haulouts at some unknown level in addition to being a source of natural mortality. The lack of predator presence information as well as prey availability make predicting the abundance and distribution of Steller sea lions on Rat Island and the Ayugadak Point Rookery very difficult.

#### **4.3 Human Impacts to Listed Species in the Action Area**

The western Steller sea lion population sustains some direct mortalities from bycatch in commercial fisheries, subsistence harvest, illegal shootings, and entanglements in fishing gear. These human activities clearly have an adverse affect to individuals in the western population; however, the population-level consequences of these anthropogenic stressors are low compared to competition for prey with commercial fisheries or natural changes in the availability or abundance of prey (see 2001 Biological Opinion on Authorization of 2002 Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fisheries based on the Fishery Management Plans for the Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish as modified by amendments 61 and 70 for further details). Because of the low number of animals, the population is considered vulnerable to catastrophic and stochastic events that could result in significant declines, threaten viability, and increase the species' risk of extinction. It is important to note that abundance estimates alone cannot be relied upon as accurate measures of population recovery without a long-term understanding of demographic parameters of the population, variability in the population trends and the effects of natural and anthropogenic stressors on the status of the population.

There is now widespread consensus within the scientific community that atmospheric temperatures on earth are increasing (warming) and that this will continue for at least the next

several decades. There is also consensus within the scientific community that this warming trend will alter current weather patterns. The strongest warming is expected in the north, exceeding the estimate for mean global warming by a factor of 3, due in part to the “ice-albedo feedback”, whereby as the reflective areas of arctic ice and snow retreat, the earth absorbs more heat, accentuating the warming (NRC 2003). The proximate effects of climate change in the arctic are being expressed as increased average winter and spring temperatures and changes in precipitation amount, timing, and type (Serreze et al. 2005). These changes in turn result in physical changes such as reduced sea ice, increased coastal erosion, changes in hydrology, depth to permafrost, and carbon availability (ACIA 2005).

The IPCC (2001b) also highlights uncertainty and inconsistencies in local and regional climate model projections and the ability to predict quantitative changes at these scales due to the capabilities of regional scale models (especially regarding precipitation).

The IPCC (2001b) concluded that:

Human activities have increased the atmospheric concentrations of greenhouse gases and aerosols since the preindustrial era.

An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.

On a global basis, it is very likely that 1998 was the warmest year and the 1990’s was the warmest decade in instrumented history (1861-2000) (IPCC, 2001a,b).

There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.... The best agreement between model simulations and observations over the last 140 years has been found when all...anthropogenic and natural forcing factors are combined” (see Figure SPM-2 of IPCC, 2001b).

Changes in sea level, snow cover, ice extent, and precipitation are consistent with a warming climate near the Earth’s surface. The IPCC (2001b) noted “Examples include...increases in sea level and ocean-heat content, and decreases in snow cover and sea-ice extent and thickness” and consider their statement that “rise in sea level during the 21st century that will continue for further centuries” to also be a “robust finding.” However, they highlight the uncertainty of understanding the probability distribution associated with both temperature and sea-level projections.

The 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007) reports that warming will be greatest over land and most high northern latitudes. They also predict the continuation of recent observed trends such as contraction of snow cover area, increases in thaw depth over most permafrost regions, and decrease in sea ice extent.

At the request of the White House, the NRC (NRC, 2001) identified areas in the science of climate change where there are the greatest certainties and uncertainties. In answer to the question of whether climate change is occurring and, if so, how, the NRC (2001) wrote that:

Weather station records and ship-based observations indicate that global mean surface air temperature warmed between about 0.4 and 0.8 C...during the 20<sup>th</sup> century...the warming trend is spatially widespread and is consistent with an array of other evidence...in this report. The ocean...has warmed by about 0.05 C...averaged over the layer extending from the surface down to 10,000 feet, since the 1950s.

The NRC concluded:

The IPCC's conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the current thinking of the scientific community on this issue. The stated degree of confidence in the IPCC assessment is higher today than it was 10, or even 5 years ago, but uncertainty remains....

The NRC (2001) also concluded that: "The predicted warming is larger over higher latitudes than over low latitudes, especially during winter and spring, and larger over land than over sea."

A general summary of the changes attributed to the current trends of arctic warming indicate sea ice in the Arctic is undergoing rapid changes. In general, the sea-ice extent is reduced during the arctic summer with relatively lower ice coverage in winter. The thickness of arctic ice is decreasing. The distribution of ice is changing, and its average age is decreasing. The melt duration is increasing. These factors lead to a decreasing perennial arctic ice pack.

The extent of winter sea ice, generally measured at the maximum in March, began changing in the late 1990's and has declined through 2006 (Comiso, 2002; Stroeve et al., 2007; Francis and Hunter, 2007). Comiso (2002) attributed the changes to corresponding changes in increasing surface temperature and wind-driven ice motion. The factors causing the reduction in the winter sea-ice extent are different from those in the summer. The reduction of the winter sea-ice extent in the Bering Sea preconditions the environment during the melt season for the Chukchi Sea. The end-of-winter perennial sea-ice extent was the smallest on record in March 2007 (Nghiem et al., 2007). The arctic sea ice reached its maximum on March 10, 2008. Although the maximum in 2008 was greater than in 2007, it was below average and was thinner than normal (Martin and Comiso, 2008; University of Colorado, NSDIC, 2008).

While changes in the reduction of summer sea-ice extent are apparent, the cause(s) of change are not fully established. The evidence suggests that it may be a combination of oceanic and atmospheric conditions that are causing the change. Incremental solar heating and ocean heat flux, longwave radiation fluxes, changes in surface circulation, and less multi-year sea ice all may play a role.

These changes are resulting, or are expected to result, in changes to the biological environment, causing shifts, expansion, or retraction of home range, changes in behavior, and changes in population parameters of plant and animal species. Much research in recent years has focused on

the effects of naturally-occurring or man-induced global climate regime shifts and the potential for these shifts to cause changes in habitat structure over large areas. Although many of the forces driving global climate regime shifts may originate outside the Arctic, the impacts of global climate change are exacerbated in the Arctic (ACIA 2005). Changes to prey distribution, prey abundance and habitat by the direct and indirect effects of global climatic change are or will be common to sub-arctic and arctic species. Whether these climate induced changes will result in positive or negative effects on the survival and reproduction of Steller sea lions is unknown.

## **5. EFFECTS OF THE FEDERAL ACTION**

Pursuant to Section 7(a)(2) of the ESA (16 U.S.C. §1536), federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of their critical habitat. This biological opinion assesses the direct and indirect effects of the proposed USFWS Rat Islands eradication and NMFS issuance of an incidental harassment authorization as the federal action agencies. In Section 2 of this biological opinion, NMFS provided an overview of the proposed action in the action area that may adversely affect listed species.

In this biological opinion, NMFS assesses the probable direct and indirect effects of the proposed action on the endangered western population of Steller sea lions and their designated critical habitat. The purpose of the assessment is to determine if it is reasonable to expect that the proposed action can have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild. This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

### **5.1. Effects of the Proposed Action**

Steller sea lions rest and breed on the Ayugadak Point islet, which is designated as critical habitat for this species, and on Rat Island at Krysi Point. The proposed action on Ayugadak Point islet and Rat Island presents the opportunity for disturbance or harassment during bait station installation and aerial rodenticide application. Steller sea lions will be exposed to airborne noise and visual stimuli from the proposed action. No other proposed activities are likely to affect Steller sea lions.

#### **5.1.1. Effects of Surveys and Staging**

Biological surveys and staging activities have the potential to harass Steller sea lions. At Rat Island, persistent haul-out sites will be avoided during surveys and staging operations as will any other haul out sites discovered prior to helicopter operations on the islet off Ayugadak Point. In spite of these precautions, sea lions encountered unexpectedly during helicopter operations could be flushed from land temporarily. An individual sea lion’s exposure to peak noise from the helicopter will be limited to animals that remain ashore, and is likely to be of short duration, as the elevation and speed of the helicopter will limit the time that any single location is exposed to maximum noise within the cone

beneath the helicopter. Given the attenuation of airborne helicopter sounds no reduction in hearing sensitivity is predicted or anticipated.

Risks to Steller sea lions from personnel camps on Rat Island are anticipated to be negligible to non-existent as camps and storage sites will be located well inland away from Steller sea lion haul out areas.

As USFWS proposes to complete these activities it is highly unlikely to result in the harassment of Steller sea lions at Krysi Point or Ayugadak Point rookery. Personnel, helicopters and vessels will be generally out of view or barely audible to Steller sea lions.

### **5.1.2. Effects of Bait Application**

There is negligible risk of Steller sea lion exposure to the rodenticide proposed for use in this project. The active ingredient, brodifacoum, will only be available to species that directly ingest the grain-based bait pellets or species that consume prey that have directly ingested pellets. The exclusively marine feeding habits of Steller sea lions effectively eliminate these exposure pathways. See the Rat Islands EA and FONSI for specific dosing analyses on-line at: <http://alaskamaritime.fws.gov/news.htm>

The response of pinnipeds like Steller sea lions to noise from aircraft overflights varies from no discernable reaction to completely vacating haul-outs after a single overflight (Calkins 1979; Efroymson and Suter 2001). Approaching aircraft generally flush animals into the water. In one case, Withrow et al. (1985 in Richardson et al. 1995) reported Steller sea lions left a beach in response to a Bell 205 helicopter >1.6 km away, but the noise from a helicopter is typically directed down in a “cone” underneath (Richardson et al. 1995). Airborne sound detection is strongly influenced by wind speed and direction so disturbance at such great distance depends on the “receiver” and environmental conditions.

Known haul out sites on Rat Island (Krysi Point, Figure 1) will be avoided by the helicopter during bait application to the extent that direct application of bait into the marine environment is to be minimized, and all haul out sites are on the immediate coast. No pups are expected on Rat Island. The impacts of disturbance to sea lions during molting will be minimized by timing the aerial broadcast after the peak molting period is over for most of the population. Richardson et al. (1995) suggested molting may be a sensitive period for pinnipeds when they haul out and rest for longer than average periods. Therefore the energetic costs of flushing into the water during the molt may be greater than at times of the year when sea lions are entering the water more frequently.

### **5.1.3. Effects of Bait Application at Ayugadak Point Steller sea lion rookery**

Installation of bait stations on the islet off Ayugadak Point in August may result in short-term displacement of some Steller sea lions from the islet. This disturbance is likely to be limited to the few-hour period when personnel are present on the island. Sea lion pups will likely be present on the islet during installation of bait stations. To minimize the probability of disturbance to the



rookery, the islet will be approached slowly in a small boat, from the side of the island opposite and out of sight of the rookery. While on the islet personnel will remain out of sight of the rookery (Figure 2).

In October, the bait stations on the islet will need to be replenished. Again, the approach to the island will be slow, and opposite the rookery. This may result in displacing a few non-breeding animals for a few hours when personnel are present on the islet. If it is not possible to land a skiff on the islet, the island will be baited with the helicopter. This is likely to result in flushing sea lions from the islet resulting in displacement for 1-6 days (Kucey and Trites 2006). The duration of helicopter baiting will take approximately 15 min. This time of year Steller sea lions are highly mobile (Raum-Suryan et al. 2002; Raum-Suryan et al. 2004) and after the sensitive periods of pupping and molting. Steller sea lions on Ayugadak Point rookery will be displaced by helicopter baiting if the other less invasive alternative baiting attempts are unsuccessful due to weather.

Ayugadak point rookery is designated critical habitat within the action area and as such is the portion of the proposed action where critical habitat may be affected. The proposed bait application whether by helicopter, hand, or via enclosed bait stations will occur only on vegetated portions of the islet or Rat Island. Steller sea lions do not typically use the vegetated ground for resting or other social actions on land, and therefore the proposed action and habitat used do not directly overlap and there will be no adverse effect on terrestrial critical habitat or its function. Aquatic critical habitat and Steller sea lion prey will not be affected by bait that accidentally enters the marine environment as the grain based pellets break down in water. In the environmental assessment USFWS reported brodifacoum's water solubility is very low, making the risk of brodifacoum contaminating the water column also very low. Hypothetically, even if brodifacoum were highly water soluble, and bait were broadcast at the full application rate of 17 kg/ha into water only 1 m (3.3 ft) deep, the resultant brodifacoum concentration in the water – about 0.04 parts per billion – would still be nearly 1000 times less than the measured 50% lethal concentration value for trout (0.04 parts per million) (USFWS 2007). Thus there will be no adverse effect on Steller sea lion aquatic critical habitat or their prey. Because rats can forage in the intertidal zone and have likely altered the species composition and health of the intertidal zone around Rat Island, the end result of the eradication project could enhance the diversity and health of the intertidal zone and the associated function of critical habitat used by Steller sea lions.

#### **5.1.4. Effects of Demobilization**

Demobilization activities have the potential to harass Steller sea lions. At Rat Island, known persistent haul-out sites will be avoided during demobilization as will any other haul sites discovered prior to helicopter operations on the islet off Ayugadak Point. In spite of these precautions, sea lions encountered unexpectedly during helicopter operations could be flushed from land temporarily. An individual sea lion's exposure to peak noise from the helicopter will be limited to animals that remain ashore, and is likely to be of short duration, as the elevation and speed of the helicopter will limit the time that any single location is exposed to maximum noise within the cone beneath the helicopter. Given the attenuation of airborne helicopter sounds, no reduction in hearing sensitivity is predicted or anticipated.

As USFWS proposes to complete these activities it is highly unlikely to result in the harassment of Steller sea lions at Krysi Point or Ayugadak Point rookery. Personnel, helicopters or vessels will be generally out of view or barely audible to Steller sea lions.

#### **5.1.5. Summary of the effects of the proposed rat eradication**

Overall, the effects of the operations described in the EA on Steller sea lions will vary depending on the number of disturbance events. In this case the most likely direct effect is a single helicopter overflight over resting or socializing Steller sea lions after the molt and breeding season. The short-term displacement from haul-outs that is likely to occur as a result of helicopter noise and personnel is not anticipated to have any effect on overall energy balance or fitness of any individual animals. No effect on aquatic or terrestrial Steller sea lion critical habitat is expected.

It is not likely that any Steller sea lions will suffer injury or the significant potential for injury as a result of the rat eradication activities by USFWS. The potential disturbance or short-term displacement associated with the project would result in Steller sea lions entering the water and transiting to other haulouts along the Aleutian Islands or returning to Rat Island or Ayugadak Point islet. Steller sea lions (adults, pups and juveniles) disperse from their natal rookeries to other haul outs normally during the fall and winter (Raum-Suryan et al. 2002; Raum-Suryan et al. 2004).

#### **5.2. Effects of Climate Change**

Climate change could potentially affect Steller sea lions in several ways including:

- \* Increased underwater noise and disturbance related to increased northern shipping routes, and possibly related to increased development, within their range;
- \* Altered interactions of Steller sea lions with commercial fisheries, including increased underwater noise and disturbance, incidental take, and gear entanglement;
- \* Decreases in ice cover with the potential for resultant changes in prey species concentrations and distribution;
- \* Changes in use of haul outs due to sea level rise;
- \* More frequent climatic anomalies, such as El Niños and La Niñas, with potential resultant changes in prey concentrations; and
- \* A northern expansion of pinniped and whale species, with the possibility of increased overlap in the Bering Sea and north Pacific Ocean.

The potential effects of climate change on this population of Steller sea lions are uncertain. There is no current evidence of negative effects on Steller sea lions. There is no evidence suggesting that many of the changes that could occur, such as changes in timing of migrations and shifts in distribution, would be associated with overall adverse effects on Steller sea lions. Available data do indicate that the Bering Sea environment is changing (Angel & Smith 2002), however whether environmental changes will be detrimental to Steller sea lions in the foreseeable future is unknown.

Sightings of California sea lions and northern elephant seals have increased concurrent with

increasing abundance, and could be indicative of a positive influence of climate change for these temperate species. Concentrations of the rare North Pacific right whale were first observed in 1996 and have continued until recently, possibly reflecting changes in zooplankton distribution due to large-scale oceanographic change within the Bering Sea.

We emphasize that there is uncertainty associated with many of the predictions about potential climate changes, especially at a regional level, and associated environmental changes that could occur. If this change occurs, it is likely that shipping would increase throughout the range of the Steller sea lion, especially in the southern portions of the Bering Sea. If commercial fisheries were to shift or expand into the Chukchi or Beaufort Sea, Steller sea lion direct and indirect interactions with commercial fisheries potentially could be reduced. There are, however, few data that would permit us to quantitatively predict such types of effects.

Tynan and DeMaster (1997) note an earlier IPCC report concluded an increase in human activity is likely to accompany the opening of the Northwest Passage and the Russian Northern Sea Route. They identify a potential for increased environmental pollution, an increased incidence of epizootics, exploration, increased ship traffic, increased fisheries, and increased industrial activities, and the synergistic effects of these factors with ecosystem changes due to climate change as potential concerns for marine mammal populations. Perhaps the greatest potential adverse effect associated with global warming could occur if predictions that the Northwest Passage may become ice free for significant lengths of time prove accurate, opening sea routes into the Bering Sea and across the Beaufort Sea.

We conclude that the potential effects of climate change on the endangered western stock of Steller sea lions are highly uncertain. The NMFS' National Marine Mammal Laboratory has stated there are insufficient data to make reliable predictions of the effects of Arctic climate change on Steller sea lions (Angliss and Outlaw 2008). There is no current evidence of adverse effects on Steller sea lions due to climate change. There is no documented evidence suggesting that many of the changes that could occur such as shifts in distribution, and shifts in abundance and distribution of prey would be associated with overall adverse or positive effects on Steller sea lions. The more frequent occurrence of some temperate pinnipeds and subarctic whales in the Chukchi and Beaufort seas in recent years may be initial indications that habitat conditions may be changing that favor some species; however, the short duration of observations is insufficient to conclude whether the recent observations indicate an anomaly or a trend. We remain concerned that increasing shipping and industrial activity associated with arctic warming will occur in addition to changes in fish distribution and their associated fisheries. This predicted increase in transportation and commercial activity will increase noise and disturbance in addition to the levels of noise from current industrial activity, subsistence harvest activities, local/regional shipping, research, recreational, military, aircraft, and other vessel traffic.

### **5.3. Cumulative Effects**

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area

of the Federal action subject to consultation.” Future Federal actions are reviewed through separate section 7 consultation processes. Therefore, such actions are not considered cumulative to the proposed action.

Cumulative effects are usually viewed as those effects that impact the existing environment and remain to become part of the environment. These effects differ from those that may be attributed to past and ongoing actions within the area because those are considered part of the environmental baseline.

Cumulative effects to Steller sea lions may result from the subsistence harvest by Alaska Natives, and State-managed subsistence, sport, and commercial fisheries. NOAA Fisheries is not aware of any specific future non-Federal activities within the action area. NOAA Fisheries assumes that future private and state actions will continue at similar intensities as in recent years. We do not find the proposed action is likely to contribute significantly to cumulative effects.

## **6.0 CONCLUSION**

NOAA Fisheries has determined that, based on the available information, the proposed action is not likely to jeopardize the continued existence of listed species nor result in the destruction or adverse modification of critical habitat. NOAA Fisheries used the best available scientific and commercial data to analyze the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, as well as consideration for cumulative effects. NOAA Fisheries believes that the proposed action may result in behavioral reactions among Steller sea lions which may be present on Rat Island and the small islet offshore known as Ayugadak Point during the eradication. These reactions could range from becoming vigilant, increased calling, movement towards or into the water, and at the most, extreme temporary site abandonment. Sound pressure levels are not expected to result in any hearing loss or impairment (temporary threshold shift) due to the source levels of helicopter noise, the proximity of the haul outs to areas baited by the helicopter, and the transient nature of helicopter noise. Lethal take is not expected. Additional harassment could result due to the presence of people in close proximity to resting Steller sea lions while hand broadcasting bait or installing bait stations.

This analysis concludes that implementation of rat eradication activities as described is not likely to jeopardize the continued existence of the western stock of Steller sea lions or adversely or destroy modify critical habitat.

## **7. CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The National Marine Fisheries Service and the U.S. Fish and Wildlife Service should implement the following measures for these purposes if the Rat Islands eradication is successful and USFWS intends to undertake additional rat eradications on islands where Steller sea lions breed, rest or have critical habitat:

1. USFWS and NMFS should design and implement research to understand the short-term and long-term effects of harassment to Steller sea lions as a result of acoustic and visual stimuli associated with helicopter overflights and human presence.
2. The USFWS and NMFS should coordinate research associated with the restoration of island ecosystems eradicated of rats, and the potential benefits to the intertidal and nearshore habitat used by Steller sea lions.

## **8. REINITIATION OF CONSULTATION**

Consultation must be reinitiated if: (1) the amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16). Moreover, if monitoring at the project site reveals that listed species are being stranded or affected in ways not anticipated, consultation must be reinitiated.

## **9. INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

This opinion does not include an incidental take statement at this time. Upon issuance of regulations or authorizations under Section 101(a)(5) of the Marine Mammal Protection Act and/or its 1994 Amendments, NMFS will amend this opinion to include an incidental take statement(s) for the described work.

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