Draft
Supplemental Environmental Impact Statement

Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska

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United State Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries
Service, Alaska Region

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for
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Abstract: The National Marine Fisheries Service (NMFS) proposes to change the management of the subsistence use of the Eastern Pacific stock of northern fur seals (*Callorhinus ursinus*) based on a petition from the Aleut Community of St. Paul Island (ACSPI), Tribal Government. NMFS is evaluating alternatives, which consider balancing the use of federal regulations and cooperative management with ACSPI to share management of subsistence use. The different combinations of regulatory and non-regulatory restrictions within each alternative would provide greater harvest flexibility and food security compared to the no action alternative. Under any alternative, NMFS and ACSPI would both co-manage subsistence use consistent with the requirements of Marine Mammal Protection Act and regulate aspects of subsistence use under the Fur Seal Act due to the risks of an unrestricted harvest. The alternatives evaluate the potential effects of: changes in the subsistence harvest range setting process; allowing a portion of the harvest to be comprised of male fur seal pups; hunting seals using firearms; accidental mortality of females; and transferring more management and enforcement responsibility of the subsistence use to the locally-based Co-Management Council.

EXECUTIVE SUMMARY

This Draft Supplemental Environmental Impact Statement (DSEIS) supplements the Final Environmental Impact Statement (EIS) for Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands (National Marine Fisheries Service [NMFS] 2005). NMFS decided to prepare this SEIS because the proposed action makes substantial changes to the action analyzed in the 2005 EIS. The action analyzed in the 2005 EIS was setting the annual Pribilof Islands northern fur seal (*Callorhinus ursinus*) subsistence take ranges as required by regulations. The 2005 action was limited to the subsistence take of sub-adult male seals. The action established the subsistence take range for St. Paul Island at 1,645 - 2,000 seals. The 2005 EIS concluded that subsistence harvests within this range would have minimal effect on the northern fur seal stock and met the documented subsistence needs of the Pribilovians on St. Paul Island. The following sections provide a brief overview of the contents of this DSEIS.

ES 1. INTRODUCTION

NMFS manages the subsistence harvest of northern fur seals in the Pribilof Islands under Federal regulations (at 50 Code of Federal Regulations [CFR] 216.71-74) established under the Fur Seal Act (FSA) in 1985. Under these regulations, harvests on the islands of St. Paul and St. George are managed independently, and the taking of northern fur seals for subsistence purposes is restricted to a season from June 23 to August 8 each year by experienced sealers using traditional harvesting methods. In February 2007 the Aleut Community of St. Paul Island (ACSPI), Tribal Government, passed a resolution requesting that NMFS revise regulations governing the northern fur seal subsistence harvest. In October 2009, ACSPI submitted a resolution to NMFS with further information as to how to modify the regulations governing the subsistence harvest of northern fur seals on St. Paul Island, Alaska. Through a series of subsequent meetings and communications with NMFS, ACSPI amended its initial resolution requesting that the subsistence harvest regulations for St. Paul allow for more flexibility in the management of the harvest under the co-management system. On July 12, 2012, NMFS announced in the Federal Register the receipt of the Tribal Government of St. Paul's petition for rulemaking to revise the regulations governing the subsistence taking of northern fur seals, and received public comments from four organizations and two individuals. Those comment letters were received by NMFS from the Marine Mammal Commission (MMC), Humane Society of the United States (HSUS), Center for Biological Diversity, Alaskan Wildlife Federation, and two individuals. ACSPI then submitted a revised petition on November 17, 2014, which was commented on during the public scoping process as part of this DSEIS (see Section 1.8).

ES 1.1. The Petitioned Action

The 2014 revised petition recommended keeping the upper limit of up to 2,000 male fur seals that could be taken annually. In addition, the petition requested to take female seals incidental to the hunt and harvest of male seals up to 1% of the upper limit. This would mean up to 20 female seals could be killed incidental to meet the subsistence need. ACSPI also petitioned NMFS to eliminate the length restriction of 124.5 centimeters (cm) established in the 1986 Final Rule[1]. The ACSPI petition also requested two

[1] *Federal Register* 51 FR 17896

subsistence use seasons. The first season would extend from January 1 to May 31, during which juvenile male fur seals (defined in the petition as male seals up to 7 years, excluding pups) could be taken by hunters using firearms. The second season would occur from June 23 to December 31, during which pups and juvenile male fur seals could be harvested for subsistence. Finally, on May 13, 2016, ACSPI submitted amended revisions to their petitioned alternative emphasizing the request to allow ACSPI more flexibility to manage the harvest under the co-management system rather than through federal regulations. Specifically, the harvests will be co-managed by the Tribal Government of St. Paul and NMFS under the existing co-management agreement.

ES 1.2. Public Scoping

NMFS held public meetings June 17-19, 2015, on St. Paul Island to discuss the proposed action. Following the public meeting, NMFS incorporated aspects of the comments received into the range of alternatives. The formal NEPA scoping process for this SEIS was initiated with the publication of the Notice of Intent (NOI) in the *Federal Register* on July 24, 2015, inviting public comments on the scope of issues, alternatives, and impacts to be addressed in the DSEIS, and for identifying the significant issues related to the proposed action. NMFS received comments from the U.S. Environmental Protection Agency, HSUS, MMC, Central Bering Sea Fishermen's Association (CBSFA), Aleutian Pribilof Islands Association, Inc. (APIAI), ACSPI, and eight individuals. Based on comments received, NMFS has increased the number of alternatives under consideration and incorporated comments into components of several of the alternatives. Alternative 2 Option A represents the Preliminary Preferred/Petitioned Alternative in its entirety.

ES 1.3. Purpose and Need

The purpose of the proposed action is to conserve northern fur seals and manage the subsistence use of fur seals on St. Paul Island for their long-term sustainable use for purposes of food, cultural continuity, clothing, arts, and crafts. The proposed action is needed to allow Pribilovians on St. Paul Island greater flexibility to meet their subsistence needs by obtaining fresh fur seal meat and subsistence resources throughout the year.

ES 1.4. Action Area

The Action Area is the Pribilof Island of St. Paul, located in the central Bering Sea, approximately 500 kilometers (km) west of the mainland, and 300 km north of the Aleutian Islands Chain, and is part of the Bering Sea shelf slope that constitutes a large marine ecosystem. Generally, the Pribilof Islands support high concentrations of marine mammals, seabirds, fish, and invertebrates (Hood and Calder 1981). This biodiversity and biological productivity results from the proximity of the islands to the continental shelf break, and nearby canyons, along with the general ecological complexity of the isolated island habitat and its assemblage of nearshore habitats, sea cliffs, beaches, sand dunes and coastal wetlands unique in the Bering Sea. The Pribilof Islands provide terrestrial habitat for the majority of the northern fur seal population to reproduce and rest during the summer and autumn (Gentry 1998). However, as the proposed subsistence harvest regulations are intended specifically for the St. Paul Island community and due to site fidelity and philopatry exhibited by northern fur seals (see Section 3.2.3.1), the Action Area or geographic

scope of the DSEIS is limited to St. Paul Island and its immediate surroundings. For additional information on northern fur seal biology, see Section 3.2.

ES 2. ALTERNATIVES CONSIDERED

NMFS has, in accordance with guidance from Council on Environmental Quality on implementing NEPA (40 CFR 1500), developed five alternatives for evaluation in this SEIS. These include the No Action Alternative and four other alternatives that evaluate two northern fur seal harvest levels as well as regulatory and non-regulatory restrictions on when, where, and how different-aged, non-breeding male fur seals can be taken for subsistence purposes. Alternative 1 is the No Action Alternative and represents the current fur seal harvest as status quo. The main distinctions under the other alternatives relate to the level of co-management versus the use of federal regulations to manage fur seal subsistence use. Below is a brief overview of each alternative. Additional detail about the alternatives can be found in Chapter 2.

ES 2.1. Alternative 1 (No Action)

Alternative 1 would maintain the current subsistence harvest take range on St. Paul Island of 1,645 to 2,000 northern fur seals. This alternative continues the harvest under the regulatory process used to establish harvest take levels every 3 years, and a set of restrictions that have been in place since 1993. Federal regulations at 50 CFR 216.72 currently restrict subsistence harvests of sub-adult male fur seals to the period between June 23 and August 8 of each year.

The regulatory restrictions for Alternative 1 include Subpart F--Pribilof Islands, Taking for Subsistence Purposes:

- Sec. 216.71 Allowable Take of Fur Seals:
  Pribilovians may take fur seals on the Pribilof Islands, if such taking is:

  (a) For subsistence uses, and

  (b) Not accomplished in a wasteful manner.

- Sec. 216.72 Restrictions on Taking:

  (a) The harvests of seals on St. Paul and St. George Islands shall be treated independently for the purposes of this section. Any suspension, termination, or extension of the harvest is applicable only to the island for which it is issued.

  (b) By April 1 of every third year, beginning April 1994, the Assistant Administrator (AA) will publish in the Federal Register a summary of the preceding 3 years of harvesting and a discussion of the number of seals expected to be taken annually over the next 3 years to satisfy the subsistence requirements of each island. This discussion will include an assessment of factors and conditions on St. Paul and St. George Islands that influence the need by Pribilof Aleuts to take seals for subsistence uses and an assessment of any changes to those conditions, indicating that the number of seals that may be taken for subsistence each year should be made higher or lower. Following a 30-day public comment period, a final notification of the expected annual harvest levels for the next 3 years will be published.

  (c) [Reserved]

(d) St. George Island [Not Applicable]

(e) St. Paul Island--Seals may only be harvested from the following haulout areas: Zapadni, English Bay, Northeast Point, Polovina, Lukanin, Kitovi, and Reef. No haulout area may be harvested more than once per week.

(1) The scheduling of the harvest is at the discretion of the Pribilovians, but must be such as to minimize stress to the harvested seals. The Pribilovians must give adequate advance notice of their harvest schedules to the NMFS representatives to allow for necessary monitoring activities.

(2) No fur seal may be taken on the Pribilof Islands before June 23 of each year.

(3) No fur seal may be taken except by experienced sealers using the traditional harvesting methods, including stunning followed immediately by exsanguination. The harvesting method shall include organized drives of sub-adult males to killing fields unless it is determined by the NMFS representatives, in consultation with the Pribilovians conducting the harvest, which alternative methods will not result in increased disturbance to the rookery or the increased accidental take of female seals.

(4) Any taking of adult fur seals or pups, or the intentional taking of sub-adult female fur seals is prohibited.

(5) Only sub-adult male fur seals 124.5 cm or less in length may be taken.

(6) Seals with tags and/or entangling debris may only be taken if so directed by NMFS scientists.

(f) Harvest suspension provisions. (1) The AA is required to suspend the take provided for in Sec. 216.71 and 216.72 when:

(i) (S)He determines, after reasonable notice by NMFS representatives to the Pribilovians on the island, that the subsistence needs of the Pribilovians on the island have been satisfied; or

(ii) (S)He determines that the harvest is otherwise being conducted in a wasteful manner; or

(iii) The lower end of the range of the estimated subsistence level provided in the notice issued under paragraph (b) of this section is reached.

(2) A suspension based on a determination under paragraph (f)(1)(ii) of this section may be lifted by the AA if (s)he finds that the conditions, which led to the determination that the harvest was being conducted in a wasteful manner have been remedied.

(3) A suspension issued in accordance with paragraph (f)(1)(iii) of this section may not exceed 48 hours in duration and shall be followed immediately by a review of the harvest data to determine if a finding under paragraph (f)(1)(i) of this section is warranted. If the harvest is not terminated under paragraph (f)(1)(i) of this section, the AA must provide a revised estimate of the number of seals required to satisfy the Pribilovians' subsistence needs.

(g) Harvest termination provisions. (1) The AA shall terminate the take provided for in Sec. 216.71 on August 8 for sub-adult males on St. Paul and St. George Islands and on November 30 for male young of the year on St. George Island.

(2) The AA shall terminate the take provided for in §216.71 when (s)he determines under paragraph (f)(1)(i) or (f)(1)(iii) of this section that the subsistence needs of the Pribilovians on the island have been satisfied or the upper end of the harvest range has been reached, whichever occurs first.

Table ES-1 provides additional detail on Alternative 1.

Table ES-1 Alternative 1 (No Action)

Alternative Component	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Harvest Range	1,645 sub-adult male fur seals set unchanged for 2014-2016; can be increased to 2,000 sub-adult males fur seals if 1,645 is reached and NMFS determines need has not yet been met.	
Harvested Animals	Sub-adult male fur seals 124.5 cm or less in length.	
Harvest Area	Zapadni, English Bay, Northeast Point, Polovina, Lukanin, Kitovi, and Reef hauling grounds.	
Harvest Season(s)	June 23 to August 8	
Harvest range setting process	A required regulatory 3-year harvest summary, and notification, used to establish the following 3-year harvest ranges.	
Prohibited Harvest	Any taking of adult fur seals is prohibited; any taking of pups is prohibited; the intentional taking of sub-adult female fur seals is prohibited.	
Suspend Harvest When…	Retains AA authority to suspend harvest Subsistence needs have been satisfied; harvest is being conducted in a wasteful manner; or when lower end of the range of subsistence need has been reached.	[non-regulatory co-management restriction] If five female fur seals have been accidentally harvested.
Terminate Harvest When…	Retains AA authority to terminate harvest After August 8; subsistence need has been met; or conditions that led to waste or wasteful taking have not been remedied.	[non-regulatory co-management restriction] Eight female fur seals have been accidentally harvested.
Harvest Practices	Only experienced sealers using traditional and humane methods of round-up, stunning, and immediate exsanguination. Seals with tags and/or entangling debris may only be taken if so directed by NMFS scientists; No haulout area may be harvested more than once per week.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

ES 2.2. Alternative 2 (Petitioned / Preliminary Preferred Alternative)

Alternative 2 Option A addresses the ACSPI's petition (see Section 1.1) and would modify the management of the subsistence harvest as described in the 2014 petition from the ACSPI to rely more on co-management rather than Federal regulations. Alternative 2 Option A would eliminate all the regulatory provisions applicable to St. Paul Island under 50 CFR 201.72, and replace them with the following provisions:

1. Take of up to 2,000 juvenile male fur seals annually;
2. Take of juvenile male fur seals by hunting with firearms annually from January 1 to May 31;
3. Take by harvesting pups and juvenile male fur seals annually from June 23 to December 31 annually without using firearms;

4. Both harvesting and hunting of fur seals will be co-managed by the ACSPI and NMFS under an existing Co-Management Agreement.

NMFS will define male seals less than 7 years old as "juvenile" to be used for subsistence purposes in Alternative 2. Alternative 2 considers two options which would terminate the continuation of subsistence use based on mortality of female fur seals. The following elements are specific to Alternative 2 - Option A or Option B as noted in the list below and presented in Tables ES-2 and ES-3.

5. Alternative 2 - Option A authorizes the Co-Management Council to define an allowance for accidental female mortality in the annual harvest management plan, up to a maximum of 20 females per year.
6. Alternative 2 - Option B terminates the subsistence use of fur seals by regulation if and when 20 female fur seals are killed during subsistence activities.
7. Alternative 2 [Options A and B] eliminates the regulatory process used to establish harvest take levels every 3 years, eliminates the lower harvest take level, and creates an annual upper harvest take level of 2,000 northern fur seals in the regulations.
8. Alternative 2 [Options A and B] creates a new subsistence hunting season from January 1 through May 31 and extends the summer harvest season from June 23 through December 31 by regulation.
9. Alternative 2 [Options A and B] removes the regulatory prohibition on taking of pups and adult fur seals (*i.e.,* 7 years or older) and authorizes the Co-Management Council to manage any prohibitions, including suspension provisions outside of those defined in the regulations.
10. Alternative 2 [Options A and B] eliminates the existing regulatory restriction of harvesting fur seals greater than 124.5 cm in length.
11. Alternative 2 [Options A and B] allows harvesting of fur seals with tags or entangling debris.
12. Alternative 2 [Options A and B] eliminates the regulatory requirement that the Pribilovians must give adequate notice of their harvest schedules to NMFS. Harvest dates and locations would be described in an annual harvest management plan developed by the Co-Management Council (which includes NMFS).
13. Alternative 2 [Options A and B] eliminates the regulatory restriction that no haulout area may be harvested more than once per week. Harvest dates and locations would be described in an annual harvest management plan developed by the Co-Management Council.
14. Alternative 2 [Options A and B] eliminates the AA's authority to suspend or terminate the take as described in Section 216.72 (e) and (f). Harvests will be suspended or terminated as defined in an annual harvest management plan developed by the Co-Management Council, in addition to the termination threshold in the regulations once 2,000 juvenile males have been killed.

Alternative 2 would monitor and manage harvesting or hunting to make suspensions, terminations, or adjustments within the co-management system (see Section 2.2.2 for additional detail).

Table ES-2 provides additional detail about Alternative 2 - Option A.

Table ES-2 Alternative 2 Option A

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male (*i.e.*, up to 7 years old) fur seals.	
Pup Subsistence Harvest Limit	Establish the age-specific level based on community need and environmental conditions.	
Juvenile Subsistence Harvest Limit		
Juvenile Subsistence Hunt Limit		
Harvest Area	Any breeding or hauling grounds.	
Pup Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Hunt Season	January 1 to May 31	Frequency established by community need and environmental conditions.
Female Mortality Limit to Temporarily Suspend Subsistence	Female mortality threshold to be set by Co-Management Council.	
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed.	
Temporary Suspension of Subsistence use	Female mortality threshold to be set by Co-Management Council.	
Termination of Subsistence use	The AA determines 2,000 fur seals have been killed. The AA determines the harvest is being conducted in a wasteful manner have not been remedied.	Subsistence needs have been met.
Authorized Harvest Method	Juvenile fur seals must be harvested using methods determined to minimize effects on non-harvested seals. Pups must be harvested using methods determined to minimize effects on non-harvested seals. Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.	
Authorized Hunt Method	Firearms	Estimate harassment based on actual hunting methods and establish maximum acceptable level. Estimate level of struck and lost seals based on actual hunting and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

Table ES-3 Alternative 2 Option B

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male (*i.e.*, up to 7 years old) fur seals.	
Pup Subsistence Harvest Limit	Establish the age-specific level based on community need and environmental conditions.	
Juvenile Subsistence Harvest Limit		
Juvenile Subsistence Hunt Limit		
Harvest Area	Any breeding or hauling ground.	
Pup Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Hunt Season	January 1 to May 31	Frequency established by community need and environmental conditions.
Female Mortality Limit to Temporarily Suspend Subsistence	Female mortality threshold to be set by Co-Management Council.	
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed	
Temporary Suspension of Subsistence use	Female mortality threshold to be set by Co-Management Council.	
Termination of Subsistence use	The AA determines 2,000 fur seals have been killed. The AA determines the harvest is being conducted in a wasteful manner have not been remedied.	Subsistence needs have been met.
Authorized Harvest Method	Juvenile fur seals must be harvested using methods determined to minimize effects on non-harvested seals. Pups must be harvested using methods determined to minimize effects on non-harvested seals. Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.	
Authorized Hunt Method	Firearms	Estimate harassment based on actual hunting methods and establish maximum acceptable level. Estimate level of struck and lost seals based on actual hunting and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

ES 2.3. Alternative 3

Alternative 3 will revise federal regulations to manage subsistence use by including prescriptive restrictions defining seasons, locations, methods of killing, and harvest and hunt allocation by age and season. This alternative incorporates elements of federal regulation and co-management to restrict the subsistence use of fur seals. Compared to Alternative 1 (No Action), Alternative 3 uses federal regulations to manage most aspects of the subsistence use of fur seals and limits the use of the Co-Management Council to prohibiting subsistence use at breeding locations likely to reach unsustainable

abundance levels, managing sub-lethal effects of hunting and harvesting, and monitoring and reporting subsistence use. Alternative 3 would add regulations to authorize and restrict the use of firearms to hunt fur seals to two specific locations.

Alternative 3 (Table ES-4) would amend federal regulations to manage the following aspects of subsistence use of fur seals:

1. Authorize the Pribilovians on St. Paul to take up to 2,000 male fur seals annually for subsistence use;
2. Create two subsistence seasons totaling 219 days: the first to hunt juvenile male fur seals with firearms from January 1 to March 15, and the second to harvest male pups only from August 9 to December 31;
3. Retain the prohibition on harvesting adult fur seals;
4. Retain the provision to limit the frequency of harvests any site occupied by fur seals to occur once per week;
5. Limit the harvest of male pups from August 9 to December 31 to 1,500 animals.
6. Limit the hunt of juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups, killed with firearms) to 500 animals from January 1 to March 15;
7. Restrict the use of firearms to hunt juvenile males hauled out on land at the Vostochni and Morjovi hauling and breeding grounds;
8. Terminate the subsistence use for that year if and when five females have been killed (*i.e.*, 0.25% of the authorized total male kill);
9. Create a provision that suspends subsistence use for up to 2 days if and when three females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the three accidental mortalities have been reviewed;
10. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternative 1);
11. Create a provision that Pribilovians' method of harvest must include at a minimum that all pups be captured, handled and their sex determined prior to harvesting male pups.

Alternative 3 would eliminate the following provisions from the regulations:

1. Eliminate the provision to set the harvest range every 3 years;
2. Eliminate the provision to establish a lower end of the subsistence harvest range;
3. Eliminate the juvenile male harvest period between June 23 and August 8 of each year;
4. Eliminate the prohibition on harvesting pups.

Table ES-4 Alternative 3

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male fur seals (*i.e.*, up to 7 years old).	
Subsistence Harvest Limit	1,500 male fur seal pups (*i.e.*, up to 1 year old).	
Subsistence Hunt Limit	500 juvenile males (*i.e.*, up to 7 years old).	
Harvest Area	Any breeding or hauling ground.	Determined on pup production and trend projection (see Johnson *et al.* 2013).
Hunt Area	Vostochni and Morjovi hauling and breeding grounds.	
Harvest Season	Once per week per harvest area from August 9 to December 31.	
Hunt Season	January 1 to March 15	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when Three female fur seals are killed.	Determination of measures to be taken to detect and avoid female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	Five female fur seals are killed.	
Temporary Suspension of Subsistence use	The AA determines the harvest or hunt is being conducted in a wasteful manner results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner.
Termination of Subsistence use	The AA terminate the subsistence use when 2,000 juvenile seals have been killed. Conditions that led to the harvest or hunt being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Authorized Hunt Method	Use of firearms	Establish a hunt monitoring and reporting system Estimate struck and lost rates and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

ES 2.4. Alternative 4

This alternative continues regulatory control, the monitoring of the harvest to ensure no wasteful taking occurs, minimizing the disturbance of breeding and resting fur seals, the taking of females, and the prohibition on the use of firearms. Alternative 4 is similar to Alternative 3 in that it represents a much greater use of federal regulations than non-regulatory restrictions under co-management to manage subsistence use of fur seals. Under Alternative 4, the Co-Management Council's primary responsibility would be to develop annual monitoring and reporting plans for the subsistence harvest.

Alternative 4 (Table ES-5) would amend federal regulations to manage the following aspects of subsistence use of fur seals:

1. Authorize the Pribilovians on St. Paul to kill up to 2,000 male fur seals annually for subsistence use (same as Alternatives 2 and 3);

2. Retain the provision to establish the lower and upper range of the subsistence need every 3 years (same as Alternative 1);
3. Create a 342-day subsistence harvest period, split into three seasons: January 1 to May 31, June 23 to August 8, and August 9 to December 31;
4. Retain the limit to harvest once per week per site (same as Alternatives 1 and 3), but revise to any site (same as Alternative 3);
5. Prohibit the harvest of adult fur seals (same as Alternatives 1, 2, and 3);
6. Create a limit to harvest up to 1,500 male pups from August 9 to December 31 annually (same as Alternative 3);
7. Create a limit to harvest up to 500 juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups) during January 1 to May 31, and June 23 to August 8;
8. Create a provision to prohibit the harvest from breeding locations at risk of reaching unsustainable population levels (same as Alternative 3);
9. Create a provision to prohibit the use of firearms to hunt or harvest fur seals;
10. Create a provision to prohibit the mortality of female fur seals, with the exception of allowing no more than 20 accidental female mortalities (*i.e.*, 1% of the authorized total male kill);
11. Create a provision that suspends subsistence use for up to 2 days if and when five females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the five female mortalities have been reviewed;
12. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternatives 1 and 3). The harvest would be suspended for up to 2 days if NMFS determines the harvest is being conducted in a wasteful manner, or if five female fur seals are killed during the harvest of male seals. Termination provisions would include a determination that the subsistence needs have been met, 20 females were killed, 2,000 seals have been harvested, and if the conditions, which led to a suspension if harvests were being conducted in a wasteful manner, have not been remedied.
13. Retain the provision that harvest may be conducted only by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (same as Alternative 1); and
14. Create a provision that Pribilovians' method of harvest must include at a minimum that all pups be captured, handled and their sex determined prior to harvesting male pups.
15. Alternative 4 would create non-regulatory co-management provisions to manage sub-lethal effects and assessment of subsistence needs through the co-management process.

Table ES-5 Alternative 4

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male fur seals (*i.e.*, up to 7 years old).	
Pup Subsistence Harvest Limit	1,500 male fur seal pups (*i.e.*, up to 1 year old).	
Juvenile Subsistence Harvest Limit	500 juvenile males (*i.e.*, up to 7 years old).	
Harvest Area	Determined annually on pup production and trend projection (see Johnson *et al.* 2013).	
Harvest Needs Assessment Process	Establish the lower and upper range of the harvest need every 3 years after reporting in the Federal Register the actual subsistence use from the 3 years prior.	Assess the harvest need every 3 years.
Pup Harvest Season	Once per week per harvest area from August 9 to December 31.	
Juvenile Harvest Seasons	Once per week per harvest area from June 23 to August 8. Once per week per harvest area from January 1 to May 31.	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when five female fur seals are killed.	Determination of measures to be taken to detect and avoid additional female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed	
Temporary Suspension of Subsistence use	The AA determines the harvest is being conducted in a wasteful manner results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner.
Termination of Subsistence use	The AA terminates the subsistence use when 2,000 juvenile seals have been killed. Conditions that led to the harvest being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Juvenile fur seals must be harvested using traditional methods of round-up, stunning and immediate exsanguination by experienced sealers. Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Prohibited Harvest Method	Firearms are prohibited.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

ES 2.5. Alternative 5

Alternative 5 continues to establish the subsistence need by regulation, but creates a new process to estimate the lower and upper limit of the subsistence need. The new process would use the most recent 3-year average of actual harvest levels beginning in 2017 to set the lower limit and potential biological removal (PBR) to set the upper limit for the initial 3-year period of the new regulation rather than a household survey of the subsistence need as in Alternative 1, No Action. Alternative 5 includes a mix of actions managed under federal regulations and actions managed under co-management in one alternative. Alternative 5 specifically uses the federal regulations to apportion the harvest of male fur seals by season and age, and increases the accidental female mortality limits to 200. This alternative establishes an adaptive process for demonstrating need as required by regulations.

Alternative 5 (Table ES-6) would amend federal regulations at 50 CFR 216.72 to manage the following aspects of subsistence use of fur seals:

1. Retain the federal requirement to establish the lower and upper range of the subsistence need every 3 years (same as Alternative 1);
2. Create a new method for establishing the upper and lower end of the range of the annual subsistence need. From 2017 to 2019, the upper end of the range of subsistence harvest of male pups and juveniles (*i.e.*, fur seals up to 7 years old, excluding pups) will be authorized up to 50% of the PBR for the St. Paul population. PBR for St. Paul is 9,805 seals[2]; therefore, the upper limit of the subsistence harvest range would be 4,902 seals. The lower end of the range would be set at the most recent 3-year average (2014 to 2016) of subsistence harvest. Beginning in 2020, the lower end of the 3-year harvest range (2020 to 2022) would be set based on the average number of reported seals harvested over the 2017 to 2019 period, and the upper end of the range to be based on the average from the entire subsistence period (*i.e.*, 1985 to the present year).
3. Create a 188-day subsistence harvest period, split into two seasons: June 23 to August 8, and August 9 to December 31;
4. Retain the limit to harvest once per week per site (same as Alternatives 1, 3, and 4);
5. Prohibit the harvest of adult fur seals (same as Alternatives 1, 2, 3, and 4) and remove the prohibition on the harvest of male pups (same as Alternatives 2, 3, and 4);
6. Create a provision to prohibit the mortality of female fur seals, with the exception of allowing no more than 200 accidental juvenile (*i.e.*, less than 7 years old) female mortalities.
7. Create a restriction to harvest only juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups) during June 23 to August 8;
8. Create a restriction to harvest only male pups from August 9 to December 31;
9. Create a provision to prohibit the harvest from breeding locations at risk of reaching unsustainable population levels (same as Alternative 4);
10. Create a provision to prohibit use of firearms to harvest fur seals (same as Alternatives 1 and 4);
11. Create a provision that suspends subsistence use for up to 2 days if and when 150 females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the 150 mortalities have been reviewed;
12. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternatives 1, 3, and 4);
13. Retain the suspension provision regarding when the lower end of the harvest range has been reached (same as Alternative 1). A suspension issued in accordance with this section may not exceed 48 hours in duration and shall be followed immediately by a review of the harvest data to

[2] Based on the 2012 Stock Assessment Report and used as the basis for the St. George Subsistence Harvest SEIS (Allen and Angliss 2013).

determine if a harvest termination determination is warranted. If the harvest is not terminated under this section, the AA must provide a revised estimate of the number of seals required up to the upper end of the range to satisfy the Pribilovians' subsistence needs;

14. Retain the provision that harvest may be conducted only by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (same as Alternatives 1 and 4); and

15. Create a provision that Pribilovians method of harvest must include at a minimum that all pups be captured, handled, and their sex determined prior to harvesting male pups (same as Alternative 4).

Table ES-6 Alternative 5

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	Juvenile male (*i.e.*, up to 7 years old) fur seals up to fifty percent of the 2017 estimate of Potential Biological Removal level.	
Pup Subsistence Harvest Limit	Establish the age-specific level based on community need.	
Juvenile Subsistence Harvest Limit	Establish the age-specific level based on community need.	
Harvest Area	Determined annually on pup production and trend projection (see Johnson *et al.* 2013).	
Harvest Needs Assessment Process	Establish the lower and upper range of the harvest need (see text for details) every 3 years after reporting in the Federal Register the actual subsistence use from the 3 years prior.	Report the actual harvest level every 3 years.
Pup Harvest Season	Once per week per harvest area from August 9 to December 31.	
Juvenile Harvest Seasons	Once per week per harvest area from June 23 to August 8.	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when 150 female fur seals are killed.	Determination of measures to be taken to detect and avoid additional female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	200 female fur seals are killed.	
Temporary Suspension of Subsistence use	The AA determines the harvest is being conducted in a wasteful manner results in a 2-day suspension. The AA determines the lower end of the subsistence harvest range has been reached results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner. Assessment of revised need above the lower end of the range.
Termination of Subsistence use	The AA determines the upper end of the subsistence harvest range has been reached. The AA determines the conditions that led to the harvest being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Juvenile fur seals must be harvested using traditional methods of round-up, stunning and immediate exsanguination by experienced sealers. Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Prohibited Harvest Method	Firearms are prohibited.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

ES 3. AFFECTED ENVIRONMENT

Chapter 3 describes the environment affected by the subsistence harvest and use of northern fur seals, and consists of the biological, physical, social, and economic resources of the Pribilof Island of St. Paul, and more broadly the Eastern Bering Sea and Bering Sea-Aleutian Islands region. This chapter establishes the context in which the proposed action must be evaluated and presents the relevant history for the subsistence harvest by Alaska Natives of St. Paul, the natural history and current status of northern fur seals and their physical environment, and establishes an environmental baseline as context for evaluating direct, indirect and cumulative effects of the northern fur seal subsistence harvest alternatives.

ES 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This DSEIS analyzes the direct, indirect, and cumulative impacts of five alternatives for managing the subsistence harvest of northern fur seals on St. Paul Island. Detailed analyses and discussions of effects can be found in Chapter 4. The effects (both beneficial and adverse) of each alternative on a range of biological and socio-economic resources were analyzed and categorized on a scale ranging from negligible to major as described in Section 4.2 Methods for Impact Analysis.

To measure the direct and indirect effects of each alternative (Sections 4.3.4 through 4.3.8), the total number of harvested seals were compared to the PBR of the northern fur seal population breeding on St. Paul Island. Impacts associated with lethal take (mortality) under Alternatives 1 through 5 would all be negligible to minor with regard to PBR (Table ES-7). Alternative 5 total lethal take would be considered moderate for the first 3-year period since it sets the upper limit of the harvest range at 50% of PBR. However, the harvest would not be maintained at the proposed level under Alternative 5 (4,902) since the upper limit of the harvest range is set based on the average subsistence use during the entire subsistence period after 2019. Therefore, the harvest range would decrease under Alternative 5 after the first 3-year period and future impacts associated with mortality under that alternative would also be negligible or minor. Table ES-7 provides a summary of potential direct and indirect effects of Alternatives 1 through 5.

Table ES-7 Summary of Potential Direct and Indirect Effects of the Alternatives on Northern Fur Seals

Direct / Indirect Effects	Alternative 1, No Action	Alternative 2 (Options A & B), Preliminary Preferred/Petitioned	Alternative 3	Alternative 4	Alternative 5
Mortality					
Sub-adult / Juvenile males	Mortality of up to 2,000 sub-adult male fur seals	Mortality of up to 2,000 male fur seals, up to 7 years	Mortality of up to 500 juvenile male fur seals, up to 7 years	Mortality of up to 500 juvenile male fur seals, up to 7 years	Mortality of up to 4,902 male fur seals, up to 7 years The first 3 years
Male pups	Prohibited pup harvest		Mortality of up to 1,500 male pup	Mortality of up to 1,500 male pup	
Females	Mortality of up to 8 female fur seals	Mortality of up to 20 female fur seals	Mortality of up to 5 female fur seals	Mortality of up to 20 female fur seals	Mortality of up to 200 female fur seals
Summary of Effect on Population	Sub-adult male mortality 19% of PBR = **minor effect**	Juvenile male and male pup mortality 19% of PBR = **minor effect**	Juvenile male and male pup mortality 19% of PBR = **minor effect**	Juvenile male and male pup mortality 19% of PBR = **minor effect**	Juvenile male and male pup mortality 50% of PBR = **moderate effect for the first 3 years then to be determined**

Direct / Indirect Effects	Alternative 1, No Action	Alternative 2 (Options A & B), Preliminary Preferred/Petitioned	Alternative 3	Alternative 4	Alternative 5
Mortality					
	Pup mortality **negligible effect** (unknown illicit harvest) Female mortality 0.0008% of PBR = **negligible effect**	Female mortality 0.002% PBR = **negligible effect**	Female mortality 0.0003% PBR = **negligible effect**	Female mortality 0.002% PBR = **negligible effect**	**based on harvest setting process** Female mortality 0.02% PBR = **negligible effect**
Geographic Extent	**Moderate**, harvest would be distributed across seven specific breeding grounds	**Minor**, harvest and hunting would be distributed equally across all breeding grounds	**Minor** for the pup harvest, distributed equally across all breeding grounds; **Moderate** for hunting, distributed only at Northeast Point rookeries	**Minor**, harvest is distributed equally among all breeding grounds	**Minor**, harvest is distributed equally among all breeding grounds
Sub-Lethal Effects	**Minor effect**, up to 3,950 non-pup fur seals exposed to effects	**Moderate effect**, up to 12,220 pups and 9,150 non-pup fur seals exposed to effects	**Moderate effect**, up to 9,240 pups and 6,925 non-pup fur seals exposed to effects	**Moderate effect**, up to 9,240 pups and 7,575 non-pup fur seals exposed to effects	**Moderate effect** for the first 3 years, up to 16,044 pups and 10,837 non-pup fur seals exposed to effects

None of the alternatives result in significant sub-lethal effects to the population. NMFS defines sub-lethal effects as any potential direct or indirect effects that do not cause death such as changing activity patterns, departure from land into the water, being herded inland by harvesters and not being selected for harvest, or injury ultimately resulting in a reduction in reproductive rates. Sub-lethal effects occur incidental to the harvest and affect those fur seals not harvested. The analysis suggests that a very small level of anticipated sub-lethal effects may occur under any of the alternatives. However, these effects would not result in any detectable change to reproduction rate or sustainability of the St. Paul Island fur seal population.

Section 4.4.3 addresses the most likely actions that may contribute to cumulative effects on the northern fur seal population. Historically, the past and present effects of human-related activities have resulted in both adverse and beneficial cumulative effects on the northern fur seal population. The commercial culling program of female fur seals to intentionally reduce the population contributed significant adverse effects on the fur seal population beyond predictions. The commercial harvest of sub-adult or juvenile male fur seals with a small percentage accidental female harvest was sustained for decades and the population production and abundance increased under nearly all harvest levels. Most of the historic sources of direct mortality and injury have been eliminated or thought to be significantly reduced from historic levels such that their cumulative effect may be insignificant compared to the past. Also, significant beneficial effects for both fur seals and their habitat are related to specific legislative actions such as the 1911 Fur Seal Treaty, the FSA, and the MMPA. Northern fur seal scientific research has helped to determine major aspects of fur seal ecology and understand the population response to harvests

that support our ability accurately predict the sustainability of subsistence harvests at the significantly lower exploitation levels.

The Alaska Native residents of St. Paul rely on a traditional subsistence lifestyle and Alternative 2 would improve the management of fur seal subsistence use on St. Paul and significantly reduce illicit taking. Alternative 2 (Preliminary Preferred/Petitioned Alternative) addresses the subsistence need of the St. Paul community expressed in their petition. The Petitioned Alternative recognizes a formal request by the ACSPI to use co-management rather than federal regulations to restrict subsistence practices. Alternative 2 addresses the petition of the tribal government to reinitiate the pup harvest and winter hunting of fur seals, delegates authority to the St. Paul Co-Management Council to develop a process and implement practical locally-supported conservation controls. These controls will include measures to manage and minimize accidental mortality of females, monitor and report the subsistence use during all seasons, and and prohibit harvests at rookeries where the annual pup production cannot sustain a harvest. This increases opportunities for harvesting fur seals by authorizing harvest at any breeding or resting area and by adding a hunting season January 1 through May 31 every year. As a result of this change, the availability of fresh fur seal meat outside the current summer harvest season and the opportunities to co-manage the subsistence harvest are improved. During the hunting season, firearms would be a permitted method to pursue fur seals on land or in the water. By allowing subsistence opportunities to range across the population of fur seals on St. Paul, the community would have greater resilience in meeting the demands of changing future environmental conditions to meet their subsistence need. Alternative 2 would best balance meeting the subsistence needs of the community with the conservation and management of the fur seal population. Therefore, Alternative 2 is believed to have major beneficial effects to the community of St. Paul Island (see Table 4.4-2).

NMFS' preliminary preferred alternative is Alternative 2 due to the high likelihood of positive or beneficial effects on the community, and similar environmental consequences to all other alternatives. NMFS' conclusion here regarding the effects of the subsistence harvest on fur seals, and the importance of these subsistence resources to the community, is consistent with analyses described in the Steller sea lion and northern fur seal research Programmatic Environmental Impact Statement (NMFS 2007b), the northern fur seal harvest quota EIS (NMFS 2005) and similar analyses reviewing the management of the subsistence harvest of fur seals on St. George Island (NMFS 2014).

ES 5. AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

This Executive Summary is a synopsis of the contents of the DSEIS for the Management of Northern Fur Seal Subsistence Harvest on St. Paul Island, Alaska. The current subsistence harvest level of northern fur seals on the Pribilof Islands is not considered controversial. It is recognized that the direct and indirect biological effects of the harvest on fur seals are negligible. Modifying the existing harvest regime increases opportunities for harvest and co-management to be coordinated between NMFS and the ACSPI. NMFS' next step is to release the DSEIS for public review and comment during a formal, public comment period. Comments received will be reviewed and considered by NMFS and the ACSPI when developing a Final SEIS.

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ACRONYMS AND ABBREVIATIONS

% .....percent
AA.....Assistant Administrator [for Fisheries]
ACIA.....Arctic Climate Impact Assessment
ACSPI .....Aleut Community of St. Paul Island
ADFG.....Alaska Department of Fish and Game
AEWC.....Alaska Eskimo Whaling Commission
APIAI.....Aleutian Pribilof Islands Association
BSAI .....Bering Sea-Aleutian Islands
°C .....degree Celsius
CBSFA.....Central Bering Sea Fishermen's Association
CDQ.....Community Development Quota
CEQ .....Council on Environmental Quality
CFR.....Code of Federal Regulation
cm.....centimeters
CV(N) .....coefficient of variation
DOC.....Department of Commerce
DPS .....Distinct Population Segments
EA .....Environmental Assessment
EBS .....Eastern Bering Sea
ECO .....Ecosystem Conservation Office
EIS .....Environmental Impact Statement
ENSO.....El Niño-Southern Oscillation
E.O. .....Executive Order
ESA.....Endangered Species Act
EZZ .....Exclusive Economic Zone
°F.....degrees Fahrenheit
FAO .....Food and Agriculture Organization
FR.....Federal Register
FSA.....Fur Seal Act
GOA.....Gulf of Alaska
HSUS .....Humane Society of the United State
IPCC.....Intergovernmental Panel on Climate Change
IPHC .....International Pacific Halibut Commission
K.....carrying capacity
km .....kilometers
km^2 .....square kilometers
m .....meters
MMC.....Marine Mammal Commission
MML.....Marine Mammal Laboratory
MMPA .....Marine Mammal Protection Act

MNPL .....maximum net productivity level
N.....population estimate
NEPA.....National Environmental Policy Act
nm .....nautical miles
NMFS.....National Marine Fisheries Service
N_{MIN}.....minimum population estimate
NOA.....Notice of Availability
NOAA.....National Oceanic and Atmospheric Administration
NOI .....Notice of Intent
NPFMC.....North Pacific Fishery Management Council
NPFSC .....North Pacific Fur Seal Committee
NRC .....National Research Council
OPR.....Office of Protected Resources
OSP .....optimum sustainable population
PBR.....potential biological removal
PCB.....polychlorinated biphenyls
PDO .....Pacific Decadal Oscillation
PEIS .....Programmatic Environmental Impact Statement
PIHCZ.....Pribilof Islands Habitat Conservation Zone
P.L.....Public Law
RFFA .....reasonably foreseeable future action
R_{MAX}.....maximum potential population growth rate
ROD.....Record of Decision
SEIS .....Supplemental Environmental Impact Statement
SHARC.....Subsistence Halibut Registration Certificate
TDX .....Tanadgusix Corporation
U.S. .....United States
U.S.C.....United States Code
USDA.....United States Department of Agriculture

1. INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) manages the subsistence[1] harvests of northern fur seals (*Callorhinus ursinus*) in the Pribilof Islands under federal regulations found in 50 Code of Federal Regulations (CFR) 216, Subpart F - Taking for Subsistence Purposes. Initially, these regulations were issued as a single-year emergency interim rule[2]. The purpose of the rule was to limit the take of fur seals to a level providing for the subsistence needs of the Pribilof Aleuts using humane harvesting methods, and to restrict taking by sex, age, and season for herd management purposes. An emergency final rule was published on July 9, 1986[3], under the authority of the Fur Seal Act (FSA) (16 United States [U.S.] Code [U.S.C.] § 1151, *et seq.*).

Under these regulations, the harvests on the Pribilof Islands of St. Paul and St. George are managed independently. The annual harvests have been restricted by age of the seal, size and sex, and have occurred during a narrowly defined 47-day harvest season from June 23 to August 8, with explicit prohibitions on the taking pups and adults, until NMFS promulgated regulations in 2014 allowing a pup harvest on St. George (79 Federal Register [FR] 65327; November 4, 2014). The conduct of the harvests and the regulations on St. Paul Island have changed little since the 1986 regulations were published (see Section 3.7.4 for additional detail on current harvest regulations). The current regulations provide the Aleut Community of St. Paul Island (ACSPI) with limited opportunities during a relatively short summer season to meet its nutritional and cultural needs.

ACSPI submitted a resolution on February 16, 2007 requesting that NMFS issue an immediate moratorium of 50 CFR 2016, Subpart F and begin the process to change the regulations to allow St. Paul residents to meet their customary and nutritional subsistence needs. The resolution requested that NMFS allow: (1) the legal take of historically allowed fur seal harvest/hunts, (2) the flexibility to adapt to the subsistence needs of the members of the ACSPI, and (3) full implementation of co-management of the subsistence take of all northern fur seals on St. Paul Island. NMFS and ACSPI have conferred during the intervening years to clarify the details necessary for NMFS to analyze a reasonable range of alternatives that address the ACSPI petition for rulemaking.

1.1. Background on the Management of Northern Fur Seal Subsistence Harvest

The subsistence harvest of northern fur seals on the Pribilof Islands is governed by regulations established under the FSA and Marine Mammal Protection Act (MMPA). Section 105(a) of the FSA authorizes the promulgation of regulations "with respect to the taking of fur seals on the Pribilof Islands…as [the Secretary] deems necessary and appropriate for the conservation, management, and protection of the fur seal population" 16 U.S.C. § 1155. Additionally, the Secretary of Commerce may enter into co-management agreements with Alaska Native Organizations under Section 119 of the MMPA to conserve and provide for the subsistence uses of marine mammals. On St. Paul Island, NMFS works with the Co-

[1] Section 109(f)(2) of the MMPA defines subsistence as the customary and traditional uses by rural Alaska residents of marine mammals for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of marine mammals taken for personal or family consumption; and for barter, or sharing for personal or family consumption (16 U.S.C. 1379(f)(2)).

[2] *Federal Register* 50 FR 27914.

[3] *Federal Register* 51 FR 24828.

Management Council, guided by a Co-Management Agreement[4], to cooperatively implement subsistence harvest monitoring programs, marine debris cleanup, fur seal entanglement response, and fur seal habitat monitoring as resources allow. The subsistence harvest regulations remain the basis for managing and restricting the harvests of northern fur seals by Pribilovians.

The process to change subsistence harvest management on St. Paul Island began with the ACSPI, Tribal Government tribal resolution, passed on February 16, 2007, requesting NMFS to immediately start the process to impose a moratorium on the regulations at 50 CFR 216, Subpart F or revise regulations governing the northern fur seal subsistence harvest. On May 7, 2007, NMFS determined that an immediate moratorium was not warranted and that the co-management process with ACSPI was the best means to determine what changes were needed to allow the community to meet their subsistence needs while also conserving northern fur seals. Subsequent discussions between NMFS and ACSPI resulted in the tribe forming an ad-hoc committee on fur seals on January 15, 2009. NMFS Alaska Region and NOAA Office of Law Enforcement staff participated in the ad-hoc committee's deliberations.

On September 23, 2009, the Tribal Council adopted the Proposed Framework for Northern Fur Seal Sub-adult Male and Young of the Year Harvests/ Hunts, and directed the St. Paul Co-Management Council, the Tribal Council President, and Director of the Ecosystem Conservation Office (ECO) to work with NMFS to follow through and implement the Proposed Framework.

On September 23, 2009, ACSPI also passed a resolution[5] outlining a framework for northern fur seal hunting and harvesting for subsistence purposes. On October 21, 2009, ACSPI submitted resolution 2009-57 with supporting information to NMFS as a basis to modify the regulations governing the subsistence harvest of northern fur seals on St. Paul Island, Alaska. NMFS evaluated the resolution, clarified details of ACSPI's supporting documents, and determined that there was adequate information to publish a notice of receipt of petition for rulemaking and opportunity for public comment under the Administrative Procedure Act[6].

On July 12, 2012, NMFS announced in the Federal Register the receipt of the Tribal Government of St. Paul's petition for rulemaking to revise the regulations governing the subsistence taking of northern fur seals and received public comments from the Marine Mammal Commission (MMC), Humane Society of the United States (HSUS), Center for Biological Diversity, Alaskan Wildlife Federation, and two individuals.

On November 10, 2014, ACSPI submitted a letter to NMFS revising their petition after consultation with NMFS, and in response to the public comments. ACSPI subsequently approved Resolution 2015-04, a resolution to NMFS amending Resolution 2009-57. The Tribal Government of St. Paul determined a revision that would satisfy the petition comments, as well as the subsistence needs of the community, and ACSPI submitted a revised petition on November 17, 2014 (represented as Alternative 2 in its entirety). The 2014 petition did not recommend changes to the upper limit of 2,000 male fur seals that could be

[4] Co-Management Agreement between Aleut Community of St. Paul Island and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (June 13, 2000).

[5] Resolution 2009-57: A Resolution to Modify the Proposed Framework for Northern Fur Seal Sub-Adult Male and Young of the Year Harvests/Hunts, ACSPI Tribal Council, September 23, 2009.

[6] *Federal Register* 77 FR 41168.

taken annually based on subsistence need. However, the petition did specify an upper limit to the number of female seals that could be taken incidental to the harvest of male seals up to 1 percent (%) of the total harvest (*i.e.*, up to 20 female seals). ACSPI also petitioned NMFS to eliminate the length restriction of 124.5 centimeters (cm), established in the 1986 Subsistence Taking of North Pacific Fur Seals; Final Rule[7]. In that final rule, NMFS described the result of the 124.5 cm length restriction to confine the harvest primarily to male fur seals ranging from 2 to 4 years old. The regulatory length restriction, which subsequently was codified at 50 CFR 216.72, was originally derived from the needs of the commercial harvest and was meant to ensure the largest high-quality pelt for commercial sale, not the subsistence preference of those Alaska Natives who consume fur seals. Finally, ACSPI requested the elimination of regulation suspending the harvest when the lower end of the harvest range limit of 1,645 fur seals on St. Paul Island is reached.

The November 10,2014 ACSPI resolution requested two subsistence use seasons. The first season would extend from January 1 to May 31, during which juvenile male fur seals (defined in the petition as from 1 to up to 7 years) could be taken by hunters using firearms. The second season would occur from June 23 to December 31, during which pups and juvenile male fur seals could be harvested for subsistence. Pups are defined as seals up to 1 year in age. Juvenile males are defined, generally, as seals too young to mate (up to 7 years old; see Chapter 3 for details). Harvesters would handle and sex all fur seal pups to be harvested during this second season. The harvests will be stopped for the remainder of that year if or when 20 female fur seals are taken incidental to the male harvests (*i.e.*, 1% of total male harvest) (see Section 2.2.2 for additional detail on the Petitioned Alternative).

Finally, on May 13, 2016, ACSPI submitted amended revisions to their Petitioned Alternative emphasizing the request to allow ACSPI more flexibility to manage the harvest under the co-management system rather than through federal regulations. Specifically, ACSPI requested that only the following elements of harvest management be codified under federal regulation:

- Take of up to 2,000 male fur seals annually;
- Take of juvenile male fur seals from January 1 to May 31 annually using firearms;
- Take of pups and juvenile male fur seals from June 23 to December 31 annually without the use of firearms; and
- Harvests will be co-managed by the Tribal Government of St. Paul and NMFS under the existing co-management agreement.

The intent of this Supplemental Environmental Impact Statement (SEIS) is to evaluate, in compliance with the National Environmental Policy Act (NEPA), the potential direct, indirect, and cumulative impacts on the human environment of alternative approaches to managing the northern fur seal subsistence harvest on St. Paul Island. NMFS decided to prepare this SEIS because the proposed action makes substantial changes to the action analyzed in the 2005 Final Environmental Impact Statement (EIS), "Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands" (NMFS 2005). The action analyzed in the 2005 Final EIS was setting the annual Pribilof Islands northern fur seal subsistence take ranges as required by regulations. The 2005 action limited the subsistence take of sub-

[7] *Federal Register* 51 FR 17896.

adult male seals and established the subsistence take range for St. Paul Island at 1,645 to 2,000 seals, and the subsistence take range for St. George Island at 300 to 500 seals. The 2005 Final EIS concluded that subsistence harvests within these ranges would have minimal effect on the northern fur seal stock. NMFS recently supplemented the 2005 Final EIS to change subsistence harvest management for St. George with the final SEIS for management of the subsistence harvest of northern fur seals on St. George Island, Alaska (NMFS 2014a).

1.2. Purpose and Need for the Proposed Action

The purpose of the proposed action is to conserve northern fur seals and manage the subsistence harvest of fur seals on St. Paul Island for their long-term sustainable use for purposes of food, cultural continuity, clothing, arts, and crafts. The proposed action is needed to allow Pribilovians on St. Paul Island greater flexibility to meet their subsistence needs by obtaining fresh fur seal meat and subsistence resources throughout the year.

Since northern fur seals are the primary source of subsistence protein to the Pribilovians, the current regulatory regime does not provide for the nutritional or cultural needs of the residents of St. Paul throughout most of the year. ACSPI's request is to revise current harvest regulations to allow for two extended subsistence seasons addressing the nutritional need for fresh meat throughout a greater portion of the year.

1.3. Description of the Action Area and Scope for Analysis

The Pribilof Islands are located in the central Bering Sea, approximately 500 kilometers (km) west of the mainland, and 300 km north of the Aleutian Islands Chain, and are part of the Bering Sea shelf slope that constitutes a large marine ecosystem (National Research Council [NRC] 1996). The Pribilof Islands support high concentrations of marine mammals, seabirds, fish, and invertebrates (Hood and Calder 1981). This biodiversity and biological productivity results from the proximity of the islands to the continental shelf break, and nearby canyons, along with the general ecological complexity of the isolated island habitat and its assemblage of nearshore habitats, sea cliffs, beaches, sand dunes and coastal wetlands unique in the Bering Sea.

The Eastern Pacific stock of the northern fur seal ranges throughout the North Pacific Ocean from southern California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan. During the summer breeding season, most of the worldwide population is found on the Pribilof Islands (Harry and Hartley 1981; NMFS 2007a). The Pribilof Islands provide terrestrial habitat for the majority of the population to reproduce and rest during the summer and autumn (Gentry 1998). However, as the proposed subsistence harvest regulations are intended specifically for the St. Paul Island community and due to site fidelity and philopatry exhibited by northern fur seals (see Section 3.2.3.1), the geographic scope of the SEIS is limited to St. Paul Island and its immediate surroundings. For additional information on northern fur seal biology, see Section 3.2.

1.4. Definitions

The following key terms are used throughout this document to discuss northern fur seal biology, subsistence uses of fur seals, and the potential effects of proposed alternatives. In the analysis presented in

Chapter 4, the terms "effects" and "impacts" are used interchangeably. Additional terms used throughout the SEIS are provided in Appendix A.

- Pup – young of the year, a fur seal less than a year old and dependent on its mother for food;
- Juvenile – a fur seal up to 7 years old, excluding pups (this term will replace sub-adult in Alternatives 2 through 5);
- Sub-adult – a fur seal between 2 and 5 years old and less than 124.5 cm long, this term was used during the commercial harvest period and is used in the No-Action Alternative: subsistence harvest regulations at 50 CFR 216.72(e)(5);
- Haulout – an inland site where fur seals congregate to rest and interact. A rookery is a specific form of hauling ground for reproduction and nursing pups. Not all hauling grounds are rookeries;
- Breeding ground – a site where fur seals congregate on land to give birth, breed, and copulate. This term is synonymous with the term rookery;
- Subsistence – the use of marine mammals taken by Alaskan Natives for food, clothing, shelter, heating, transportation, and other uses necessary to maintain the life of the taker or those who depend upon the taker to provide them with such subsistence (50 CFR 216.3);
- Subsistence uses – the customary and traditional uses of fur seals taken by Pribilovians for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of marine mammals taken for personal or family consumption; and for barter, or sharing for personal or family consumption (50 CFR 216.3).
- Pribilovian – Indians, Aleuts, and Eskimos who live on the Pribilof Islands (50 CFR 216.3);
- Harvest – the take of male fur seals using the method of roundup, driving to an inland site, stunning, and exsanguination, but prohibits any use of firearms.
- Hunt – the take of fur seals by hunters using firearms.
- Direct Effects – caused by the action and occurring at the same time and place (40 CFR §1508.8). Direct impacts pertain to the proposed action and alternatives only.
- Indirect Effects – effects "caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of resource use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8).
- Cumulative Effects – additive or interactive effects that would result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions (RFFAs) regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

- Reasonably Foreseeable Future Actions or Events – RFFAs or events are those that are likely to occur and are not purely speculative. RFFAs can include both human-induced actions as well as natural events, such as storms or floods. Typically, a list of RFFAs is developed based on information from existing plans, permit applications, announcements, or evidence of ecosystem patterns (*i.e.*, historical storm records or climate modeling). The process for determining what is considered reasonably foreseeable is further described in Section 4.3.6.
- Sub-lethal Effects – an effect on an animal that does not lead to mortality but may otherwise compromise health or reproduction. For example, a painful injury may make it more difficult for an animal to forage efficiently. If food is plentiful, the animal may be able to compensate for the decrease in efficiency by foraging a little longer than usual and may not suffer an overall loss of nutrition. If the prey population is at a low density or of low quality, a decrease in foraging efficiency could affect an animal's nutritional state. This could lead to a reduced rate of growth or loss of weight that could reduce the reproductive rate of the animal. While sub-lethal effects can result in changes in an individual's body condition, immune response, etc., the analysis of sub-lethal effects in this SEIS focuses on reproductive success because it is a biologically meaningful and measureable effect on the population (NMFS 2007a; NMFS 2014a).

1.5. Federal Trust Responsibilities and Other Relevant Federal Mandates

The concept of "trust responsibility" is derived from the relationship between the federal government and Indian tribes first delineated by Supreme Court Justice, John Marshall, in 1831. The scope of the federal trust relationship is broad and incumbent upon all federal agencies. The U.S. Government has a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The unique relationship provides the constitutional basis for legislation, treaties, and Executive Orders (E.O.) that grant unique rights or privileges to Native Americans.

NMFS' federal trust responsibilities under the MMPA and FSA include:

- The conservation of the Eastern Pacific stock of northern fur seals to ensure that any subsistence harvest does not adversely affect the northern fur seal population;
- The regulation and co-management of the subsistence harvests by Alaska Natives and NMFS given that the species used for subsistence purposes is listed as depleted[8] under the MMPA; and
- The recognition of the nutritional and cultural (*i.e.*, subsistence) needs of Alaskan Natives on St. Paul Island to the fullest extent possible consistent with applicable statutes, implementing regulations, and co-management provisions.

E.O. 13084[9] requires each federal agency to establish meaningful consultation and collaboration with Indian Tribal Governments (including Alaska Natives) in formulating policies that significantly or

[8] The MMPA defines the term "depletion" or "depleted" (16 U.S.C.1362(1)) as meaning any case in which "(A) the Secretary of Commerce, after consultation with the MMC and the Committee of Scientific Advisors on Marine Mammals established under title II of this Act, determines that a species or population stock is below its optimum sustainable population; (B) a state, to which authority for the conservation and management of a species or population stock is transferred under U.S.C. 1379, determines that such species or stock is below its optimum sustainable population; or (C) a species or population stock is listed as an endangered species or a threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531, *et seq.*)."

[9] E.O. 13084, "Consultation and Coordination with Indian Tribal Governments", issued May 14, 1998.

uniquely affect their communities. The E.O. requires agency policy making to be guided by principles of respect for tribal treaty rights and responsibilities that arise from the unique legal relationship between the federal government and the Indian Tribal Governments. Furthermore, on issues relating to treaty rights, E.O. 13084 directs each agency to "explore, and, where appropriate, use consensual mechanisms" for developing regulations.

E.O. 13175 replaced E.O. 13084 on November 6, 2000[10]. The E.O. carries the same title and strengths as the previous E.O. regarding the government-to-government relationship between the U.S. Government and Indian tribes. E.O. 13175 requires that all Executive departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policies that impact Indian communities.

In 1979, the U.S. Council on Environmental Quality (CEQ) established uniform procedures and regulations for implementing NEPA. These regulations (40 CFR 1500.1-1508.28) provide for the use of the NEPA process to identify and assess the alternatives to proposed actions that avoid and minimize adverse effects on the human environment. This SEIS complies with CEQ's guidance on implementing NEPA.

1.6. Co-Management of Subsistence Harvest of Fur Seals on the Pribilof Islands

In April 1994, the MMPA was amended to include Section 119, *Marine Mammal Cooperative Agreements in Alaska*[11]. Section 119 established a formal framework for Tribal Governments, and other Alaska Native Organizations, to develop co-management agreements to cooperatively manage those stocks of marine mammals used for subsistence purposes. The co-management agreements in the Pribilof communities of St. Paul and St. George are specific to the conservation and management of northern fur seals and Steller sea lions (*Eumetopias jubatus*), with particular attention to the subsistence harvest, hunting, and use of these animals. NMFS and ACSPI entered into a co-management agreement on June 13, 2000[12] to work in partnership to achieve the following:

- Promote the conservation and preservation of northern fur seals and Steller sea lions;
- Use traditional knowledge, wisdom and values, and conventional science to establish management actions for the protection and conservation of fur seals and sea lions on the Pribilof Islands;
- Establish a process of shared local responsibilities regarding the management and research of fur seals and sea lions on behalf of the citizens of the U.S.;
- Identify and resolve through a consultative process any management conflicts that may arise in association with fur seals and sea lions on the Pribilof Islands; and
- Provide information to hunters and the affected community, as a means of increasing the understanding of the sustainable use, management, and conservation of fur seals and sea lions.

[10] E.O. 13175 "Consultation and Coordination with Indian Tribal Governments", replaced E.O. 13084 on November 6, 2000.

[11] Section 119, MMPA Amendments of 1994, P.L. 103-238.

[12] Co-Management Agreement between ACSPI and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (signed on June 13, 2000).

The Co-Management Agreement specifies that NMFS and ACSPI (the Parties) will review applicable laws and regulations governing the subsistence take and use of fur seals and sea lions for the purpose of making recommendations for appropriate change consistent with the intent and language of the Co-Management Agreement.

Pursuant to the Co-Management Agreement, a Co-Management Council consisting of equal membership by ACSPI and NMFS was created. The Co-Management Agreement indicates the Co-Management Council is to meet formally (i.e., a quorum in attendance) twice a year and informally as needed, to:

- Promote open communication and consider development of annual management plans, monitoring programs, and research programs for St. Paul Island;
- Review the contents, performance, and responsibilities in the agreement annually;
- Review and assess progress towards implementation of the agreement;
- Identify challenges to achieving the purpose of the agreement;
- Recommend solutions to any identified challenges;
- Identify future courses of action; and
- Review applicable laws and regulations governing the subsistence take and use of fur seals and sea lions.

In 2007, NMFS worked with both Tribal Governments on the Pribilof Islands (St. Paul and St. George) to revise and update the Conservation Plan for the Eastern Pacific stock of northern fur seals to reflect the co-management approach to protection, conservation and management of this population (NMFS 2007a). With the adoption of Co-Management Agreements between NMFS and Pribilof Tribal Governments, the harvest process and operations have continued to improve. The petitioned action and the subsistence needs described herein are the direct result of discussions between NMFS and ACSPI under provisions of the Co-Management Agreement.

1.7. Cooperating Agencies

CEQ regulations provide for any state or federal agency to be a cooperating agency if it has special expertise with respect to any environmental issue to be addressed in an SEIS. At this time, NMFS has not identified any agencies that have special expertise regarding northern fur seals or their subsistence harvest. NMFS has met with representatives from the USFWS Alaska Maritime National Wildlife Refuge regarding the environmental and socio-economic effects of the actions analyzed in this draft SEIS and they did not express an interest in becoming a cooperating agency.

1.8. Public Participation

Scoping is an early and open process for determining the scope of issues, alternatives, and impacts to be addressed in an EIS, and for identifying the possible controversies related to the proposed action. A principal objective of the scoping and public involvement process is to identify a range of reasonable alternatives that, with adequate analysis, will delineate critical issues and provide a clear basis for distinguishing among those alternatives and selecting a preferred alternative. The most obvious and significant ‘critical’ issue received by NMFS throughout the deliberations with ACSPI, and throughout

the scoping process, was the need for an increased role of co-management in the development and monitoring of the subsistence use of fur seals. The continued reliance on federal regulations in the overall management and monitoring of fur seal subsistence is viewed by ACSPI as being contrary to the language and intent of Section 119, and the 1994 amendments to the MMPA.

The 2007 petition from ACSPI to NMFS proposed a moratorium to the harvest regulations to better provide for cultural and traditional practices. NMFS responded to ACSPI indicating that using the co-management relationship to explore options to revise the regulations was the most likely way forward. NMFS then began informal scoping for this issue on February 16, 2007. NMFS met with ACSPI and participated in numerous meetings and an ad-hoc working group formed by ACSPI through 2009. NMFS continued to work with ACSPI through the Co-Management Council to characterize the outcomes of the ad-hoc working group through 2011.

On July 12, 2012, NMFS published a notice in the Federal Register announcing the receipt of a petition for rulemaking and invited public comments on the petition (77 FR 41168). NMFS received public comments from the MMC and the HSUS during the 60-day scoping comment period. NMFS developed a plan to respond to the petition, determined there was a need to prepare an SEIS, and worked with ACSPI to address specific comments made on the petition.

On November 10, 2014, ACSPI submitted an updated letter to NMFS to petition for a rule change to the management of Northern fur seal harvest on St. Paul Island. NMFS participated in public meetings on June 17 -19, 2015, on St. Paul Island in an effort to help the agency meets its tribal consultation needs, identify community issues, and tribal concerns related to the NEPA process. Notices for the meetings were advertised through the Tribal Government office and in the community, encouraging community participation in the process. Following the public meeting, NMFS incorporated comments it received into the range of alternatives.

The formal NEPA scoping process for this SEIS was initiated with the publication of the Notice of Intent (NOI) in the Federal Register on July 24, 2015[13], inviting public comments on the scope of issues related to the proposed action, alternatives to be analyzed, and impacts to be addressed in the SEIS, and for identifying the significant issues. NMFS received comments from the U.S. Environmental Protection Agency, HSUS, MMC, Central Bering Sea Fishermen's Association (CBSFA), Aleutian Pribilof Islands Association, Inc. (APIAI), Tribal Government of St. Paul, and eight individuals. Comments included the following topics: NMFS' failure to provide the public with adequate time for review of the information, potential wasteful and inhumane practices, disturbance and incidental mortality of fur seals, inaccuracy of self-reporting, inability to meet nutritional and subsistence needs under current management practices, and the restrictions to cultural traditions under current management practices.

1.9. Related NEPA Documents that Influence the Scope of this Environmental Impact Statement

To streamline the NEPA process and avoid duplication, pertinent information presented in other relevant NEPA evaluations has been incorporated by reference, where appropriate, in this SEIS. This SEIS supplements the Final EIS, "Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof

[13] *Federal Register* 80 FR 44057

Islands" (NMFS 2005)[14]. NMFS decided to prepare this SEIS because the proposed action makes substantial changes to the action analyzed in the 2005 Final EIS, which are relevant to the environmental effects.

In addition to the 2005 Final EIS, the following documents provide useful history and background for this SEIS and are incorporated throughout the document, where relevant.

- On April 2, 1985, NMFS published a Final EIS on the future of the Interim Convention on Conservation of Northern Fur Seals, which contained a discussion of four alternatives. One of the alternatives allowed the convention to expire, which eventually became the chosen preferred alternative. At that time, it was generally believed that the commercial harvest would continue; however, that was not to be the case.
- On May 12, 1986, NMFS published an Environmental Assessment (EA) on the first regulations governing the subsistence taking of northern fur seals[15]. The EA tiered from the analyses contained in the 1985 Final EIS and concluded that the action would not have a significant effect on the human environment other than those described in the 1985 Final EIS on the Interim Convention. Therefore, it was determined at that time that an EA, not an EIS, was the appropriate level of NEPA review for the subsistence harvest regulations. A Finding of No Significant Impact was published with the final EA on May 12, 1986.
- In November 2001, NMFS drafted the "Steller Sea Lion Protection Measures, Final Supplemental Environmental Impact Statement" (NMFS 2001a). The 2001 Steller Sea Lion SEIS documented a conditionally significant adverse cumulative effect on northern fur seals as the result of a potential effect of past, present, and future commercial fishing activity in the Bering Sea on the northern fur seal population (NMFS 2001a). The finding provides important context for consideration in this SEIS.
- On June 21, 2001, NMFS published an EA on the final estimates of the fur seal subsistence needs through 2002[16]. The EA examined two alternatives: 1) setting take at ranges agreed upon and that have occurred since 1994 (Status Quo referred to in this SEIS as the No Action Alternative); and 2) setting take ranges at levels other than those established in 1997.
- In 2003, NMFS completed another draft EA for setting subsistence take ranges. Through this process, the agency determined that the interaction between the commercial groundfish fisheries in the Eastern Bering Sea (EBS) and the foraging activities of the declining northern fur seal population was likely resulting in significant cumulative effects on the seal population[17]. This finding was consistent with the 2001 NMFS SEIS evaluation of the potential effects of the Bering Sea Aleutian Islands groundfish fisheries on fur seal prey availability (NMFS 2001a). In light of

[14] Available at: http://alaskafisheries.noaa.gov/protectedresources/seals/fur/eis/final0505.pdf

[15] NMFS published an EA on the Proposed Regulations Governing the Harvest of Fur Seals on the Pribilof Islands (51 FR 17896, May 15 1986) because NMFS believed there were no significant impacts that were not already discussed in the 1985 EIS, on the Interim Convention on North Pacific Fur Seals, April 1985.

[16] *Federal Register* 66 FR 33209.

[17] Environmental Assessment 2003, "Setting of the Annual Subsistence Harvest Take Ranges of Northern Fur Seals on the Pribilof Islands for the Period 2003-2005", NMFS, Alaska Region (unpublished).

these findings, NOAA General Counsel determined that the preparation of an EIS for the proposed action of setting of harvest limits and regulations was required under NEPA[18]. In the meantime, NMFS prepared an EA to set annual harvest limits while simultaneously completing the EIS. Once the EIS was prepared, NMFS was able to promulgate regulations regarding northern fur seal harvest limits.

- In May 2005, NMFS completed the required final EIS for setting annual harvest (NMFS 2005)[19]. The 2005 Final EIS analyzed the process of setting annual Pribilof Islands fur seal subsistence take ranges, but did not consider changing the regulations to otherwise manage, restrict, or alter the ability of Pribilovians to meet their subsistence needs. The 2005 Final EIS supported setting the St. Paul Island harvest at 1,645 to 2,000 sub-adult male seals and the St. George Island at 300 to 500 sub-adult male seals. The 2005 Final EIS concluded that subsistence harvests within the specified ranges would have a minimal effect on the northern fur seal stock and would meet the documented subsistence needs of the Aleuts on St. Paul and St. George Islands at that time.
- In 2007, NMFS, Office of Protected Resources (OPR), completed a Final Programmatic EIS (PEIS) for Steller Sea Lion and Northern Fur Seal Research (NMFS 2007b). Specifically, the 2007 PEIS evaluated the effects of the type and range of research activities that may be implemented in current and future research grants. The PEIS assessed the direct and indirect effects of various levels of funding and different research techniques on Steller sea lions and northern fur seals throughout their entire range, including Alaska. A quantitative analysis of the sub-lethal effects of research was undertaken and was subsequently applied in the analysis of potential effects of subsistence harvests on St. George Island northern fur seals (see below) (NMFS 2014a). A similar approach has been applied in this SEIS and is described in detail in Section 4.3. The Notice of Availability (NOA) for the final PEIS on Steller Sea Lion and Northern Fur Seal Research was published on May 11, 2007[20], and the Record of Decision (ROD) signed on June 18, 2007.
- On April 23, 2010, NMFS published a notice of receipt of petition for rulemaking[21] from the Pribilof Island Aleut Community of St. George Island Traditional Council. The petition was in the form of a tribal resolution to NMFS requesting changes to the regulations to allow the harvest of 150 male northern fur pups[22] to satisfy the specific St. George community subsistence needs. The final rule modifying the harvest regulations for St. George Island was published on July 24, 2014[23]. An SEIS on the proposed changes to the management of the St. George fur seal harvest was completed and the ROD was signed on September 23, 2014[24]. The proposed action did not change take ranges or methods of harvest, but did allow for the limited subsistence take of male

[18] *Federal Register* 68 FR 36539.

[19] Final EIS, May 2005, "Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands", NMFS, Alaska Region.

[20] *Federal Register* 72 FR 26814.

[21] *Federal Register* 75 FR 21233.

[22] *Federal Register* 75 FR 21233.

[23] *Federal Register* 79 FR 65327.

[24] *Federal Register* 79 FR 48774.

young of the year fur seals, as well changes to when and where the subsistence harvests can occur on the Island.

Pertinent information from each of these documents has been incorporated by reference as appropriate when applicable to the St. Paul Island fur seal subsistence harvest.

1.10. Northern Fur Seal Conservation Plan & Relevance to the St. Paul Island Subsistence Harvest

Amendments to the MMPA, which passed into law on November 23, 1988 (P.L. 100-711), direct the Secretary of Commerce to develop a conservation plan on northern fur seals. Under the MMPA, a conservation plan delineates actions for "conserving and restoring the [depleted][25] species or stock to its optimum sustainable population" (16 U.S.C. 1383b (b)). NMFS designated the Pribilof Islands northern fur seal stock depleted under the MMPA on June 17, 1988, because it declined to less than 50% from levels observed in the late 1950s[26]. NMFS determined that further restrictions of the subsistence harvest were not required as part of the depleted listing and the current regulations were adequate. The Pribilof Islands Northern Fur Seal Conservation Plan was signed by the NMFS Assistant Administrator (AA), and published by NMFS in June 1993. This conservation plan included information on the status of fur seals on the Pribilof Islands, causes of declines, threats to the species, critical information gaps, and recommended research and management actions for meeting the objectives of the plan (NMFS 1993).

The Co-Management Agreement between NMFS and ACSPI is specific to the conservation and management of northern fur seals and Steller sea lions, with particular attention paid to the subsistence harvest, hunting, and use of these animals. NMFS has worked with St. Paul under the Co-Management Agreement to develop harvest management plans for the purpose of recovering and maintaining sea lion and fur seal populations to levels that provide for a sustainable subsistence use of these species in the Pribilof Islands region. In conjunction with the implementation of the co-management plans, NMFS and the Pribilof Islands Tribal Governments (St. Paul and St. George) revised and updated the 1993 Conservation Plan for the Eastern Pacific Stock Northern Fur Seals in 2007 (NMFS 2007a). NMFS published an NOA for the revised and updated plan on December 28, 2007[27].

The 2007 conservation plan serves as a guide that delineates and schedules those actions believed necessary at this time to restore the northern fur seal to pre-depleted levels of abundance. These actions are outlined in the implementation schedule of the conservation plan. The four major objectives of the plan are to:

1. Identify and eliminate or mitigate the cause or causes of human-related mortality;
2. Assess and avoid or mitigate adverse effects of human-related activities on or near the Pribilof Islands and other habitat essential to the survival and recovery of fur seals;

[25] The MMPA defines the term "depletion" or "depleted" (16 U.S.C.1362(1)) as meaning any case in which it is determined, after consultation with the MMC and the Committee of Scientific Advisors on Marine Mammals established under title II of this Act, that a species or population stock is below its optimum sustainable population… or when a species or population stock is listed as an endangered species or a threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531, *et seq.*).

[26] *Federal Register* 53 FR 17888.

[27] *Federal Register* 72 FR 73766.

3. Continue and, as necessary, expand research or management programs to monitor trends and detect natural or human-related change in fur seals or habitat essential to its survival and recovery; and
4. Coordinate and assess the implementation of the conservation plan.

The conservation plan reflects and encourages the co-management approach for protection, conservation and management of the northern fur seal population (NMFS 2007a).

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2. ALTERNATIVES CONSIDERED

This chapter describes the reasonable range of alternatives that have been determined to meet the purpose and need of the proposed action to conserve northern fur seals and manage the subsistence harvest of fur seals on St. Paul Island for their long-term sustainable use for purposes of food, cultural continuity, clothing, arts, and crafts. This chapter also summarizes how the alternatives would achieve the defined purpose and need. NMFS' evaluation of the potential environmental impacts of the alternatives is provided in Chapter 4.

NMFS has, in accordance with guidance from CEQ on implementing NEPA (40 CFR 1500), developed five alternatives for evaluation in this SEIS. These include the No Action Alternative and four other alternatives that evaluate two northern fur seal harvest levels as well as regulatory and non-regulatory restrictions on when, where, and how different-aged, non-breeding male fur seals can be taken for subsistence purposes. The process and thresholds for annually suspending or terminating the harvest is also described for each alternative.

As described in Section 2.2, and in line with CEQ guidance (40 CFR 1501.7), NMFS has considered comments received during the scoping period in determining the significant issues related to the proposed action to be considered during development of the alternatives presented herein.

2.1. Federal Regulations versus a Co-Management System

As described under Alternative 1, No Action, the current subsistence harvest is managed using federal regulations, and later added a co-management system. Recent studies of subsistence harvest monitoring have shown that locally-implemented monitoring is more cost-effective and samples a significantly greater proportion of the available subsistence users (Rist *et al.* 2010). The need for a more significant role of co-management versus federal regulations was the single-most 'critical' issue identified throughout the scoping process from local residents and Alaska Natives. Therefore, each of the alternatives analyzed in this SEIS varies in terms of the level of federal regulations versus co-management restrictions for managing the harvest. This section describes the differences in these approaches and Section 2.2 provides specific detail on how each alternative varies in terms of which aspects of harvest management are the responsibility of the federal government versus the Co-Management Council. The distinction between federal regulations and co-management, and its significance in the development of the petitioned Alternative 2, is explained more in Section 2.2.2.

2.1.1. Federal Regulations

Federal regulations carry out a specific piece of legislation. Regulations are enforced by a regulatory agency, such as NMFS, formed or mandated to carry out the purpose or provisions of legislation. Regulations restrict specific activities (*e.g.*, northern fur seal subsistence harvest). Regulations are based on, and implement, statutes or law and are enforced by the government. Generally, prescriptive regulations, such as those used to restrict the subsistence harvest of northern fur seals take a long time to change and are not easy to adapt to new information or circumstances.

NMFS has managed subsistence use of northern fur seals by regulation under Section 105(a) of the FSA on the Pribilof Islands by establishing the predicted range of the annual subsistence need triennially and

limiting, suspending, and terminating the implementation of the harvest through restrictions and prohibitions that remain largely unchanged from the 1986 rulemaking. NMFS used their authority under the FSA, not the MMPA, to promulgate regulations to authorize the subsistence use of northern fur seals on the Pribilof Islands. Section 103(b) of the FSA provides an exemption to the prohibition on taking for subsistence use by Alaska Natives residing on the Pribilof Islands, if those regulations promulgated by the Secretary of Commerce are consistent with conditions set forth by the Fur Seal Commission and accepted by the Secretary of State. NMFS lacks the authority to implement Section 103(b) because the Fur Seal Commission has been disbanded and, therefore, can no longer prescribe those conditions for subsistence use on the Pribilof Islands. Therefore, subsistence taking is prohibited under Section 102(a) of the FSA and the exception is provided for by regulation under the broad authority under Section 105(a).

2.1.2. Co-Management Rules and Restrictions

Recommendation from the Alaska Natives Commission[28] Final Report (1994):

> *Cognizant federal agencies should fully implement existing provisions of law requiring the operation of regional subsistence advisory councils and the options of contracting with communities and regional entities for co-management agreements. The involvement, responsibility and power of local people should become permanent principles of the system.*

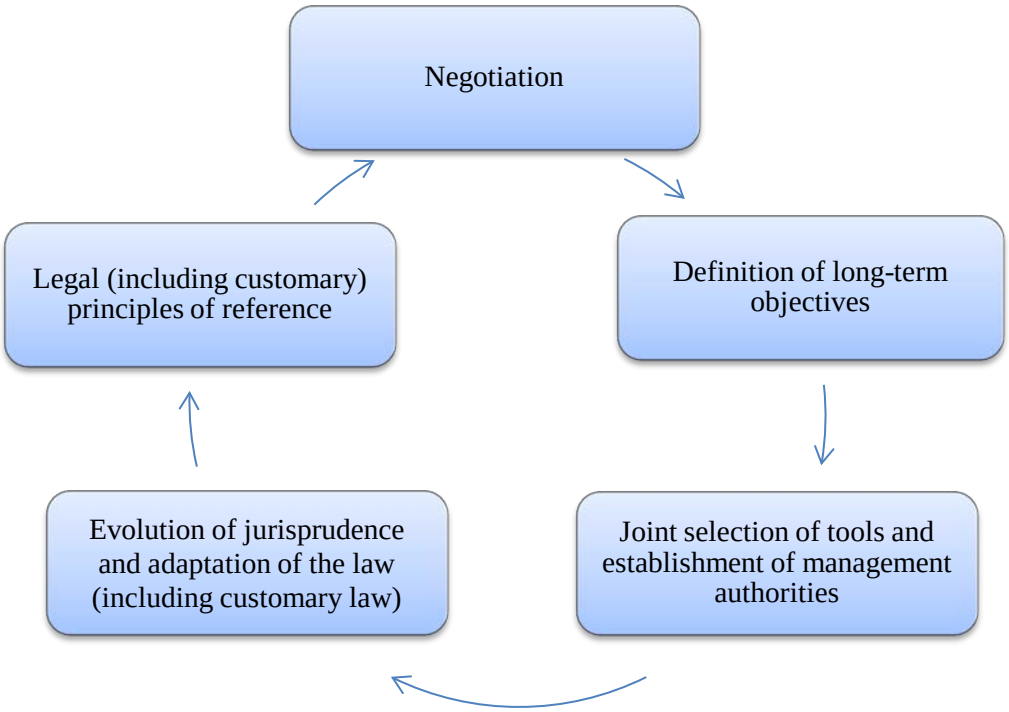
The MMPA was amended in 1994 to include Section 119, which states, "the secretary may enter into cooperative agreements with Alaska Native organizations to conserve marine mammals and provide co-management of subsistence use by Alaska Natives." Generally, co-management is a process under which a government entity (NMFS) shares power with the resource users (ACSPI), with each given specific rights and responsibilities relating to information, adaptive management, governance and decision-making, pluralism, and conflict management. Borrini-Feyerabend *et al.* (2007) defined co-management as "a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources".

Some relevant principles of co-management include the recognition of different values, interests and concerns involved in managing natural resources (*i.e.*, fur seals), both outside the local communities and within them; sharing of roles and responsibilities; and learning by doing through on-going revisions and improvements in management. Similarly, there are certain principles of adaptive management that are inherent in a co-management system in that the "management of natural resources is always experimental, that we can learn from implemented activities, and that natural resources management can be improved on the basis of what has been learned" (Borrini-Feyerabend *et al*. [2007]).

While there is no specific scheme for a co-management or adaptive management system, Figure 2.2-1 provides insight on some key aspects of the process.

[28] The Alaska Natives Commission (the joint Federal-State Commission on Policies and Programs Affecting Alaska Natives) was created by Congress in 1990 at the urging of Alaska Native groups. The Commission's undertaking was jointly funded by the federal government and the State of Alaska.

Figure 2.2-1 Key Aspects of a Co-Management System



In furtherance of Section 119, NMFS and ACSPI entered into a cooperative management agreement to include, but not limited to, the following purposes that are relevant to this discussion: (C) establishing a process of shared local responsibilities regarding the management and research of fur seals and sea lions on behalf of the citizens of the U.S.; (D) identifying and resolving through a consultative process any management conflicts that may arise in association with fur seals and sea lions; and (E) providing information to hunters and the affected community, as a means of increasing the understanding of the sustainable use, management, and conservation of fur seals and sea lions[29]. The agreement created a Co-Management Council that meets twice a year to make consensus-based decisions and develop management, monitoring, and research programs, as needed, and share responsibility for co-managing the harvest.

As emphasized in ACSPI's May 13, 2016 letter to NMFS to clarify their petition, increasing the level of co-management for the subsistence use of fur seals would build in flexibility and promote an adaptive management approach that can allow the Co-Management Council to quickly adjust the subsistence use restrictions to respond to changes in the environment or fur seal population. Section 2.2 provides additional detail on the level of co-management proposed under each alternative (see Tables 2.2-1 through 2.2-6).

[29] Co-Management Agreement between ACSPI and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (signed on June 13, 2000).

2.2. Alternatives

Five alternatives are evaluated in this SEIS. All alternatives manage subsistence harvesting or hunting of the fur seals on St. Paul Island, and are designed to accomplish the stated purpose and need for the action. The range of alternatives is intended to contrast different management measures and to what extent federal regulations are the most effective means to manage the subsistence use of northern fur seals on St. Paul Island. The alternatives are also intended to analyze how to balance NMFS' authority to regulate fur seal subsistence use with NMFS' authority to co-manage subsistence use with St. Paul under Section 119 of the MMPA under non-regulatory restrictions. Each alternative also defines shared roles and responsibilities under co-management versus exclusive federal or tribal responsibilities under federal regulations to manage and monitor alternative subsistence use regimes considered in the alternatives.

NMFS will select a final Preferred Alternative, which may include options from multiple alternatives for limiting, adjusting, suspending, or terminating subsistence use in the Final SEIS and ROD, based on comments received during the public review of the Draft SEIS and final analysis of alternatives.

2.2.1. Alternative 1 (No Action)

The No Action Alternative (Alternative 1) (Table 2.2-1) is defined as maintaining status quo and a decision to not update the subsistence regulations. In other words, the No Action Alternative is a continuation of the current subsistence harvest regulations as authorized under 50 CFR 216.71-72. Alternative 1 provides a benchmark for decision makers to compare the magnitude of environmental effects of the action alternatives.

Alternative 1 would maintain the current subsistence harvest take range on St. Paul Island of 1,645 to 2,000 northern fur seals. This alternative continues the harvest under the regulatory process used to establish harvest take levels every 3 years, and a set of restrictions that have been in place since 1993. Federal regulations at 50 CFR 216.72 currently restrict subsistence harvests of sub-adult male fur seals to the period between June 23 and August 8 of each year. Alternative 1 uses the term sub-adult to identify the harvestable age group, and includes a prohibition that seals must be 124.5 cm or less in length. In the 1985 emergency interim rule (50 FR 27914, July 8, 1985), NMFS indicated that "Every attempt should be made to achieve a proportional harvest that reflects the relative abundance of 2-, 3-, 4-, and 5-year-olds in the population; no age class selectivity should be made" (see 50 FR 27918, top of third column). In the 1986 proposed (51 FR 17896, May 15, 1986) and final rule (51 FR 24828, 9 July 1986), NMFS continued to use the term sub-adult, and retained the prohibition that sub-adult male fur seals 124.5 cm or less in length may be taken. NMFS further described the result of the length restriction is to "…confine the harvest to primarily 2-, 3-, and 4-year-old males." The harvest of adults and pups is prohibited in 50 CFR 216.72(c)(3).

The regulatory restrictions for Alternative 1 include Subpart F--Pribilof Islands, Taking for Subsistence Purposes:

- Sec. 216.71 Allowable Take of Fur Seals:
  Pribilovians may take fur seals on the Pribilof Islands, if such taking is:

  (a) For subsistence uses, and

  (b) Not accomplished in a wasteful manner.

- Sec. 216.72 Restrictions on Taking:

  (a) The harvests of seals on St. Paul and St. George Islands shall be treated independently for the purposes of this section. Any suspension, termination, or extension of the harvest is applicable only to the island for which it is issued.

  (b) By April 1 of every third year, beginning April 1994, the Assistant Administrator (AA) will publish in the Federal Register a summary of the preceding 3 years of harvesting and a discussion of the number of seals expected to be taken annually over the next 3 years to satisfy the subsistence requirements of each island. This discussion will include an assessment of factors and conditions on St. Paul and St. George Islands that influence the need by Pribilof Aleuts to take seals for subsistence uses and an assessment of any changes to those conditions, indicating that the number of seals that may be taken for subsistence each year should be made higher or lower. Following a 30-day public comment period, a final notification of the expected annual harvest levels for the next 3 years will be published.

  (c) [Reserved]

  (d) St. George Island [Not Applicable]

  (e) St. Paul Island--Seals may only be harvested from the following haulout areas: Zapadni, English Bay, Northeast Point, Polovina, Lukanin, Kitovi, and Reef. No haulout area may be harvested more than once per week.

  (1) The scheduling of the harvest is at the discretion of the Pribilovians, but must be such as to minimize stress to the harvested seals. The Pribilovians must give adequate advance notice of their harvest schedules to the NMFS representatives to allow for necessary monitoring activities.

  (2) No fur seal may be taken on the Pribilof Islands before June 23 of each year.

  (3) No fur seal may be taken except by experienced sealers using the traditional harvesting methods, including stunning followed immediately by exsanguination. The harvesting method shall include organized drives of sub-adult males to killing fields unless it is determined by the NMFS representatives, in consultation with the Pribilovians conducting the harvest, which alternative methods will not result in increased disturbance to the rookery or the increased accidental take of female seals.

  (4) Any taking of adult fur seals or pups, or the intentional taking of sub-adult female fur seals is prohibited.

  (5) Only sub-adult male fur seals 124.5 cm or less in length may be taken.

  (6) Seals with tags and/or entangling debris may only be taken if so directed by NMFS scientists.

  (f) Harvest suspension provisions. (1) The AA is required to suspend the take provided for in Sec. 216.71 and 216.72 when:

  (i) (S)He determines, after reasonable notice by NMFS representatives to the Pribilovians on the island, that the subsistence needs of the Pribilovians on the island have been satisfied; or

(ii) (S)He determines that the harvest is otherwise being conducted in a wasteful manner; or

(iii) The lower end of the range of the estimated subsistence level provided in the notice issued under paragraph (b) of this section is reached.

(2) A suspension based on a determination under paragraph (f)(1)(ii) of this section may be lifted by the AA if (s)he finds that the conditions, which led to the determination that the harvest was being conducted in a wasteful manner have been remedied.

(3) A suspension issued in accordance with paragraph (f)(1)(iii) of this section may not exceed 48 hours in duration and shall be followed immediately by a review of the harvest data to determine if a finding under paragraph (f)(1)(i) of this section is warranted. If the harvest is not terminated under paragraph (f)(1)(i) of this section, the AA must provide a revised estimate of the number of seals required to satisfy the Pribilovians' subsistence needs.

(g) Harvest termination provisions. (1) The AA shall terminate the take provided for in Sec. 216.71 on August 8 for sub-adult males on St. Paul and St. George Islands and on November 30 for male young of the year on St. George Island.

(2) The AA shall terminate the take provided for in §216.71 when (s)he determines under paragraph (f)(1)(i) or (f)(1)(iii) of this section that the subsistence needs of the Pribilovians on the island have been satisfied or the upper end of the harvest range has been reached, whichever occurs first.

Alternative 1 requires NMFS to publish a summary of the number of seals expected to be taken annually over the next 3-year period to meet local subsistence and nutritional needs. This information is used to set lower and upper ranges for the number of seals that can be harvested annually and is published in the Federal Register. Following a 30-day public comment period, a final notification of the harvest ranges for the subsequent 3-year period is reported. Under this alternative, the regulations suspending the harvest when the lower end of the harvest range is reached (1,645 fur seals) would be maintained along with the remaining suspension and termination provisions as defined in 50 CFR 216.72. Under Alternative 1, management and monitoring of the subsistence harvest would not change and most management measures would continue to be managed through federal regulations as shown in Table 2.2-1.

Table 2.2-1 Alternative 1 (No Action)

Alternative Component	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Harvest Range	1,645 sub-adult male fur seals set unchanged for 2014-2016; can be increased to 2,000 sub-adult males fur seals if 1,645 is reached and NMFS determines need has not yet been met.	
Harvested Animals	Sub-adult male fur seals 124.5 cm or less in length.	
Harvest Area	Zapadni, English Bay, Northeast Point, Polovina, Lukanin, Kitovi, and Reef hauling grounds.	
Harvest Season(s)	June 23 to August 8	
Harvest range setting process	A required regulatory 3-year harvest summary, and notification, used to establish the following 3-year harvest ranges.	
Prohibited Harvest	Any taking of adult fur seals is prohibited; any taking of pups is prohibited; the intentional taking of sub-adult female fur seals is prohibited.	
Suspend Harvest When…	Retains AA authority to suspend harvest Subsistence needs have been satisfied; harvest is being conducted in a wasteful manner; or when lower end of the range of subsistence need has been reached.	[non-regulatory co-management restriction] If five female fur seals have been accidentally harvested.

Alternative Component	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
Terminate Harvest When…	Retains AA authority to terminate harvest After August 8; subsistence need has been met; or conditions that led to waste or wasteful taking have not been remedied.	[non-regulatory co-management restriction] Eight female fur seals have been accidentally harvested.
Harvest Practices	Only experienced sealers using traditional and humane methods of round-up, stunning, and immediate exsanguination. Seals with tags and/or entangling debris may only be taken if so directed by NMFS scientists; No haulout area may be harvested more than once per week.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

2.2.2. Alternative 2 (Petitioned Action and Preliminary Preferred Alternative)

Alternative 2 will directly address the ACSPI's petition (see Section 1.1). Alternative 2 creates three new regulatory provisions that restrict the subsistence harvest of northern fur seals on St. Paul Island, and a fourth provision which delegates the in-season management decisions regarding the frequency of hunting and harvesting, locations where hunting and harvesting may occur, age-specific subsistence take levels, monitoring methods, and non-regulatory suspension or termination provisions to the St. Paul Island Co-Management Council. Alternative 2 would retain 50 CFR 216.71 and replace the provisions under 50 CFR 201.72 which are applicable to St. Paul Island with the following provisions:

1. Take of up to 2,000 juvenile male fur seals annually;
2. Take of juvenile male fur seals by hunting with firearms annually from January 1 to May 31;
3. Take by harvesting pups and juvenile male fur seals annually from June 23 to December 31 annually without using firearms;
4. Both harvesting and hunting of fur seals will be co-managed by the Aleut Community of St. Paul Island and NMFS under an existing Co-Management Agreement.

As part of the regulatory revisions NMFS will define male seals less than 7 years old as "juvenile" to be used for subsistence purposes in Alternative 2. Alternative 2 would authorize the St. Paul Island Co-Management Council (see discussion in Sections 1.5 and 2.1.2) to develop an annual subsistence use management plan. The annual plan will include monitoring to collect in-season subsistence harvest and hunt data to ensure that practices under Alternative 2 are implemented consistent with statutory and regulatory requirements. The St. Paul Island Co-Management Council would have the ability to create additional limitations or clarifications (*i.e.*, beyond the regulatory restrictions) on the frequency or location of subsistence hunting or harvesting activities, suspension, or termination provisions, monitoring and reporting, and other measures deemed necessary to ensure subsistence activities continue to be conducted in a humane and non-wasteful manner.

Alternative 2 considers two options which would terminate the continuation of subsistence use based on mortality of female fur seals. Alternative 2 - Option A (Table 2.2-2) reflects ACSPI's petition by not including a federal regulation that would terminate subsistence use when 20 females (1% of the total subsistence take level requested) were killed. The petition requested that the female mortality limit would be instituted through co-management rather than in regulation. Pursuant to the FSA, take of fur seals is prohibited unless otherwise authorized by the statute or through regulations promulgated by the Secretary of Commerce. Under Option A, there is no regulatory exception for the mortality of females during either

season when subsistence activities would occur. Thus, absent the promulgation of regulations to allow for accidental mortality of female fur seals, Alternative 2 - Option A could not be implemented consistent with the FSA. To address the FSA take prohibition, NMFS created Alternative 2 - Option B (Table 2.2-3) to allow incidental take of up to 20 females during hunting or harvesting. If 20 females are killed on St. Paul Island subsistence use will be terminated for the year by a fifth regulatory provision. Alternative 2, Option B is the preliminary preferred alternative in this DSEIS.

Alternative 2 - Option A authorizes the Co-Management Council to define an allowance for accidental female mortality in the annual harvest management plan, up to a maximum of 20 females per year.

Alternative 2 - Option B terminates the subsistence use of fur seals by regulation if and when 20 female fur seals are killed during subsistence activities.

Alternative 2 [Options A and B] eliminates the regulatory process used to establish harvest take levels every 3 years, eliminates the lower harvest take level, and creates an annual upper harvest take level of 2,000 northern fur seals in the regulations.

Alternative 2 [Options A and B] creates a new subsistence hunting season from January 1 through May 31 and extends the summer harvest season from June 23 through December 31 by regulation.

Alternative 2 [Options A and B] removes the regulatory prohibition on taking of pups and adult fur seals (*i.e.*, 7 years or older) and authorizes the Co-Management Council to manage any prohibitions, including suspension provisions outside of those defined in the regulations.

Alternative 2 [Options A and B] eliminates the existing regulatory restriction of harvesting fur seals greater than 124.5 cm in length.

Alternative 2 [Options A and B] allows harvesting of fur seals with tags or entangling debris.

Alternative 2 [Options A and B] eliminates the regulatory requirement that the Pribilovians must give adequate notice of their harvest schedules to NMFS. Harvest dates and locations would be described in an annual harvest management plan developed by the Co-Management Council (which includes NMFS).

Alternative 2 [Options A and B] eliminates the regulatory restriction that no haulout area may be harvested more than once per week. Harvest dates and locations would be described in an annual harvest management plan developed by the Co-Management Council.

Alternative 2 [Options A and B] eliminates the AA's authority to suspend or terminate the take as described in Section 216.72 (e) and (f). Harvests will be suspended or terminated as defined in an annual harvest management plan developed by the Co-Management Council, in addition to the termination threshold in the regulations once 2,000 juvenile males have been killed.

Alternative 2 would monitor and manage harvesting or hunting to make suspensions, terminations, or adjustments within the co-management system. That is, the Co-Management Council:

- Would create plans to monitor and manage the subsistence use and then create a process to make decisions about the need to take management actions and enforce non-regulatory restrictions;.
- Would review harvest monitoring data and evaluate the application of adaptive management measures within each subsistence season;

- Would evaluate the data and determine what measures are being taken to track the number of seals killed or injured for subsistence purposes, detect females, avoid additional mortality of females, minimize disturbance, etc.; and
- May decide to temporarily suspend the hunt or harvest to review the data and circumstances of each situation.

Under Alternative 2 - Option A and B, the Co-Management Council would develop harvest monitoring and allocation plans intended to minimize sub-lethal effects on seals not harvested, maximize detection and avoidance of females, minimize the possibility of wasteful taking, make in-season allocations among the age groups and locations to be harvested consistent with the regulations, and make determinations regarding the suspension of hunting or harvesting.

Table 2.2-2 Alternative 2 Option A

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male (*i.e.*, up to 7 years old) fur seals.	
Pup Subsistence Harvest Limit	Establish the age-specific level based on community need and environmental conditions.	
Juvenile Subsistence Harvest Limit		
Juvenile Subsistence Hunt Limit		
Harvest Area	Any breeding or hauling grounds.	
Pup Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Hunt Season	January 1 to May 31	Frequency established by community need and environmental conditions.
Female Mortality Limit to Temporarily Suspend Subsistence	Female mortality threshold to be set by Co-Management Council.	
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed.	
Temporary Suspension of Subsistence use	Female mortality threshold to be set by Co-Management Council.	
Termination of Subsistence use	The AA determines 2,000 fur seals have been killed. The AA determines the harvest is being conducted in a wasteful manner have not been remedied.	Subsistence needs have been met.
Authorized Harvest Method	Juvenile fur seals must be harvested using methods determined to minimize effects on non-harvested seals. Pups must be harvested using methods determined to minimize effects on non-harvested seals. Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.	
Authorized Hunt Method	Firearms	Estimate harassment based on actual hunting methods and establish maximum acceptable level. Estimate level of struck and lost seals based on actual hunting and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

Table 2.2-3 Alternative 2 Option B

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male (*i.e.*, up to 7 years old) fur seals.	
Pup Subsistence Harvest Limit	Establish the age-specific level based on community need and environmental conditions.	
Juvenile Subsistence Harvest Limit		
Juvenile Subsistence Hunt Limit		
Harvest Area	Any breeding or hauling ground.	
Pup Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Harvest Season	June 23 to December 31	Frequency established by community need and environmental conditions.
Juvenile Hunt Season	January 1 to May 31	Frequency established by community need and environmental conditions.
Female Mortality Limit to Temporarily Suspend Subsistence	Female mortality threshold to be set by Co-Management Council.	
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed	
Temporary Suspension of Subsistence use	Female mortality threshold to be set by Co-Management Council.	
Termination of Subsistence use	The AA determines 2,000 fur seals have been killed. The AA determines the harvest is being conducted in a wasteful manner have not been remedied.	Subsistence needs have been met.
Authorized Harvest Method	Juvenile fur seals must be harvested using methods determined to minimize effects on non-harvested seals. Pups must be harvested using methods determined to minimize effects on non-harvested seals. Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.	
Authorized Hunt Method	Firearms	Estimate harassment based on actual hunting methods and establish maximum acceptable level. Estimate level of struck and lost seals based on actual hunting and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

2.2.3. Alternative 3

Alternative 3 will revise federal regulations to manage subsistence use by including prescriptive restrictions defining seasons, locations, methods of killing, and harvest and hunt allocation by age and season. This alternative incorporates elements of federal regulation and co-management to restrict the subsistence use of fur seals. Compared to Alternative 1 (No Action), Alternative 3 uses federal regulations to manage most aspects of the subsistence use of fur seals and limits the use of the Co-Management Council to prohibiting subsistence use at breeding locations likely to reach unsustainable abundance levels, managing sub-lethal effects of hunting and harvesting, and monitoring and reporting

subsistence use. Alternative 3 would add regulations to authorize and restrict the use of firearms to hunt fur seals to two specific locations.

Alternative 3 (Table 2.2-4) would amend federal regulations to manage the following aspects of subsistence use of fur seals:

1. Authorize the Pribilovians on St. Paul to take up to 2,000 male fur seals annually for subsistence use;
2. Create two subsistence seasons totaling 219 days: the first to hunt juvenile male fur seals with firearms from January 1 to March 15, and the second to harvest male pups only from August 9 to December 31;
3. Retain the prohibition on harvesting adult fur seals;
4. Retain the provision to limit harvests any site occupied by fur seals to occur once per week;
5. Limit the harvest of male pups from August 9 to December 31 to 1,500 animals.
6. Limit the hunt of juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups, killed with firearms) to 500 animals from January 1 to March 15;
7. Restrict the use of firearms to hunt juvenile males hauled out on land at the Vostochni and Morjovi hauling and breeding grounds;
8. Terminate the subsistence use for that year if and when five females have been killed (*i.e.*, 0.25% of the authorized total male kill);
9. Create a provision that suspends subsistence use for up to 2 days if and when three females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the three accidental mortalities have been reviewed;
10. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternative 1);
11. Create a provision that Pribilovians' method of harvest must include at a minimum that all pups be captured, handled and their sex determined prior to harvesting male pups.

Alternative 3 would eliminate the following provisions from the regulations:

1. Eliminate the provision to set the harvest range every 3 years;
2. Eliminate the provision to establish a lower end of the subsistence harvest range;
3. Eliminate the juvenile male harvest period between June 23 and August 8 of each year;
4. Eliminate the prohibition on harvesting pups;

Alternative 3 would include suspension and termination provisions within the regulations. The harvest would be suspended for up to 2 days if NMFS determines the harvest is being conducted in a wasteful manner, or if three female fur seals are killed during the harvest of male seals. The AA would terminate subsistence use annually under Alternative 3 if and when five females were killed, 2,000 seals have been

harvested, or if the conditions that led to harvests or hunts being conducted in a wasteful manner have not been remedied.

Alternative 3 includes non-regulatory provisions to manage and restrict hunting and harvesting by the Co-Management Council (see Table 2.2-4). The Co-Management Council would estimate which breeding locations have adequate abundance to sustain a pup harvest each year. Alternative 3 would implement this co-management conservation control (*i.e.*, non-regulatory provision) based on the same analytical approach used by NMFS to manage the St. George subsistence harvest by regulations (NMFS 2014a). Specifically, the Co-Management Council would obtain the pup production and trend information at each breeding location to evaluate the statistical probability of pup production falling below a level that is necessary for long-term stability of the population.

Under Alternative 3, NMFS would estimate the probability of any breeding areas being reduced below the levels established in Johnson *et al.* (2013), by projecting estimated biennial pup production at each breeding area 10 years into the future. NMFS would provide the estimated population projections to the Co-Management Council for review. NMFS (2014a) based harvest prohibitions on projections with a greater than 5% probability that pup production at a breeding site would fall below 500 within the 10-year timeframe. NMFS chose this probability threshold based on the best available science from the population viability analysis in Gerber and DeMaster (1999). The Co-Management Council would evaluate the estimated projections and determine thresholds for prohibiting subsistence use at all breeding areas as new data are available.

Alternative 3 would use the Co-Management Council to implement a conservation control to jointly develop harvest and hunt monitoring and reporting plans. These conservation controls would define methods to minimize sub-lethal effects on seals not harvested, maximize detection and avoidance of females. Monitoring and reporting goals under Alternative 3 would be to obtain harvest and hunt data to include the number of females accidentally killed, total number of juvenile seals killed, and estimate the number of seals struck and lost.

Table 2.2-4 Alternative 3

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male fur seals (*i.e.*, up to 7 years old).	
Subsistence Harvest Limit	1,500 male fur seal pups (*i.e.*, up to 1 year old).	
Subsistence Hunt Limit	500 juvenile males (*i.e.*, up to 7 years old).	
Harvest Area	Any breeding or hauling ground.	Determined on pup production and trend projection (see Johnson *et al.* 2013).
Hunt Area	Vostochni and Morjovi hauling and breeding grounds.	
Harvest Season	Once per week per harvest area from August 9 to December 31.	
Hunt Season	January 1 to March 15	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when Three female fur seals are killed.	Determination of measures to be taken to detect and avoid female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	Five female fur seals are killed.	

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
Temporary Suspension of Subsistence use	The AA determines the harvest or hunt is being conducted in a wasteful manner results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner.
Termination of Subsistence use	The AA terminate the subsistence use when 2,000 juvenile seals have been killed. Conditions that led to the harvest or hunt being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Authorized Hunt Method	Use of firearms	Establish a hunt monitoring and reporting system Estimate struck and lost rates and establish maximum acceptable level.

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

2.2.4. Alternative 4

This alternative continues regulatory control, the monitoring of the harvest to ensure no wasteful taking occurs, minimizing the disturbance of breeding and resting fur seals, the taking of females, and the prohibition on the use of firearms. Alternative 4 is similar to Alternative 3 in that it represents a much greater use of federal regulations than non-regulatory restrictions under co-management to manage subsistence use of fur seals. Alternative 4 also places a greater reliance on federal regulations to manage subsistence use rather than the use of adaptive management by the Co-Management Council. Under Alternative 4, the Co-Management Council's primary responsibility would be to develop annual monitoring and reporting plans for the subsistence harvest.

Alternative 4 (Table 2.2-5) would amend federal regulations to manage the following aspects of subsistence use of fur seals:

1. Authorize the Pribilovians on St. Paul to kill up to 2,000 male fur seals annually for subsistence use (same as Alternatives 2 and 3);
2. Retain the provision to establish the lower and upper range of the subsistence need every 3 years (same as Alternative 1);
3. Create a 342-day subsistence harvest period, split into three seasons: January 1 to May 31, June 23 to August 8, and August 9 to December 31;
4. Retain the limit to harvest once per week per site (same as Alternatives 1 and 3), but revise to any site (same as Alternative 3);
5. Prohibit the harvest of adult fur seals (same as Alternatives 1, 2, and 3);
6. Create a limit to harvest up to 1,500 male pups from August 9 to December 31 annually (same as Alternative 3);
7. Create a limit to harvest up to 500 juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups) during January 1 to May 31, and June 23 to August 8;

8. Create a provision to prohibit the harvest from breeding locations at risk of reaching unsustainable population levels (same as Alternative 3);
9. Create a provision to prohibit the use of firearms to hunt or harvest fur seals;
10. Create a provision to prohibit the mortality of female fur seals, with the exception of allowing no more than 20 accidental female mortalities (*i.e.*, 1% of the authorized total male kill);
11. Create a provision that suspends subsistence use for up to 2 days if and when five females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the five female mortalities have been reviewed;
12. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternative 1). The harvest would be suspended for up to 2 days if NMFS determines the harvest is being conducted in a wasteful manner, or if five female fur seals are killed during the harvest of male seals. Termination provisions would include a determination that the subsistence needs have been met, 20 females were killed, 2,000 seals have been harvested, and if the conditions, which led to a suspension if harvests were being conducted in a wasteful manner, have not been remedied.
13. Retain the provision that harvest may be conducted only by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (same as Alternative 1); and
14. Create a provision that Pribilovians' method of harvest must include at a minimum that all pups be captured, handled and their sex determined prior to harvesting male pups.
15. Alternative 4 would create non-regulatory co-management provisions to manage sub-lethal effects and assessment of subsistence needs through the co-management process.

Unlike Alternatives 2 and 3, Alternative 4 would prohibit any use of firearms such that fur seals would be harvested using the method of roundup, stunning, and exsanguination currently used under Alternative 1.

Alternative 4 would include co-management provisions for ACSPI and NMFS to jointly develop harvest monitoring and reporting plans within the co-management structure intended to minimize sub-lethal effects on seals not harvested, maximize detection and avoidance of females, and assess the subsistence and nutritional needs of St. Paul.

Again, monitoring goals of the subsistence harvest under Alternative 4 would be consistent with those under Alternatives 2 and 3. Alternative 4 is more similar to Alternative 3 than Alternative 2 in that the federal government retains the primary responsibility in managing and monitoring the harvest. While monitoring would occur under co-management principles, the harvest continues to be managed and monitored under federal regulations more than by the ACSPI (see Table 2.2-5) when compared to the proposed monitoring program under Alternative 2. Reporting requirements under Alternative 4 are the same as for Alternatives 2 and 3.

Table 2.2-5 Alternative 4

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	2,000 juvenile male fur seals (*i.e.*, up to 7 years old).	
Pup Subsistence Harvest Limit	1,500 male fur seal pups (*i.e.*, up to 1 year old).	
Juvenile Subsistence Harvest Limit	500 juvenile males (*i.e.*, up to 7 years old).	
Harvest Area	Determined annually on pup production and trend projection (see Johnson *et al.* 2013).	
Harvest Needs Assessment Process	Establish the lower and upper range of the harvest need every 3 years after reporting in the Federal Register the actual subsistence use from the 3 years prior.	Assess the harvest need every 3 years.
Pup Harvest Season	Once per week per harvest area from August 9 to December 31.	
Juvenile Harvest Seasons	Once per week per harvest area from June 23 to August 8. Once per week per harvest area from January 1 to May 31.	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when five female fur seals are killed.	Determination of measures to be taken to detect and avoid additional female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	20 female fur seals are killed	
Temporary Suspension of Subsistence use	The AA determines the harvest is being conducted in a wasteful manner results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner.
Termination of Subsistence use	The AA terminates the subsistence use when 2,000 juvenile seals have been killed. Conditions that led to the harvest being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Juvenile fur seals must be harvested using traditional methods of round-up, stunning and immediate exsanguination by experienced sealers. Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Prohibited Harvest Method	Firearms are prohibited.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

2.2.5. Alternative 5

Alternative 5 continues to establish the subsistence need by regulation, but creates a new process to estimate the lower and upper limit of the subsistence need. The new process would use the most recent 3-year average of actual harvest levels beginning in 2017 to set the lower limit and potential biological removal (PBR) to set the upper limit for the initial 3-year period of the new regulation rather than a household survey of the subsistence need as in Alternative 1, No Action. Alternative 5 includes a mix of actions managed under federal regulations and actions managed under co-management in one alternative. Alternative 5 specifically uses the federal regulations to apportion the harvest of male fur seals by season and age, and increases the accidental female mortality limits to 200. This alternative establishes an adaptive process for demonstrating need as required by regulations.

Alternative 5 (Table 2.2-6) would amend federal regulations at 50 CFR 216.72 to manage the following aspects of subsistence use of fur seals:

1. Retain the federal requirement to establish the lower and upper range of the subsistence need every 3 years (same as Alternative 1);
2. Create a new method for establishing the upper and lower end of the range of the annual subsistence need. From 2017 to 2019, the upper end of the range of subsistence harvest of male pups and juveniles (*i.e.*, fur seals up to 7 years old, excluding pups) will be authorized up to 50% of the PBR for the St. Paul population. PBR for St. Paul is 9,805 seals[30]; therefore, the upper limit of the subsistence harvest range would be 4,902 seals. The lower end of the range would be set at the most recent 3-year average (2014 to 2016) of subsistence harvest. Beginning in 2020, the lower end of the 3-year harvest range (2020 to 2022) would be set based on the average number of reported seals harvested over the 2017 to 2019 period, and the upper end of the range to be based on the average from the entire subsistence period (*i.e.*, 1985 to the present year).
3. Create a 188-day subsistence harvest period, split into two seasons: June 23 to August 8, and August 9 to December 31;
4. Retain the limit to harvest once per week per site (same as Alternatives 1, 3, and 4);
5. Prohibit the harvest of adult fur seals (same as Alternatives 1, 2, 3, and 4) and remove the prohibition on the harvest of male pups (same as Alternatives 2, 3, and 4);
6. Create a provision to prohibit the mortality of female fur seals, with the exception of allowing no more than 200 accidental juvenile (*i.e.*, less than 7 years old) female mortalities.
7. Create a restriction to harvest only juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups) during June 23 to August 8;
8. Create a restriction to harvest only male pups from August 9 to December 31;
9. Create a provision to prohibit the harvest from breeding locations at risk of reaching unsustainable population levels (same as Alternative 4);
10. Create a provision to prohibit the use of firearms to harvest fur seals (same as Alternative 4);
11. Create a provision that suspends subsistence use for up to 2 days if and when 150 females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the 150 mortalities have been reviewed;
12. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternatives 1, 3, and 4);
13. Retain the suspension provision regarding when the lower end of the harvest range has been reached (same as Alternative 1). A suspension issued in accordance with this section may not exceed 48 hours in duration and shall be followed immediately by a review of the harvest data to

[30] Based on the 2012 Stock Assessment Report and used as the basis for the St. George Subsistence Harvest SEIS (Allen and Angliss 2013).

determine if a harvest termination determination is warranted. If the harvest is not terminated under this section, the AA must provide a revised estimate of the number of seals required up to the upper end of the range to satisfy the Pribilovians' subsistence needs;

14. Retain the provision that harvest may be conducted only by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (same as Alternatives 1 and 4); and
15. Create a provision that Pribilovians method of harvest must include at a minimum that all pups be captured, handled, and their sex determined prior to harvesting male pups (same as Alternative 4).

The upper and lower limit of the subsistence harvest would be established in the regulation every 3 years based on the averages of the past levels of subsistence harvests. The upper limit of the harvest range from 2017 to 2019 would be set at 50% of PBR, and in subsequent 3-year periods would be reset based on overall average harvest level since 1985. PBR is a precautionary measure of allowable human-caused mortality that is intended to allow a population to recover from a depleted state. After the initial 3-year period to establish the upper limit of the subsistence needs of the Pribilovians, the regulatory process will use the average of the entire subsistence period to establish the subsequent upper limit of the harvest range. The lower limit of the harvest range would be set in the regulation based on the average harvest for the most recent 3-year period. Beginning in 2020, the regulatory process used to establish harvest levels every 3 years would be based on the reported harvest levels.

The regulations envisioned for Alternative 5 also prohibit the intentional (but not accidental) taking of female fur seals. Alternative 5 (Table 2.2-6) would include suspension and termination provision within the regulations. The harvest would be suspended for up to 2 days if NMFS determines the harvest is being conducted in a wasteful manner, if 150 female fur seals are killed during the harvest of male seals, or if the lower limit of the subsistence harvest range has been reached. Termination provisions would include a determination that the subsistence needs have been met, 200 females were killed, the upper end of the range of seals needed have been harvested, and if the conditions that led to a harvest suspension have not been remedied.

Alternative 5 would include non-regulatory provisions for ACSPI and NMFS to develop and implement through the co-management process. The Co-Management Council would jointly develop harvest monitoring and reporting plans intended to accurately characterize the male harvest in each season, the accidental mortality of females, minimize sub-lethal effects on seals not harvested, maximize detection and avoidance of females, and minimize taking that may have been conducted in a wasteful manner. The Co-Management Council would also allocate the number of juvenile males and male pups to be harvested each season up to the upper limit of the harvest range established by the regulations.

Monitoring and reporting goals of the subsistence harvest under Alternative 5 would be consistent with the co-management agreement and other alternatives. However, Alternative 5 is more similar to Alternatives 3 and 4, than Alternative 2, in that the federal government retains a large role in managing and monitoring the overall harvest. Further, under Alternative 5 establishing the 'subsistence need on St. Paul Island' in future years remains under federal management by retaining control of developing the subsistence harvest ranges under the regulations based on the prior year's subsistence harvest levels. While monitoring and reporting would occur under the authority of the Co-Management Agreement the

harvest would continue to be managed and monitored under federal regulations more so than by the ACSPI (see Table 2.2-6) when compared to the proposed monitoring and reporting program under Alternative 2. Reporting requirements under Alternative 5 are the same as for Alternatives 2 through 4. Shaded cells in Table 2.2-6 represent federal regulations, while white cells represent responsibilities of co-management.

Table 2.2-6 Alternative 5

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
	Federal Regulations	Co-Management Conservation Control
Subsistence Use Limit	Juvenile male (*i.e.*, up to 7 years old) fur seals up to fifty percent of the 2017 estimate of Potential Biological Removal level.	
Pup Subsistence Harvest Limit		Establish the age-specific level based on community need.
Juvenile Subsistence Harvest Limit		Establish the age-specific level based on community need.
Harvest Area	Determined annually on pup production and trend projection (see Johnson *et al.* 2013).	
Harvest Needs Assessment Process	Establish the lower and upper range of the harvest need (see text for details) every 3 years after reporting in the Federal Register the actual subsistence use from the 3 years prior.	Report the actual harvest level every 3 years.
Pup Harvest Season	Once per week per harvest area from August 9 to December 31.	
Juvenile Harvest Seasons	Once per week per harvest area from June 23 to August 8.	
Age Limit	Any taking of adult fur seals is prohibited.	
Female Mortality Limit to Temporarily Suspend Subsistence	2-day suspension when 150 female fur seals are killed.	Determination of measures to be taken to detect and avoid additional female mortality during the harvest.
Female Mortality Limit to Terminate Subsistence	200 female fur seals are killed.	
Temporary Suspension of Subsistence use	The AA determines the harvest is being conducted in a wasteful manner results in a 2-day suspension. The AA determines the lower end of the subsistence harvest range has been reached results in a 2-day suspension.	Determination of measures to be taken to remedy harvests occurring in a wasteful manner. Assessment of revised need above the lower end of the range.
Termination of Subsistence use	The AA determines the upper end of the subsistence harvest range has been reached. The AA determines the conditions that led to the harvest being conducted in a wasteful manner have not been remedied.	
Authorized Harvest Method	Juvenile fur seals must be harvested using traditional methods of round-up, stunning and immediate exsanguination by experienced sealers. Pups must be handled and sexed prior to harvest.	Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level.
Prohibited Harvest Method	Firearms are prohibited.	

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

2.2.6. Comparison of Alternatives

Table 2.2-7 provides a summary of key aspects of all five alternatives, showing how they differ in terms of what is proposed as regulation (shaded cells) versus those proposed under a co-management system (no shading). No Action (Alternative 1) proposes that most aspects of the harvest be codified under regulation. Alternative 2, the Preliminary Preferred/Petitioned Alternative, proposes that most aspects of the harvest be managed by the Co-Management Council (*i.e.*, not as regulations) while Alternatives 3, 4 and 5 propose that co-management be responsible for certain harvest restrictions and termination of the harvest be managed by the Co-Management Council. None of the Alternatives would change the regulatory provisions found in 50 CFR 216.71.

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Table 2.2-7 Comparison of the Primary Features of Alternatives 1 – 5

Federal Regulations (shaded) versus Co-Management Conservation Controls (white)

Alternative Component	Alternative 1 - No Action	Alternative 2 - Petitioned/Preferred Alternative		Alternative 3	Alternative 4	Alternative 5[31]
		OPTION A	OPTION B			
Subsistence Use Limit	1,645 sub-adult[1] (2 to 5 years old) male fur seals; can be increased to 2,000 sub-adult males if 1,645 is reached and NMFS determines need has not yet been met.	2,000 male fur seals		2,000 male fur seals	2,000 male fur seals	From 2017 to 2019, the upper harvest limit of fur seal harvest will be 50% of PBR[2] (4,902 seals[32]). Beginning in 2020-2022, harvest to be set based on the 3-year average harvest from 2017 to 2019; harvest range would continue to be established every 3 years based on the reported harvest levels from the previous 3-year period.
Pup Subsistence Harvest Limit	Pup harvest prohibited	Establish the age-specific level based on community need and environmental conditions		1,500 male pups (<1 year old)	1,500 male pups (<1 year old)	Establish the age-specific level based on community need
Juvenile Subsistence Harvest Limit	1,645 sub-adult[1] males (2 to 5 years old)			N/A	500 juvenile males (*i.e.*, up to 7 years old, excluding pups)	
Juvenile Subsistence Hunt Limit	N/A			500 juvenile males (*i.e.*, up to 7 years old, excluding pups)	N/A	N/A
Harvest Area	Zapadni, English Bay, Northeast Point, Polovina, Lukanin, Kitovi, and Reef hauling grounds	Any breeding or hauling grounds		Any breeding or hauling grounds Determined on pup production and trend projection (see Johnson *et al.* 2013)	Determined annually on pup production and trend projection (see Johnson *et al.* 2013)	Same as Alternative 4

[31] Alternative 5 also includes a federal regulation to establish the lower and upper range of the harvest need (see text for details) every 3 years after reporting in the Federal Register the actual subsistence use from the 3 years prior.

[32] Based on the 2012 Stock Assessment Report and used as the basis for the St. George Subsistence Harvest SEIS (Allen and Angliss 2013).

Alternative Component	Alternative 1 - No Action	Alternative 2 - Petitioned/Preferred Alternative		Alternative 3	Alternative 4	Alternative 5[31]
		OPTION A	OPTION B			
Hunt Area	N/A	N/A	N/A	Vostochni and Morjovi hauling and breeding grounds	N/A	N/A
Pup Harvest Season	N/A	June 23 to December 31 (pups and juvenile males, no firearms)	June 23 to December 31 (pups and juvenile males, no firearms)	August 9 to December 31 once per week per harvest area	August 9 to December 31 once per week per harvest area	Once per week per harvest area from August 9 to December 31
Juvenile Harvest Season	June 23 to August 8	June 23 to December 31 (pups and juvenile males, no firearms)	June 23 to December 31 (pups and juvenile males, no firearms)	N/A	Once per week per harvest area January 1 to May 31 and June 23 to August 8	Once per week per harvest area from June 23 to August 8
Juvenile Hunt Season	Hunting prohibited	January 1 to May 31 (juvenile males by firearms)	January 1 to May 31 (juvenile males by firearms)	January 1 to March 15 Juvenile male hunt only	N/A	N/A
Female Mortality Limit to Temporarily Suspend Subsistence	Female mortality prohibited	Five female seals are killed during the hunt and harvest of male seals.	Five female seals are killed during the hunt and harvest of male seals. Retain AA authority to suspend harvest	2-day suspension when three female fur seals are killed	2-day suspension when five female fur seals are killed	2-day suspension when 150 female fur seals are killed Determination of measures to be taken to detect and avoid additional female mortality during the harvest
Female Mortality Limit to Terminate Subsistence	Female mortality prohibited	20 female fur seals are killed	20 female fur seals are killed	Five female fur seals are killed	20 female fur seals are killed	200 female fur seals are killed
Temporary Suspension of Subsistence use	AA has authority to suspend harvest when: (1) Subsistence needs have been satisfied (2) Harvest is being conducted in a wasteful manner (3) When lower end of the range of subsistence need has been reached	Five female fur seals are killed		The AA determines the harvest or hunt is being conducted in a wasteful manner results in a 2-day suspension	Same as Alternative 3	Same as Alternative 3

Alternative Component	Alternative 1 - No Action	Alternative 2 - Petitioned/Preferred Alternative		Alternative 3	Alternative 4	Alternative 5[31]
		OPTION A	OPTION B			
	5 female fur seals are killed[3]			Determination of measures to be taken to remedy harvests occurring in a wasteful manner.	Same as Alternative 3	Same as Alternative 3
Termination of Subsistence use	After (1) Subsistence need has been met (2) Conditions that led to waste or wasteful taking have not been remedied (3) if eight female fur seals have been accidentally harvested[3] AA retains authority to terminate harvest	Subsistence needs have been met	The AA determines 2,000 fur seals have been killed The AA determines the harvest is being conducted in a wasteful manner have not been remedied	The AA terminate the subsistence use when 2,000 juvenile seals have been killed Conditions that led to the harvest or hunt being conducted in a wasteful manner have not been remedied	Same as Alternative 3	Same as Alternative 3
Authorized Harvest Method	(1) Only experienced sealers using traditional and humane methods of round-up, stunning, and immediate exsanguination (2) Seals with tags and/or entangling debris may only be taken if so directed by NMFS scientists (3) No haulout area may be harvested more than once per week	Juvenile fur seals must be harvested using methods determined to minimize effects on non-harvested seals. Pups must be harvested using methods determined to minimize effects on non-harvested seals		Pups must be handled and sexed prior to harvest.	Juvenile fur seals must be harvested using traditional methods of round-up, stunning and immediate exsanguination by experienced sealers Pups must be handled and sexed prior to harvest	Same as Alternative 4
				Establish a harvest monitoring and reporting system. Estimate harassment based on actual harvest methods and establish maximum acceptable level	Same as Alternative 3	

Alternative Component	Alternative 1 - No Action	Alternative 2 - Petitioned/Preferred Alternative		Alternative 3	Alternative 4	Alternative 5[31]
		OPTION A	OPTION B			
Authorized Hunt Method	Firearms prohibited	Firearms		Firearms	Firearms prohibited	Firearms prohibited

Shaded cells denote actions managed under federal regulations, white cells denote actions managed under co-management.

[1] - Sub-adult under Alternative 1 refers to a seal aged 2 to 5 years old or 124.5 cm or less in length.

[2] - PBR is defined as "...the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population." PBR was intended to serve as an upper limit guideline for fishery-related mortality for each stock rather than population unit and is annually reported in the stock assessment report (Allen and Angliss 2013) and it is appropriate to use for other human-caused sources of mortality. PBR is a precautionary or conservative measure of human-caused mortality that could be expected to affect a population's ability to recover from a depleted state or to remain at a sustainable level. PBR for St. Paul is 9,805 seals; therefore, 50% of PBR is 4,902 seals.

[3] - This is a provision under Co-Management and is not in current regulations.

3. AFFECTED ENVIRONMENT

The environment affected by the subsistence harvest of northern fur seals, and other past, present and future activities, consists of the biological, physical, social, and economic resources of the Pribilof Island of St. Paul, and more broadly the EBS and Bering Sea-Aleutian Islands (BSAI) region. This chapter establishes the context in which the proposed action must be evaluated and presents the relevant history for the subsistence harvest by Alaska Natives of St. Paul, and the natural history and current status of northern fur seals and their physical environment. The intent of the chapter establishes an environmental baseline as context for evaluating direct, indirect, and cumulative effects of the northern fur seal subsistence harvest alternatives described in Chapter 2. Due to: 1) the isolation and independence of subsistence harvest on each island; 2) the prescriptive and restrictive methods used in the subsistence harvests; and 3) the fidelity of fur seals to their natal site and other island-centric behaviors (see Section 3.2.3.1), the following sections focus on northern fur seal biology, habitat, and status as well as the history of the commercial fur seal harvest and St. Paul subsistence harvest. However, to gain an accurate understanding of the affected environment, it is important to bear in mind that fur seals and the St. Paul community harvesting them, does not exist in isolation, but are integrated with other physical, biological, and socioeconomic resources. Recognizing this, brief descriptions of resources within the project area are included here as context, again with particular emphasis on northern fur seals and the St. Paul subsistence community.

3.1. The Pribilof Islands

The Pribilof Islands are volcanic islands made up of two large, inhabited islands, St. George and St. Paul; two small rocky islets, Otter Island and Walrus Island; and a small rocky outcropping known as Sea Lion Rock. Of the Pribilof Islands, St. Paul is the largest and northernmost island approximately 44 square miles in area, situated 76 km north northwest of St. George and 100 km from the western continental shelf break. St. George Island is 35 square miles in area, and is the southernmost island, located approximately 25 km from the shelf break. Otter Island is located 14 km south of St. Paul, and Walrus Island about 11 km east of St. Paul. Sea Lion Rock is about a quarter mile offshore of the southern tip of St. Paul (NRC 1996).

The Pribilof Islands have moist tundra soils formed from volcanic ash with rock, gravel, sand, and marine and sediment deposits. St. Paul Island consists of a rolling upland plateau with a few extinct volcanic peaks. There are widespread rocky and sandy beaches backed by dunes, significant sea-cliff habitat along the western coastline and the only estuary on the islands, Salt Lagoon. St. George Island is made up of rocky upland hills and ridges with extensive high, precipitous sea-cliffs and limited beach habitat. The islands are treeless and covered with mixed vegetation, wet to dry tundra, dwarf shrub communities and scattered small-patch wetlands. Otter Island is similarly vegetated to St. Paul. Walrus Island is primarily a low rocky islet with sparse vegetation distributed at high points. Sea Lion Rock is a rock outcropping bordering a shoreline reef adjacent to St. Paul Island (NRC 1996).

The Pribilof Islands have a maritime climate with windy, cloudy conditions and frequent precipitation throughout the year (NRC 1996). Temperatures range between a low of -30 degrees Fahrenheit (°F) to a high of 60°F, but typically average between 19°F and 52°F on St. Paul. In the summer, there is heavy fog and almost continual cloud-cover (Western Regional Climate Center 2006). Temperatures typically range

between 32°F and 52°F from May through October (Western Regional Climate Center 2006). Winters are dominated by freezing conditions and frequent blizzards. Drift ice is often present offshore, and during severe winters, the pack ice can surround the islands for months.

The Pribilof Islands and the surrounding Bering Sea marine environment constitute a unique ecosystem that supports high concentrations of marine mammals, seabirds, fish, and invertebrates (NRC 1996). This biodiversity and biological productivity results from the proximity of the islands to the continental shelf break, and nearby marine canyons, along with the general ecological complexity of the isolated island habitat and its marine faunal assemblages unique in the central Bering Sea (NRC 1996).

3.2. Northern Fur Seals

Northern fur seals belong to the Order *Carnivora*, Suborder *Pinnipedia*, Family *Otariidae*, and Subfamily *Otariinae*. The genus *Callorhinus* contains one species, the northern fur seal (*Callorhinus ursinus)* (Rice 1998). Adult northern fur seal pelage coloration is generally brownish-gray; vibrissae (whiskers) color lightens with age, starting as black in pups, becoming mixed black and white in sub-adults and eventually all white in fully grown adults (Scheffer 1962). When reaching maturity (roughly 6 years), male fur seals become broad through the chest and shoulders and develop a "mane" of stiff, short hairs (Scheffer 1962).

Little evidence of genetic differentiation among breeding sites has been found (Dickerson *et al.* 2010; Ream 2002; Rice 1998), but for management purposes, two separate stocks of northern fur seals are recognized within all U.S. waters: the Eastern Pacific stock, which includes breeding animals on the Pribilof and Bogoslof islands, and the California stock, which includes breeding animals on San Miguel and Farallon islands (Allen and Angliss 2015; Carretta *et al.* 2015). Stocks are based on the Dizon *et al.* (1992) phylogeographic approach using the following criteria:

- Distribution – continuous during non-breeding season and discontinuous during the breeding season, high natal site fidelity (Baker *et al.* 1995; DeLong 1982);
- Population response – substantial differences in population dynamics between Pribilof Islands and San Miguel Island (DeLong 1982; DeLong and Antonelis 1991; NMFS 1993);
- Phenotypic differentiation (Allen and Angliss 2015); and
- Genotypic differentiation – little evidence of genetic differentiation among breeding islands (Dickerson *et al.* 2010; Ream 2002).

The California stock is not affected by the proposed action and is not discussed further in this SEIS.

The Eastern Pacific stock of the northern fur seal ranges throughout the North Pacific Ocean from southern California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan. During the summer breeding season, most of the worldwide population is found on the Pribilof Islands and Bogoslof Island in the southern Bering Sea (Harry and Hartley 1981; NMFS 2007a), with the remaining population (as other stocks) breeding on islands in Russia, northern Japan, and on San Miguel Island off southern California (Lander and Kajimura 1982; NMFS 1993, 2007a). Nonbreeding northern fur seals may occasionally haulout on land at other sites in Alaska, British Columbia, and on islets along the west coast of the U.S. (Fiscus 1983). They are seasonal migrants, spending the winter and spring entirely at sea and the summer and autumn alternating between marine foraging and their breeding and

resting sites on islands. The Pribilof Islands provide terrestrial habitat for a significant portion of the population for reproduction and rest during the summer and autumn (Gentry 1998).

The life history, aspects of biology, and status of the northern fur seal has been discussed in previous environmental analysis pursuant to NEPA in regards to the Pribilof Island subsistence harvest regulations (2005; 2014a), research / reporting (NMFS 2007b; Call and Ream 2012; Testa 2012; Zeppelin *et al.* 2015; Joy *et al.* 2015; Skinner *et al.* 2014; Kuhn *et al.* 2014), and in the baseline information found in environmental analyses on the effects of the BSAI groundfish fisheries on Steller sea lions (NMFS 2001a, 2014). The most recent status information on the stock is in the 2014 Marine Mammal Stock Assessment Report (Allen and Angliss 2015). Relevant information from these documents is summarized in this chapter.

3.2.1. Population Size

Pribilof breeding colonies once comprised approximately 74% of the worldwide fur seal population (Fowler 1998; Gentry 1998). The decline of the Eastern Pacific stock has reduced its contribution to the worldwide population to 55% based on preliminary estimates from all breeding colonies in 2005 (NMFS 2007a).

The current population estimates for the Eastern Pacific stock are calculated by estimating the number of pups at rookeries and then multiplying by an expansion factor (4.5) that approximates a life table analysis for the remainder of the population (Angliss and Lodge 2002). The population estimate for the Eastern Pacific stock of northern fur seals is calculated as the estimated number of pups born at rookeries in the EBS, multiplied by a series of different expansion factors determined from a life table analysis to estimate the number of yearlings, 2-year-olds, 3-year-olds, and those 4 or more years old (Lander 1981). The expansion factor is based on a sex and age distribution that was estimated after the harvest of sub-adult males was terminated.

Pup production, the most accurate indicator of population size and trend, has been estimated since 1912. The majority of Eastern Pacific stock northern fur seal pups are born on the Pribilof Islands, and pup estimates have occurred biennially on St. Paul and St. George Islands since 1990; although less frequently on Sea Lion Rock (adjacent to St. Paul Island) and Bogoslof Island. NMFS has established consistent methods to improve the precision of those estimates (York and Kozloff 1987). Pup production estimates have generally decreased over the past 40 years. The most recent estimate for the number of fur seals in the Eastern Pacific stock, based on pup production estimates from Sea Lion Rock (2008), on St. Paul and St. George (average of 2008, 2010, and 2012), and on Bogoslof Island (2011), is 648,534 (4.47 × 145,086) (Allen and Angliss 2015). The St. Paul component of this stock is estimated at 410,496 (T. Gelatt, Pers. Comm. December 22, 2015).

3.2.1.1. Minimum Population Estimate

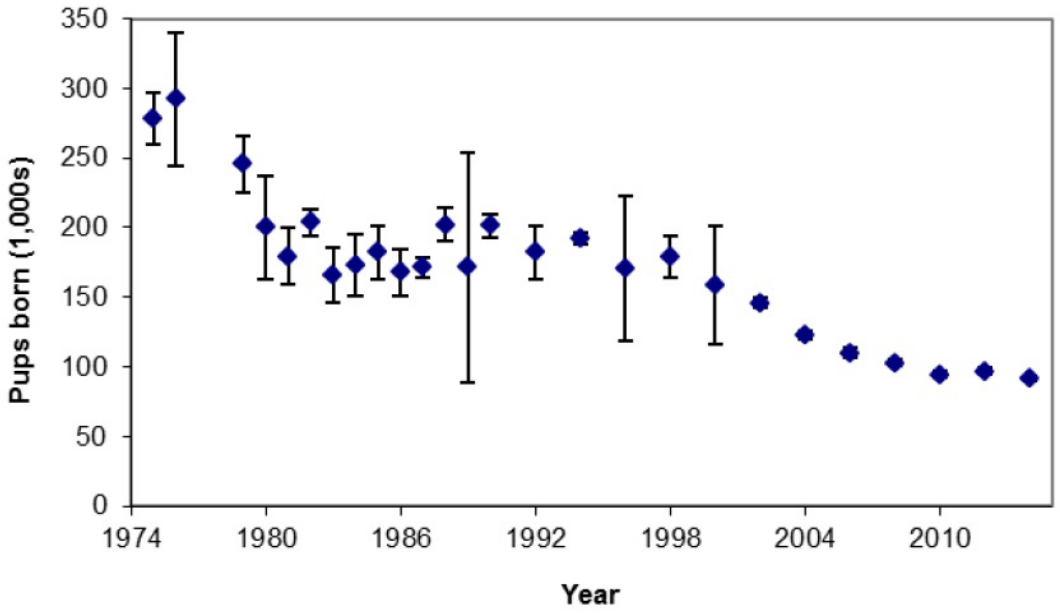
A coefficient of variation [CV(N)] that incorporates the variance of the correction factor is not available. Consistent with a recommendation of the Alaska Scientific Review Group and recommendations contained in Wade and Angliss (1997), a default CV(N) of 0.2 was used in the calculation of the minimum population estimate (N_{MIN}) for this stock (DeMaster 1998). N_{MIN} is calculated using Equation 1 from the PBR guidelines (Wade and Angliss 1997): $N_{MIN} = N/\exp(0.842\times[\ln(1+[CV(N)]^2)]^{½})$. Using the

St. Paul population estimate (N) of 410,496 and the default CV (0.2), N_{MIN} for the St. Paul northern fur seal population is 347,448 (T. Gelatt, Pers. Comm. December 22, 2015).

3.2.1.2. Current Population Trend

The estimated size of the Eastern Pacific stock of northern fur seals, after the end of commercial sealing on St. George and pelagic sealing, was approximately 1.25 million in 1974; commercial sealing was not terminated on St. Paul until 1984 (Allen and Angliss 2015). The St. Paul population decreased steadily as pup production declined at a rate of 7.8% per year between 1975 and 1981 (York 1987). Annual pup production on St. Paul Island appeared to stabilize between 1981 and 1996 (York and Fowler 1992); however, began to decline once more during the mid-1990s (York *et al.* 1997) (Figure 3.2-1). Between 1980 and 1998, the St. Paul Island population fluctuated between 35 - 45% of its peak numbers (Towell *et al.* 2006). Between 1998 and 2012, the St. Paul pup production continued to decline 4.84% per year (SE = 0.49%; $P < 0.01$); more recent estimates between 2012 and 2014 show continued decline of pup production on St. Paul (Allen and Angliss 2015; Towell *et al.* 2014). The ongoing decline in pup production at St. Paul is the determining factor for the overall low stock estimate (Allen and Angliss 2015).

Figure 3.2-1 St. Paul Island Pup Births by Year[1]



3.2.1.3. Current and Maximum Net Productivity Rates

The moratorium on the fur seal harvest and the termination of pelagic sealing resulted in a steady increase in the northern fur seal population during 1912 to 1924. During this period, the rate of population growth was approximately 8.6% (SE = 1.47) per year, the maximum recorded for this species (A. York *in* Allen and Angliss 2015). This growth rate is similar and slightly higher than the 8.1% rate of increase

[1] 2014 Northern Fur Seal Pup Production and Adult Male Counts on Pribilof Islands, Alaska Memorandum. Accessed from: http://www.afsc.noaa.gov/nmml/species/species_nfs.php

(approximate SE = 1.29) estimated by Gerrodette *et al.* (1985). Though not as high as growth rates estimated for other fur seal species, the 8.6% rate of increase is considered a reliable estimate of maximum potential population growth rate (or R_{MAX}) given the extremely low density of the population in the early 1900s (Allen and Angliss 2015).

3.2.2. Status of the Northern Fur Seal Under the MMPA

The MMPA states that marine mammal species, populations and/or stocks should not be permitted to fall below their optimum sustainable population (OSP) level (16 U.S.C. 1361(2))[2]. The maximum net productivity level (MNPL) is directly related to the OSP[3]. Historically, MNPL has been expressed as a range of values (generally, 50 to 70% of carrying capacity or K) determined theoretically by estimating the suitable stock size in relation to the original stock size (Fowler 1981). MNPL is an assessed range that will produce the maximum net increase in population[4].

The MNPL for marine mammals is at least 50% of carrying capacity (Eberhardt and Siniff 1977), and may be as high as 80% (Fowler 1981; 1988). In 1977, the mid-range value of 60% was used to determine if a stock of dolphins was depleted[5]. The 60% value was supported by NMFS[6] in the final rule governing the taking of marine mammals that are incidental to commercial fishing operations.[7] The lower bound of OSP for northern fur seals is also considered to be at 60% of K (Fowler 1981).

3.2.2.1. Depleted Determination

The MMPA defines the term "depletion" or "depleted" (16 U.S.C. 1362(1)) as meaning any case in which:

> *(A) the Secretary of Commerce, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under title II of this Act, determines that a species or population stock is below its optimum sustainable population; (B) a State, to which authority for the conservation and management of a species or population stock is transferred under U.S.C. 1379, determines that such species or stock is below its optimum sustainable population; or (C) a species or population stock is listed as an endangered species or a threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.).*

On 18 May 1988, NMFS declared the Eastern Pacific (St. Paul and St. George Islands) stock of northern fur seals depleted under the MMPA because it declined to less than 50% of population levels observed in

[2] The MMPA defines the OSP as " . . . with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the optimum carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element (16 U.S.C.1362(9))."

[3] MNPL is the greatest net annual increment in population numbers or biomass resulting from additions to the population from reproduction and/or growth losses from natural mortality

[4] *Federal Register* 42 FR 12010

[5] *Federal Register* 42 FR 64548

[6] NMFS regulations at 50 CFR 216.3 define OSP as " . . . a population size which falls within a range from the population level of a given species or stock which is the largest supportable within the ecosystem (K) to the population level that results in MNPL."

[7] *Federal Register* 45 FR 72178

the late 1950s[8]; at that time, there was no compelling evidence carrying capacity (K) had changed substantially since the late 1950s (50 CFR 216.15). The Pribilof Islands northern fur seal carrying capacity was estimated at 1.8 million (Kenyon *et al.* 1954) during the depleted listing[9].

The Secretary of Commerce was directed to develop a conservation plan on northern fur seals for "conserving and restoring the species or stock to its optimum sustainable population" on November 23, 1988 (P.L. 100-711). The MMPA amendments further stipulated that the plan must include information on the status of fur seals on the Pribilof Islands, possible causes of declines, threats to the species, critical information gaps, and research and management recommendations for meeting the objectives of the plan.

NMFS first published a conservation plan for the northern fur seal stock of the Pribilof Islands in 1993. NMFS then drafted a revised Northern Fur Seal Conservation Plan in 2007 to accommodate changes to:

- The 1994 NMFS redefinition of the Pribilof Islands population as the Eastern Pacific stock to include the new population on Bogoslof Island identified as separate from those populations on islands in the western Bering Sea, Sea of Okhotsk, and Pacific Ocean;
- Numerous changes in management structure, including the development of agreements with Alaska Native Organizations for co-management of subsistence use of marine mammal species used by Alaska Natives for subsistence; and
- New information regarding aspects of the ecology of northern fur seals.

NMFS determined that the decline of fur seals was attributed to the continued harvest of adult females from 1956 to 1968, and to the lower survival of sub-adults and adult females at sea since 1975. Between 1970 and 1982, the increased rates of entanglement in marine debris resulted in additional mortality of 2- to 5-year-old male fur seals (NMFS 2007a). Significant correlations between the sub-adult male entanglement rate and rate of change in pup production have been reported by Fowler (2002) and may have contributed significantly to declining trends of the population during the late 1970s. NMFS determined that emigration was not a contributing factor to the decline of the Eastern Pacific stock as the species had declined in total numbers throughout its range.

The 2007 Conservation Plan delineates reasonable actions necessary to promote recovery of the depleted Eastern Pacific stock of northern fur seals. NMFS developed a conservation strategy within the plan to guide federal and other actions towards the goal of recovering this stock of northern fur seals. The objectives of the conservation strategy identified in NMFS (2007a) are to:

- Identify and eliminate or mitigate the cause or causes of human related mortality of the Eastern Pacific stock of northern fur seals;
- Assess and avoid or mitigate adverse effects of human related activities on or near the Pribilof Islands and other habitat essential to the survival and recovery of the Eastern Pacific stock of northern fur seals;

[8] *Federal Register* 53 FR 17888

[9] *Federal Register* 51 FR 47156

- Continue and, as necessary, expand research or management programs to monitor trends and detect natural or human-related causes of change in the northern fur seal population and habitats essential to its survival and recovery; and
- Coordinate and assess the implementation of the Conservation Plan, based on implementation of conservation actions and completion of high priority studies. This plan was developed through the co-management process and reflects the ongoing commitment by the Tribal Governments of St. Paul and St. George Islands, and NMFS, to work cooperatively to manage, conserve and protect the northern fur seal on the Pribilof Islands.

The goal of the Conservation Plan will be met when the population of northern fur seals has increased to the level in which it can be removed as depleted under the MMPA designation. The Eastern Pacific stock of northern fur seal is also classified as a strategic stock[10] under the MMPA because of its designation as depleted. The northern fur seal is not listed as threatened or endangered under the Endangered Species Act (ESA) of 1973.

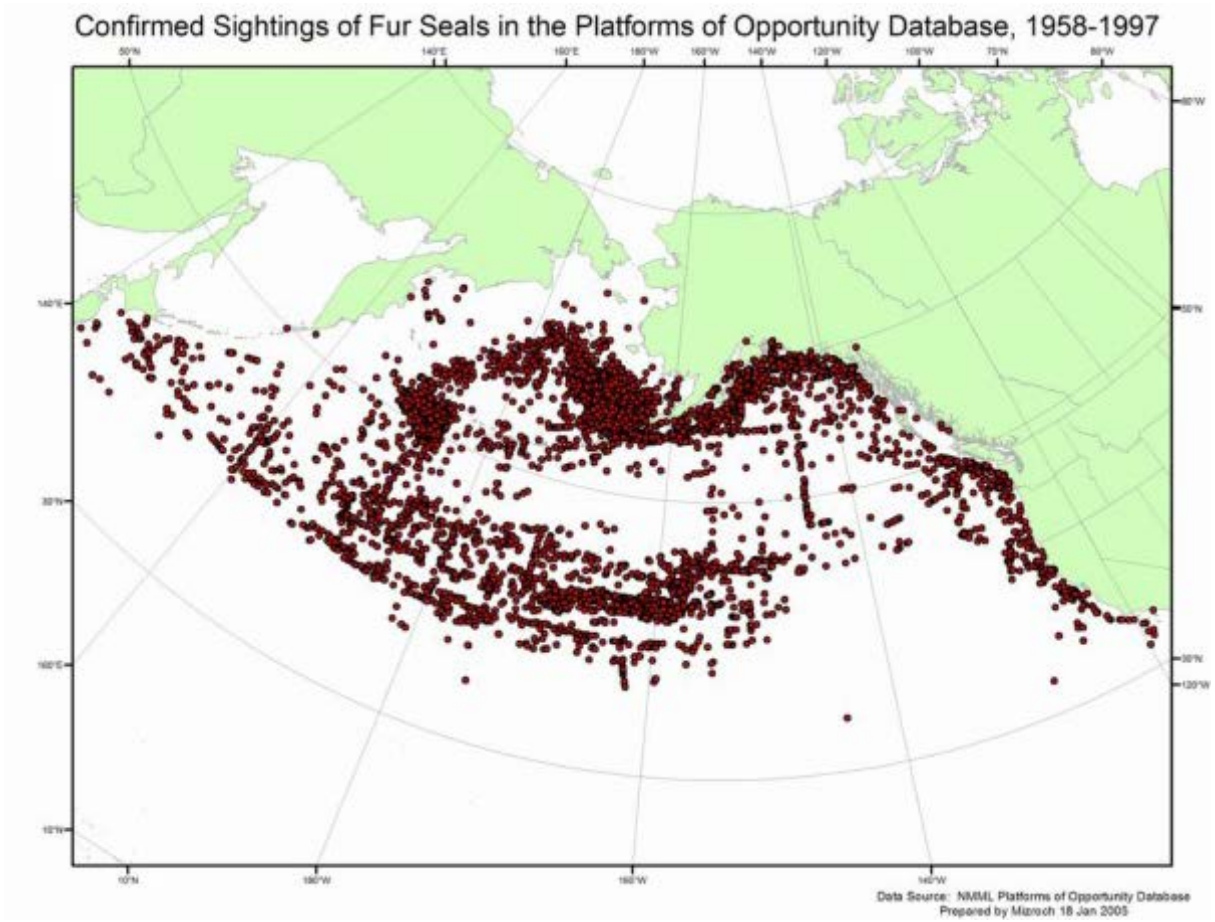
3.2.3. Northern Fur Seal Behavior and Biology

The Pribilof Islands are vital terrestrial habitat for the majority of the Eastern Pacific stock because of how essential they are for pupping, mating, and rearing of pups. Aleutian Island passes are also important and are used by a majority of the Eastern Pacific stock during their annual migration between the Bering Sea and North Pacific Ocean (Bigg 1990; Ragen *et al.* 1995). The importance and extent use of specific passes is not well known save for Unimak Pass, which is a known primary migration corridor. However, it has been documented that these passes are used at least twice each year as seals move into and out of the Bering Sea for the summer breeding season (NMFS 2007a).

Multiple sources of information have provided at-sea information including sighting data collected from 1958 to 1997 (Figure 3.2-2), bycatch data on fur seals collected from June through September (Loughlin *et al.* 1983), and telemetry data (Loughlin *et al.* 1987; Goebel *et al.* 1991; Loughlin *et al.* 1999; Robson 2001; Sterling and Ream 2004; Ream *et al.* 2005). At-sea data have revealed that: 1) the surrounding summer and fall feeding grounds extend out to at least 200 to 300 km from the islands and are important for lactating females (Loughlin *et al.* 1987; Goebel *et al.* 1991; Robson 2001; Robson *et al.* 2004); and 2) sub-adult male fur seals forage out to mean maximum straight-line distances about 367 km (range 171 to 680 km) from the islands during the summer (Sterling and Ream 2004).

[10] The MMPA, Section 3 (19) defines the term "strategic stock" as a marine mammal stock— (A) for which the level of direct human-caused mortality exceeds the PBR level; (B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA of 1973 [16 U.S.C. 1531 et seq.] within the foreseeable future; or (C) which is listed as a threatened species or endangered species under the ESA of 1973 (16 U.S.C. 1531 et seq.), or is designated as depleted under this chapter.

Figure 3.2-2 Distribution of all northern fur seal sightings in the North Pacific Ocean and Bering Sea based on observations in the NMFS platforms of opportunity sighting database 1958-1997 (NMFS 2007a)



The sub-polar continental shelf and shelf break from the Bering Sea to California have been identified as feeding grounds for fur seals while at sea. It has been suggested that fur seal densities in the open ocean are highly correlated with major oceanographic frontal features such as currents, seamounts, valleys, canyons and along the continental shelf break (Lander and Kajimura 1982; Kajimura 1984; Loughlin *et al.* 1999; Sterling *et al.* 2014). Biological and physical oceanographic factors may be attributed to the concentration of prey species in theses geographical areas (Sinclair 1988; Sinclair *et al.* 1994; Sterling *et al.* 2014). The subarctic-subtropic transition zone in the North Pacific has been identified as a physical barrier delineating the range of fur seal prey; which in turn bounds the pelagic distribution of fur seals in the North Pacific Ocean (Sinclair 1990; Ream *et al.* 2005).

3.2.3.1. Fur Seal Site Fidelity and Philopatry

The northern fur seals breeding on St. George, St. Paul, and Bogoslof islands have been delineated by NMFS as the Eastern Pacific stock (NMFS 2007a). Subsistence harvest regulations acknowledge the independence of the islands for management purposes; this decision was based in large part on site fidelity and philopatry, and other aspects of behavioral ecology.

Northern fur seals are extremely site tenacious, having colonized only two new central breeding sites (Bogoslof Island and San Miguel Island) during the past 200 years (Peterson 1968; Loughlin and Miller 1989). By the turn of the 19th Century, pelagic sealing extirpated northern fur seals from 18 of the 31 central breeding areas known at that time. Only two of those breeding locations have been recolonized (Busch 1985; Lander 1981); however, none have been recolonized on the Pribilof Islands. Female fur seals exhibit stronger site fidelity than males (Baker *et al.* 1995); site fidelity may be a determining factor in the lack of recolonization of those sites.

The reasons for limited northern fur seal colonization and re-colonization stem from their strong behavioral tendencies for site fidelity (the seals return to the same site year after year) and philopatry (male and female seals return to the site of their birth, year after year) (Gentry 1998). Gentry (1998) examined the factors influencing northern fur seal site fidelity and philopatry and determined that it is dependent on: 1) early life experience; 2) neonates attachment to a site during the first 30 days of life; 3) suckling; and 4) having contact with peers during similar life stages.

Gentry's studies indicated that females will not colonize a site without the presence of other females, and males show up at a site very quickly when females are present. Baker *et al.* (1995) found that sub-adult northern fur seals show increased precision in their tendency to return to their birth-site as they age, and that females land on their natal-site at a younger age than males. Gentry (1998) found that female northern fur seals gave birth and suckled at sites within 8.3 meters (m) of each other along the shore, and less than 1% of the 1,541 adult males observed during this study moved their territories more than 10m during their breeding tenure (Gentry 1998).

Baker *et al.* (1995) examined the commercial harvest and female culling program data and found that, for tagged females that were breeding for the first time, 84% were killed at their natal breeding area or adjacent hauling grounds within an island. Baker *et al.* (1995) also reported the homing rate for tagged females harvested from the breeding grounds was 92% or greater for all age classes. That is, more than 90% of breeding females returned to the site where they were born to breed. All of these rates may be underestimates because of the propensity of females to make brief visits to breeding areas other than their parturition site (Gentry 1998). Baker *et al.* (1995) also reported 73 to 84% of tagged 5-year-old male fur seals were first recaptured at their natal breeding area within an island after being tagged as pups. These rates are probably underestimates as well. For tagged sub-adult males captured more than once within a summer, the likelihood of observing an animal at its natal breeding area within an island increased significantly with time between captures. Eleven (11) days or more after the first capture, 100% of 5-year-old sub-adult males were found and recaptured at their natal breeding area within an island.

Although the Eastern Pacific stock is identified as a single unit, island-specific population trends on St. George, St. Paul, and central breeding areas, show significantly different trajectories and timing of changes in abundance (Johnson *et al.* 2013). Data for fur seals on each island also clearly indicate separate marine foraging areas (Robson *et al.* 2004; Sterling and Ream 2004) suggesting independence between the breeding islands and the areas within islands.

NMFS considers these data and results strong evidence for limiting the Action Area of this NEPA analysis of the effects to the northern fur seals and the human environment to include only St. Paul Island. The philopatry and other behavioral tendencies exhibited in northern fur seals indicates that subsistence harvest activities associated with northern fur seals on St. Paul Island will most likely only impact those

fur seals breeding and resting on St. Paul Island. NMFS has not identified any evidence to indicate the subsistence harvest on the Pribilof Islands or other islands where there have been harvests has affected fur seal behavior on St. Paul Island. This is consistent with the decision in NMFS (2014a) to limit the action area in that review of the fur seal harvest to only St. George Island.

3.2.4. Annual Cycle and Migration Patterns

The northern fur seal annual cycle is highly stable. During the winter, the southern limit of their range extends across the Pacific Ocean from southern California to the Okhotsk Sea and Honshu Island, Japan (Kajimura and Loughlin 1988) (Figure 3.2-3). Northern fur seals return to their breeding islands in the spring of each year from their pelagic winter foraging. On the Pribilof Islands, fur seals arrive in descending order by age, beginning in early May (Bigg 1990, 1990; Fiscus 1978; Fowler 1998). Adult males arrive first and establish territories on the breeding rookeries. The youngest males (*i.e.*, 2-year olds) may not return to the breeding areas until mid-August (Bigg 1990). Some yearlings arrive as late as September or October; however, most remain at sea.

The older pregnant females arrive on island from the North Pacific about mid-June; the peak of pupping occurs in early July. Approximately 7 to 8 days after giving birth, lactating females begin a series of foraging trips to sea alternating with 1 to 2 days on land to nurse their pups (Gentry and Holt 1986). Pups are weaned in October and November, at about 125 days of age, and go to sea soon afterward (Gentry and Holt 1986). All pups have departed by early December (Ragen *et al.* 1995; Goebel 2002; Baker 2007). Pups generally migrate from the Pribilof Islands through the Aleutian Islands within 3 weeks (Ragen *et al.* 1995; Baker 2007). After pupping, mating, and weaning of pups, adult females from the Pribilof Islands migrate south through passes in the Aleutian Islands into the North Pacific Ocean (Ream *et al.* 2005).

After departing the island most females, pups, and sub-adults enter the North Pacific Ocean where they occupy coastal waters of British Columbia, Washington, Oregon, and California, and pelagic waters of the North Pacific transition zone. Older males appear to remain in the northern part of the range (Loughlin *et al.* 1999), while young males and females of all ages spend the winter feeding in the southern part (Ream *et al.* 2005). The northward migration begins in March. This migration brings the animals back to the breeding colonies where the cycle is repeated.

3.2.4.1. Presence of Fur Seals in the Bering Sea (January – May)

Northern fur seals are exclusively pelagic during their winter migration, and rarely haulout on land. Migration out of the Bering Sea allows fur seals to avoid low water temperatures and seasonal sea ice and maintain close proximity to prey resources (Bigg 1990). Most northern fur seals leave the Bering Sea during the winter (Bigg 1990; Loughlin *et al.* 1999; Ream *et al.* 2005); however, sub-adult and adult males, can sometimes be found nearshore and onshore of St. Paul Island (P. Lestenkof, Pers. Comm. January 8, 2016). Environmental observations between January and May 2000 to 2015 systematically collected by the Island Sentinel Program on St. Paul Island are provided in Table 3.2-1. The Island Sentinel Program is a citizen science program with dedicated wildlife management staff from the ACSPI Tribal Government. The information in Table 3.2-1 provides sightings by region on St. Paul and position (land/water). Empty cells do not necessarily mean “no-detections” or absence of fur seals, but relate to the inability to access the site during a particular month or time period. Observations from St. Paul indicate

fur seals occur generally in small numbers during all months (P. Lestenkof, Pers. Comm. November 16, 2015). Sighting of northern fur seals during the winter near St. Paul is opportunistic.

Table 3.2-1 Total St. Paul Fur Seal Winter Observations Compiled from 2000 to 2015

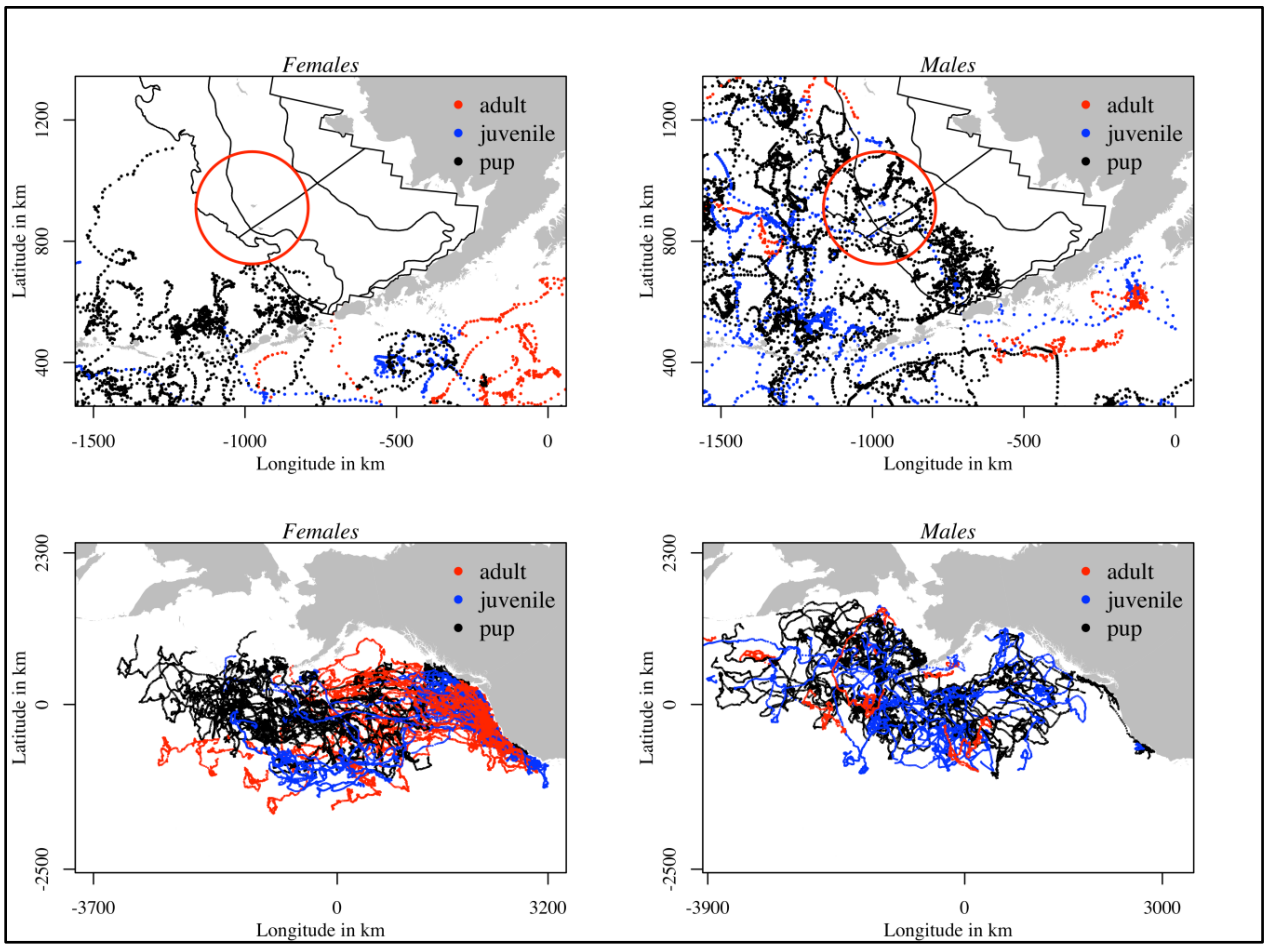
Location	January	February	March	April	May	Total Observed
Northeast Point	15	--	1	--	235	**251**
Reef	55	45	13	262	154	**529**
Tolstoi/Zapadni	220	4	--	14	212	**450**
Polovina	--	--	1	2	17	**20**
Southwest Point	--	--	2	--	3	**5**
Village Cove	--	--	--	1	5	**6**
Lukanin/Kitovi	--	--	--	--	18	**18**
Total Observed	**290**	**49**	**17**	**279**	**644**	**1,279**

Figure 3.2-3 depicts tagged locations for northern fur seals during the winter (January – May) in the Bering Sea. Dots represent a location and an individual fur seal may have multiple locations (dots). The data represents a total of 167 female tag deployments that occurred from 2003 to 2010, and includes more than 68,000 locations at sea; a total of 93 male tag deployments that occurred from 1992 to 2010, which includes 42,000 locations. Females are represented by 78 adults, 32 1- or 2-year-olds, and 57 pups. Males are represented by 10 adults, 22 1- or 2-year-olds, and 61 pups. Animals were tagged at St. Paul, St. George, and Bogoslof and subsequently tracked January through May. The data indicate that some females are present in the Bering Sea during the winter, the majority of these females are pups, and the closest location with respect to the Pribilof Islands was a female pup just over 100 nm away (NMFS unpublished, R. Ream, Pers. Comm. December 18, 2015). In summary:

1. Based on tagging data, there is a relatively low number of fur seals in the Bering near the Pribilof Islands from January through May;
2. Animals that are in the Bering Sea and near the Pribilof Islands between January and May are primarily males; and
3. No females were located within 100 nm of St. Paul between January and May, only males.

In 2015, NMFS tagged female pups at four different rookeries on St. George Island. The mean distances traveled at sea on a daily basis from their natal rookery ranged from 0.97 km to 2.07 km. NMFS recorded a maximum distance of 43 km and average maximum daily distance of 20.86 km. These data indicate that pups travel significant distances and support results published in Baker and Donahue (2000) that pups have been documented to spend an average of 35% of their time at sea in October, with at-sea trips lasting up to 16 hours. The longer trips reported by Baker and Donahue (2000) likely correlate to distances of approximately 20 km or more (NMFS unpublished data).

Figure 3.2-3 Location of Northern Fur Seals during the Winter in the Bering Sea[11]



● Black dots = Pups; ● Blue dots = Yearlings; and ● Red dots = Adults.
Pribilof Islands are circled with a ring of 100 nautical miles (nm) diameter.

3.2.5. Emigration and Immigration

Fur seals emigrate from the Pribilof Islands breeding population; however, these rates do not account for the decline observed on the Pribilof Islands during the 1960s and 1970s (York 1987b; Loughlin *et al.* 1994). Harvest records indicate that less than 1% of northern fur seals taken on the Pribilof Islands originated from other islands in the North Pacific Ocean (Lander and Kajimura 1982). Movements from the Pribilof Islands population to other areas have been documented range-wide; northern fur seals re-colonized San Miguel Island, California Channel Islands, in the 1950s or early 1960s. This small breeding population steadily increased 46% annually from 1969 to 1978 (DeLong 1982). Some of this rate increase was also attributed to immigration of females from Russia's Robben Island, and the Commander Islands (DeLong 1982; Antonelis and Delong 1985).

From 1976 to 1981, small numbers of fur seals were observed on Bogoslof Island (Loughlin and Miller 1989). Pups were first seen on Bogoslof Island in 1980 (Lloyd *et al.* 1981). Ream *et al.* (1999) reported

[11] J. Sterling Personal Communication January 2016.

pup production increased at 58% per year between 1988 and 1997. In 2005, the Bogoslof Island population continued significant growth, greatly influenced by immigration, probably from the Pribilof Islands (Ream *et al.* 1999).

3.2.6. Reproductive Ecology

Northern fur seals occupy terrestrial habitat during a 6-month period, exhibit natal site fidelity (Baker *et al.* 1995) and segregate into distinct central breeding and resting areas (Gentry 1998). Individual seals, however, are present on land for only a fraction of the time during this entire period (mid-May through November). Pregnant females arrive on land beginning in mid-June and intermittently depart for multiple days to forage. Individual lactating females typically occupy terrestrial sites on the Pribilof Islands for on average 38 days per year; non-lactating females occupy terrestrial sites for fewer days per year (Gentry 1998). Females tend to use a small (less than 20-m diameter) subarea of their central breeding area to minimize interactions with males and maximize proximity to other females (Gentry 1998). Non-breeding males typically occupy inland resting areas that are significantly larger than nearby breeding areas (Gentry 1981).

Northern fur seals are highly polygynous resulting in a few adult males dominating insemination of reproductively active females (Gentry 1998). One way to quantify the level of polygyny is by calculating the ratio of annual pup production to the number of harem males in the same year. This method is biased lower than actual polygyny, in that it does not account for the percentage of non-pregnant females in the population, but it is a reasonable index to show that excess males are in the population at all locations regardless of group size. Adult males are counted annually. NMFS categories for the adult male fur seal counts are: territorial with females, territorial without females, and non-territorial (Antonelis 1992). Numbers of harem males are highly correlated with the number of pups born (York *et al.* 2002). Smith and Polacheck (1984) reported the average annual ratio of 20 to 260 pups/adult harem male, indicating very few adult males are required to maintain adequate pregnancy rates across the various breeding areas.

Male fur seals become sexually mature at about 6 years old based on testicular development (Scheffer 1950). Male fur seals begin competing for territories at 7 to 9 years old, but most are not successful (*i.e.*, do not retain females in their territories) until 10 years of age (Johnson 1968; Gentry 1998). Adult males arrive on island in mid-May; and those that defend territories remain until early August while fasting (Gentry 1998). On average, territorial males are only capable of competing for breeding opportunity for 1.5 seasons before they are deposed by new males (Gentry 1998). Only 40% to 50% of adult males counted during the surveys in early July account for the vast majority of successful breeding (*i.e.*, percent of territorial males with females/total number of adult males counted). Most adult males do not successfully defend territories or have breeding opportunities, but instead spend time on the periphery of the breeding areas (where they are counted) or at sea (where they are not counted) annually. Recent fur seal population modeling suggests the surveys underestimate the number of adult males in the breeding population; that many more (85% to 95%) adult-aged males may exist in the population than are counted annually (Towell 2007).

Most females become sexually mature between 4 and 7 years of age (average about 5) (York 1983) and are known to be reproductive up to at least 23 years of age (Lander 1981). Pregnant females begin to arrive in mid-June; non-pregnant adult females arrive later (Bartholomew and Hoel 1953; Gentry and

Holt 1986; Gentry 1998). Early July is the peak arrival period for pregnant females; numbers of new arrivals progressively decline through August (Gentry and Holt 1986; Gentry 1998). Females give birth to a single pup within 2 days of arriving on shore, and mate 3 to 8 days after parturition (Petersen 1968; Gentry and Holt 1986; Gentry 1998). Delayed implantation of the blastocyst typically occurs in mid-November (York and Scheffer 1997). Foraging trips undertaken by lactating females range between 3 to 10 days, after which they return to nurse their young during 1- to 2-day visits at the rookery. Upon the female's return from foraging, mothers reunite with their pup utilizing vocal recognition (Insley 2000).

The young-rearing season extends from late June through early December (about 160 days), although mothers are on shore for roughly 38 days in totality (Gentry 1998). Offspring are weaned at about 125 ± 10 days old (Gentry and Holt 1986; Goebel 2002). Offspring begin swimming at about 26 days of age, spend a substantial amount of time in the water by 40 to 50 days of age, and by 100 days old are making shallow dives for short durations (Baker and Donohue 2000).

While still dependent on their mother's milk, pups have molted into their adult fur at approximately 100 days old (Scheffer and Wilke 1953). Offspring of the year exhibit a crepuscular activity cycle, and increasingly spend about one third of their activity budget in the water as they approach weaning (Baker and Donohue, 2000). Weaning is abrupt, and offspring begin leaving the Pribilof Islands between late October and early November; average departure dates are in mid-November and pup exodus is complete by early December (Ragen *et al.* 1995; Goebel 2002; Baker 2007; Lea *et al.* 2009). Most females, pups, and sub-adults leave the Bering Sea by late November and migrate south as far as Southern California in the eastern North Pacific and Japan in the western North Pacific. They remain pelagic offshore and along the continental shelf until March, when they begin returning to the rookeries. Adult males are believed to migrate only as far south as the Gulf of Alaska (GOA) (Kajimura 1980, 1984). Migrating seal pups are widely dispersed by the time they reach the Aleutian Islands (Ragen *et al.* 1995; Baker 2007; Lea *et al.* 2009). Weaned offspring remain at sea in the North Pacific Ocean (Lea *et al.* 2009) for about 22 months before returning to their islands of birth as 2-year-olds. A small proportion of 1-year-old fur seals may return to the Pribilof Islands each year from October to December (Bigg 1990).

3.2.7. Diet of Northern Fur Seals

All methods of analysis to estimate prey species and composition in pinniped diets are limited by some form of bias (Sinclair *et al.* 2000; Bowen *et al.* 2001; Tollit *et al.* 2004; Yonezaki *et al.* 2003, 2005). Studies on northern fur seal diets began with the work of Lucas (1899). In general, northern fur seals forage on a variety of fish species and gonatid squid; prey species and concentrations eaten are contingent on location and season (Kajimura 1984; Sinclair *et al.* 1994; Antonelis *et al.* 1997; Ream *et al.* 2005). Walleye pollock (or pollock), squid, and bathylagid fish (northern smoothtongue, *Leuroglossus schmidti*) were the predominant prey of fur seals in the Bering Sea during the first half of the 20th Century (Scheffer 1950) and continue to be important (Lowry *et al.* 1982, 1989; NMFS 2001a; Joy *et al.* 2015). The most extensive research on prey composition was based on the pelagic sampling of more than 18,000 fur seals between 1958 and 1974 (Perez and Bigg 1986). Of the fur seal stomachs collected, 7,373 contained identifiable prey items and an additional 3,326 had trace remains. The diet consisted of 67% fish (*i.e.*, 34% pollock, 16% capelin, 6% Pacific herring, 4% deep-sea smelt and lantern fish, 2% salmon, 2% Atka mackerel, and no more than 1% eulachon, Pacific cod, rockfish, sablefish, sculpin, Pacific sand lance, flatfish, and other fish) and 33% squid (Perez 1990).

Based on research, prey composition has changed over time; prey items, such as capelin, have disappeared entirely from fur seal diets in the EBS and squid consumption has been markedly reduced (Sinclair *et al.* 1994; Sinclair *et al.* 1996; Antonelis *et al.* 1997). Concurrently, pollock consumption has tripled. Studies show that as consumptive rates on pollock has increased, the age class targeted by feeding fur seals has decreased. Pollock is particularly important around the Pribilof Islands and other inshore areas from July to September. Consumption of pollock, squid, and smelt in the EBS has remained consistently important in all diet studies, despite the wide variety of prey available to fur seals within their diving range, and account for about 70% of the energy intake (NMFS 2007a; Joy *et al.* 2015).

Sinclair *et al.* (1994) reported that fur seal stomachs and gastrointestinal tracts, collected during pelagic studies conducted during the 1980s in the EBS, contained mostly sub-adult walleye pollock from the age-0 group (65%) or from the age-1 group (31%), while only 4% were from the age-2 group and older. The percentage of the various age groups of walleye pollock consumed by fur seals varied among years and was apparently a reflection of differences in the strengths of year classes before and during the course of the study. Adult walleye pollock were most frequently found in the stomachs of fur seals collected over the outer domain of the continental shelf, while sub-adult pollock were found in fur seals collected both over the mid-shelf and outer domain. Atka mackerel (*Pleurogrannus monopterygius*) was found only in fur seals collected over the outer shelf domain north of Unimak Island. Northern smoothtongue and gonatid squid were the dominant species found in stomach samples collected over continental slope and oceanic waters (Sinclair *et al.* 1994). Herring, eulachon, and capelin were largely absent from fur seal diets in the Bering Sea during the 1980s (Sinclair *et al.* 1994). Sinclair *et al.* (1996) reported that sub-adult pollock was the predominant prey found in scat of Pribilof Island fur seals from 1987 to 1990.

A comparative study of fur seal diets based on the current method of scat analysis versus stomach content analysis from the 1980s collections (Sinclair *et al.* 1996) demonstrated that pollock represented 79% of all prey for all years combined in gastrointestinal tracts, and 78% of the total prey in fecal samples. The frequency of pollock occurrence in all years averaged 82% in gastrointestinal tracts and 76% in fecal samples (Sinclair *et al.* 1996). Diet composition of lactating adult females breeding on the Pribilof Islands continues to be dominated by walleye pollock (Gudmundson *et al.* 2006; Call *et al.* 2008; Call and Ream 2012; Joy *et al.* 2015). Walleye pollock was the principal prey identified by Goebel (2002) using fatty acid signature analysis on milk from lactating females to examine dietary shifts related to changes in physical oceanography, dive pattern, and foraging location in female northern fur seals during 1995 to 1996.

In a recent survey of mesopelagic nekton in the slope and oceanic waters of the southeastern Bering Sea, Sinclair and Stabeno (2002) reported that as a family, the bathylagids were the dominant group throughout the water column and that nearly half of the total catch weight values were comprised of northern smoothtongue.

Antonelis *et al.* (1997) examined scats collected at rookeries during the breeding season to compare prey species taken by female northern fur seals on St. Paul and St. George Islands with those taken at Medny Island (Russia). Sub-adult walleye pollock was the most common prey of fur seals on St. Paul Island; a combination of walleye pollock and squid was consumed by seals on St. George Island; and gonatid squid, was the primary prey consumed on Medny Island. The reasons for these differences were apparently related to the physical and biological environment surrounding each island.

The variability in foraging locations result in significant differences in diet (Zeppelin and Ream 2006; Zeppelin and Orr 2010). Studies show that although pollock was the most frequent item found in scat from both St. Paul and St. George Islands, squid occurred more frequently in the diet of fur seals from St. George (Robson 2001; Antonelis *et al.* 1997). Studies indicate that fur seals from St. George Island consume pollock, squids, salmon, and northern smoothtongue most frequently, while St. Paul Island fur seals consume more pollock and fewer salmon and off-shelf prey. The diet of adult females breeding on Bogoslof Island includes off-shelf prey such as Gonatid squid and northern smoothtongue, but also includes Atka mackerel, pollock, capelin, eulachon, and herring (Zeppelin and Orr 2010). Zeppelin and Ream (2006) used cluster analysis on the frequency of occurrence of primary prey by rookery. Their results support the hypothesis of foraging habitat partitioning by central breeding area (Robson *et al.* 2004; Sterling and Ream 2004), and also provide evidence that groups of breeding areas may better distinguish the scale of partitioning. Foraging trip location and partitioning by island and breeding areas are described further in the next section.

Data show marked seasonal and geographic variation in the species consumed by northern fur seals (Kajimura 1984; Sinclair *et al.* 1994; Ream *et al.* 2005). During the summer, adult female (Robson *et al.* 2004; Kuhn *et al.* 2010; Gentry 1998; Loughlin *et al.* 1987) and sub-adult male fur seals (Sterling and Ream 2004) forage at sea, returning to St. Paul, St. George and Bogoslof islands intermittently throughout the summer and autumn. Fur seal foraging locations and trip durations during the summer and autumn vary significantly by both island (Kooyman *et al.* 1976; Antonelis *et al.* 1997) and rookery (Robson, *et al.* 2004; Sterling and Ream 2004; Call *et al.* 2008; Kuhn *et al.* 2014).

3.2.7.1. Diving Behavior, Trip Duration and Distance Associated with Foraging

While in the Bering Sea from October to January, adult male fur seals forage in areas associated with the outer domain of the continental slope, including those northwest of the Pribilof Islands on the continental shelf in water ranging from 100 to 250 m in depth. Relatively little time is spent foraging in deep water (>1,000 m) or shallow water (<100 m) (Loughlin *et al.* 1999). A study conducted by Benoit-Bird *et al.* (2013) shows that despite having a varied diet, fur seal foraging paths are defined by juvenile pollock aggregations.

A number of studies have found Bogoslof Island fur seal swim shorter foraging trips both temporally and spatially relative to St. Paul Island animals (Banks *et al.* 2006; Nordstrom *et al.* 2013). In addition, fur seals from different islands, and even from different rookeries on the same island, are known to segregate spatially during foraging trips (Robson *et al.* 2004; Kuhn *et al.* 2014a). Finally, it has also been shown that northern fur seals respond to oceanographic and environmental features such as eddies, fronts and thermoclines that are presumed to concentrate prey (Sterling 2009; Nordstrom *et al.* 2013; Pelland *et al.* 2014; Sterling *et al.* 2014). Fur seals from the different islands and rookeries have different diets and foraging patterns at certain scales, showing that they respond to habitat differences.

Satellite telemetry studies have revealed male fur seals from the Pribilof Islands have trip durations ranging from 8.7 to 28.8 days with trip distances from 171 to 681 km (Sterling and Ream 2004). Diving behavior tends to reflect patterns associated with different bathymetric domains (Zeppelin and Orr 2010; Kuhn *et al.* 2010): in water ~3,000 m deep, fur seals commonly exhibited shallow nighttime diving, whereas deeper diving was typically observed in <200 m deep waters. The study also suggests that sub-

adult male fur seals forage at greater maximum distances from the island of departure than lactating females (Sterling and Ream 2004).

Two similar diving patterns have been described for female northern fur seals from St. Paul during the breeding season: 1) deep-diving that occurred at all hours of the day over the continental shelf in water less than 200 m depth; and 2) shallow-diving that occurred primarily at night over deep water (Goebel *et al.* 1991; Zeppelin and Ream 2006; Zeppelin *et al.* 2015). Data show shallow divers forage more frequently at night and make more dives per foraging trip than deep divers. Fur seals forage for gonatid squid and deep-sea smelt while in deep water beyond the continental shelf. These prey species exhibit diel vertical migration and can be found at relatively shallow depths at night, which may in part explain the diving pattern data. There is currently no information to suggest one diving strategy (shallow) is better than the other (deep). Costa and Gentry (1986) reported that although shallow-diving female fur seals exhibited higher food consumption when compared to deep-diving seals, deep-diving seals gained similar body mass during a feeding trip, suggesting that their prey is of higher energy content than that of shallow divers. Goebel *et al.* (1991) further reported that deep divers expend less energy than shallow divers (because they have fewer dives) and apparently obtain greater energy per dive (because the food source has higher energy content).

Nordstrom *et al.* (2012) study indicates that foraging habitats of lactating northern fur seals are structured by thermocline depths and sub-mesoscale fronts in the EBS. Nordstrom *et al.* (2012) found a difference in the duration and distance of foraging trips between females from St. Paul (located on the shelf) and Bogoslof Island (located off the shelf in deeper oceanic waters), suggesting that prey are more diffuse near St. Paul Island. Foraging hotspots were found to be linked to thermocline depth and occurred near sub-mesoscale surface fronts (eddies and filaments).

St. Paul fur seals were discerned to mix epipelagic (night) and benthic (day) dives; primarily foraging on-shelf in areas with deeper thermoclines that may concentrate prey closer to the ocean floor. Strictly epipelagic (night) foragers, Bogoslof fur seals, tended to use waters with shallower thermoclines that may have aggregated prey closer to the surface. Female fur seals from St. Paul Island traveled >100 km and extended some trips off-shelf to the basin to forage at similar oceanographic features found near Bogoslof Island fur seal foraging areas. The relative distribution and accessibility of prey-concentrating oceanographic features can account for the observed differences in interisland foraging patterns (Nordstrom *et al.* 2012).

A female fur seal tracked by Goebel *et al.* (1991) fed as far as 160 km to the northwest, southwest, and south of St. Paul Island. Loughlin *et al.* (1987) followed adult female fur seals equipped with radio transmitters and found that some had round-trip foraging trips of more than 400 km and one had a round trip of 740 km. Robson (2001) used satellite telemetry to compare feeding locations of 97 lactating female fur seals on St. Paul and St. George Islands and reported a strong tendency for separation of foraging areas by breeding location on the islands. Females from St. Paul Island dispersed in all directions except southeast, where St. George Island females foraged. Likewise, Kuhn *et al.* (2010, 2014) found that less than 8% of foraging females from St. Paul rookeries foraged in areas used by female fur seals from St. George Island. Foraging locations were also separated for female fur seals departing from different groups of rookeries on St. Paul Island. Zeppelin *et al.* (2015) predicted foraging habitat of adult female

seals based on modeled stable isotope ratios and concluded similar foraging habitat partitioning when using satellite telemetry.

Winter foraging areas are suspected to vary geographically. Ream *et al.* (2005) showed that female fur seals are closely associated with eddies (Sterling *et al.* 2014), the subarctic-subtropical transition region, and areas that undergo coastal mixing from the California Current during the winter and spring. Ream *et al.* (2005) also indicated that fur seals may cue on a variety of oceanographic features thereby reducing energetic expenditures and optimizing foraging (Sterling *et al.* 2014). The transition zone may bound the pelagic distribution of fur seals in the North Pacific Ocean on the south between subarctic and subtropic water masses, possibly because these fronts serve as physical barriers to fur seal prey (Sinclair 1990; Ream *et al.* 2005).

3.2.8. Natural Mortality including Predation (Excluding Disease)

Neonatal mortality on St. George Island is purportedly lower than on St. Paul Island (York 1985). Several factors, including emaciation, trauma, various infections, and increased incidence of parasites, contribute to neonatal mortality rates (York 1985; Fowler 1985, 1987a). In the 1940s and 1950s, on-land pup mortality ranged from 10% to 22%. Between 1990 and 1999, pup mortality ranged from 2.82% to 4.69% on St. Paul, and 2.05% to 3.97% on St. George (Antonelis *et al.* 1994; York *et al.* 2000). Body condition may be a factor in pup mortality. Baker *et al.* (1995) and Baker and Fowler (1992) showed that larger-than-average male pups of the year were more likely to survive to at least 2 years of age.

Mortality at sea is highest during the first 2 years, and may reach 60% to 80% (Keyes 1965; Lander 1981; Fowler 1985; York 1987). Most of the mortality is believed to occur during the first winter (Lander 1989). Lander (1980) estimated that at-sea mortality of 0- to 2-year-olds from 1950 to 1970 was 60% to 65%. Some evidence suggests mortality rates for 0- to 2-year-olds (York 1985), 2- to 5-year-olds (Fowler 1985), and adult females (Trites and Larkin 1989) may have increased through the 1960s and 1970s. Cohort survival has not been studied in recent years.

Survival of adult females remains high (>80%) until age 14, after which it decreases to about 30% by age 19 (Smith and Polachek 1981). Males have a higher mortality rate than females after 2 years of age, and particularly after 7 years, when males begin to defend territories (Lander and Kajimura 1982; Johnson 1968).

Spraker and Lander (2010) investigated the cause of death for 104 adult female fur seals on St. Paul Island between 1986 and 2003. Seventeen (17) of the 104 adult females necropsied from 1986 to 2003 were killed accidently during the subsistence harvest; the remaining 87 female fur seals died from natural causes. Further analysis revealed 72% (63 of 87) of female deaths were the result of bite wounds; the remaining deaths were caused by a variety of factors. Spraker and Lander (2010) also examined 40 dead adult males to determine the cause of death. Eighty-seven percent (87%) of male mortality on land was the result of bite wounds and secondary infections (Spraker and Lander 2010). Spraker and Lander (2010) necropsied 2,608 northern fur seal pups during the breeding season on St. Paul from 1986 to 2003. Five general categories of mortality were found: emaciation, trauma, perinatal mortality, infections, and a rare anomalous condition. Emaciation was found in 52% of the pups. Trauma was the primary cause of death in 19% of the pups (blunt trauma accounted for 12% and sharp trauma accounted for 7%) and is

consistent with the findings of Gentry (1998). Perinatal mortality accounted for 19% of the dead pups (516 of the 2,735) examined (Spraker and Lander 2010).

Killer whales (*Orcinus orca*), Steller sea lions, and sharks prey on fur seals; predation impacts to the fur seal population have not been analyzed. Killer whales are probably the most important predator of northern fur seals (NMFS 2007a). Anecdotal reports by local fishermen to the Tribal ECO and others indicate that killer whales are seen regularly around the islands. Since 1996, the Tribal ECO reports that 1 to 5 sightings of killer whales feeding on fur seals are made each year (Island Sentinel database, St. Paul). Killer whales are seen around St. Paul in early and late summer; fishermen see killer whales offshore from June to August and they are observed in the spring and fall from land.

Springer *et al.* (2003) hypothesized that declines in North Pacific populations of seals (including fur seals), Steller sea lions, and sea otters was attributed to increased predation by killer whales. Killer whales shifted their prey base to smaller marine mammals following the removal of baleen whales, the primary food source, by commercial whaling. Wade *et al.* (2007) also suggested that killer whales may have caused or contributed to the decline of species like sea otters, but disagreed with the hypothesis of Springer *et al.* (2003) stating little evidence supports the hypothesis that predation resulted from a lack of available cetacean prey.

Steller sea lions were observed killing weaned fur seal pups close to shore on St. George Island (Gentry and Johnson 1981). NMFS (1993) also reported Steller sea lions killing fur seal pups in 1992. Attacks on northern fur seals by Steller sea lions may be lower in recent years as a result of concurrent and sustained declines in both species.

3.2.9. Disease and Parasites

A summary on the effects of diseases and parasites on the northern fur seal population is presented in NMFS (2007a) and Spraker and Lander (2010). The following is a brief review of that information supplemented with several current studies completed since the publication of the Conservation Plan.

As many other mammal species, fur seals are susceptible to disease. Necropsies of sub-adult seals taken in the St. Paul subsistence harvest during the 1980s suggest that the population was relatively disease free as compared to the period between the 1950s and early 1970s (NOAA MML, unpublished data, reported in NMFS 2007a). Fur seal mortality from ascarid (nematode worm) infection may have been prevalent during the 1950s and 1960s (Neiland 1961; Keyes 1965); although not identified until the late 1970s, leptospirosis may have also contributed to mortality (Smith *et al.* 1977).

The prevalence of disease and resulting mortality rates may be site-specific. Hookworm disease was responsible for 45% of the fur seal pup mortality in a study conducted between 1974 and 1977 (Gentry 1981). Lyons *et al.* (2001) indicated a dramatic decline in the incidence of hookworm disease in fur seal pups on St. Paul Island in recent years. However, in 2003, hookworm mortality at San Miguel Island exceeded 50% and was a significant cause of mortality of pups in the first 3 months of life (Melin *et al.* 2005).

The prevalence of *Coxiella burnetii* in northern fur seals on St. Paul is not conclusive. Tissue samples from subsistence harvested northern fur seals on St. Paul (2010 and 2011) documented *C. burnetii* (Duncan *et al.* 2013). This study identified two strains that have been increasingly identified in marine

mammals as well as a strain type more commonly found in terrestrial environments and associated with disease in humans and terrestrial animals. However, a subsequent study (2013) did not detect *C. burnetii* in tissues of harvested animals (Duncan *et al.* 2014). None of the animals sampled showed clinical signs of active infection or symptoms found in other species (Duncan *et al.* 2013; 2014). Very low levels of *Brucella spp*. were detected in tissue samples of harvested fur seals on St. Paul (Duncan *et al.* 2014).

Infectious diseases have been found in 4% of the pups on St. Paul Island. Despite the incidence of infection, there has been little evidence in the recent past to implicate diseases or mortality of pups prior to weaning as an important factor in the current population decline on St. Paul (NMFS 2007a).

Recent studies have documented parasitic acanthocephalans and anisakids found in northern fur seals at St. Paul (Kuzmina *et al.* 2012 and 2014). Kuzmina *et al.* (2015) reported high occurrence (98.6%) of cestodes (tapeworms) in northern fur seals on St. Paul; significant differences in cestode prevalence were also observed between different haulouts. The same study also observed very high parasite concentrations (mean intensity 19.7 specimens per host) that were significantly higher than previous study reports for other northern fur seal populations (Yurakhno and Taikov 1986; Yurakhno 1998). The high levels of cestode infection in St. Paul fur seals were consistent throughout the study period (2011 to 2014). The authors surmised that increases of cestode intensity in St. Paul fur seals may be attributed to ecological and oceanographic condition changes in the Bering Sea and North Pacific related to climate change in Arctic during the last decades.

Overall, studies do not suggest the prevalence of disease and parasites have been a significant threat to fur seals in recent years; however, high mortality from disease should be considered a constant threat given the high densities of fur seals during the breeding season that would facilitate transmission. Baker *et al.* (1995) and Gentry (1998) reported that about 20% of individuals from a particular island visit other islands intermittently during the year, and may facilitate disease transmission between islands.

3.2.10. Environmental Contaminants

NMFS (2007a) reviewed several environmental pollutant studies identifying possible factors attributed to the decline in the populations of some marine mammals. Some studies have suggested organochlorine pollutants may have been associated with reproductive failures of California sea lions and harbor seals (DeLong *et al.* 1973; Gilmartin *et al.* 1976; Reijnders 1986). Krahn *et al.* (1997) reported concentrations of certain organochlorine contaminants in blubber from Pribilof Island fur seals that were about an order of magnitude higher than those found in other seal species. Age and sex did not account for differences in contaminant concentrations, and it was suspected that the differences may be attributed to differences in feeding habits and migratory patterns among species. Loughlin *et al.* (2002) reported that organochlorine concentrations in the blubber of fur seals on St. George Island were higher than in seals on St. Paul Island. The toxic equivalency levels of raw blubber from St. George sub-adult male fur seals exceeded the levels recommended for consumption by humans (Loughlin *et al.* 2002). Organochlorines have been linked to immunotoxic effects including suppression of antibody and humoral immune responses; halogenated aromatic hydrocarbons have been associated with measurable alteration in immune function (Holsapple, *et al.* 1991). Some organochlorines, such as DDE, may have properties that are similar to estrogen, and may play a role in estrogen receptor positive breast cancer (Wolff *et al.* 1993).

Milk samples from seals on St. Paul Island had higher polychlorinated biphenyls (PCB) levels than samples from St. George Island seals (Loughlin *et al.* 2002). Beckmen *et al.* (1999) also reported that fur seal pups from young females (less than 5 years old) from the Pribilof Islands had significantly higher organochlorine concentrations in their blood than pups born to older females (greater than 7 years old), and organochlorine contaminants were significantly more concentrated in early lactation milk of young females than older females. Mean concentrations of PCB congeners were higher in pup blood than in that of reproductively active females. Beckmen *et al.* (1999) also suggested that northern fur seal pups, especially pups born to first-time mothers, have substantially higher exposures to organochlorine contaminants at a critical developmental stage and suggested that this exposure could impact neurological and immune system development.

Kim *et al.* (1974) detected mercury in adult female fur seal blood and hair, and Anas (1974) reported high levels of mercury concentration in fur seal liver, followed by those levels detected in the kidney and muscle. Mercury is a ubiquitous environmental pollutant that bioaccumulates and biomagnifies in food webs. Mercury enters ecosystems through natural sources (*e.g.*, volcanism) and a variety of anthropogenic activities and is converted by bacteria into the more toxic methylmercury, which can impair or suppress the nervous, cardiovascular, and endocrine systems, decrease reproductive success, and disrupt development (Scheuhammer *et al.* 2007; Kenney *et al.* 2012). Elevated levels of mercury have been found in Arctic ecosystems despite the paucity of local anthropogenic sources. Some studies indicate that heavy metals are unlikely to have been a significant factor in the decline of the Steller sea lion (Castellini 1999). Mercury levels in the hair of young Steller sea lions from both the western and eastern populations were lower than for northern fur seals (Beckmen *et al.* 2002).

Noda *et al.* (1995) measured the concentrations of various heavy metals in muscle, liver and kidney tissues of northern fur seals caught off the coast of Japan and from the Pribilof Islands. Concentrations of heavy metals varied depending on the particular metal in question, the tissue involved, and the age and location of the seal, but no consistent trends among areas were detected. Beckmen *et al.* (2002) reported higher total mercury concentrations in the fur of northern fur seals from the Pribilof Island population when compared to both declining and thriving populations of Steller sea lions from Prince William Sound and Southeast Alaska.

The 2011 Tohoku earthquake and subsequent Fukushima nuclear power plant coolant failure resulted in the release of radionuclides into the atmosphere and marine environments. Impacts to marine mammals and their exposure levels to these substances quickly became a concern to many, including those who rely on these animals for subsistence. Ruedig *et al.* (2016) sampled fur seals on St. Paul, and determined that the population was exposed to small quantities of Fukushima-derived radiocesium; the quantities detected were small and the authors agree that no impact is expected on fur seals or human consumers as a result of the measured radiation exposure. Radiation exposure from this source is predicted to decrease from the peak expected in 2014, given the half-life decay of radiocesium and dilution across the Pacific Ocean.

NMFS (2007a) identified significant data gaps regarding the effects of toxic substances on northern fur seals, including information for assessing the impacts at the individual, population, and species levels. Of primary concern is chronic exposure to toxic substances and the potential for reactive metabolites to cause damage to DNA, RNA, and cellular proteins. But more importantly, there are no studies on the effects of

toxic substances at the population level to determine their impact on vital rates, population trends, or the human consumers.

3.2.11. Illicit Subsistence Harvest of Northern Fur Seals

There is currently an unknown level of illicit subsistence hunting/harvest of fur seals that is unreported. This illegal harvest has resulted in ongoing tension and mistrust between ACSPI and NMFS due to violations of regulations that is unaccounted for and goes unpunished. All enforcement investigations of known and reported subsistence taking outside of the regulatory season since 2004 have included two adult female seals, six female pups, and five male pups. The population consequences of such subsistence hunting are unknown since NMFS has no ability to quantify whether, and to what extent, female fur seals are killed outside of the regulatory season and the population consequences of these events. Evaluation of this aspect of the alternatives is discussed in Section 4.4.1

3.2.12. Interaction between Commercial Fisheries in the Bering Sea and Northern Fur Seals

Commercial fisheries have the potential to directly affect northern fur seals in several ways including: 1) the incidental take during fishing operations; 2) the entanglement in marine debris lost or discarded from fishing activities; and 3) from disturbance related to boat traffic, fishing activities, and the presence of fishing gear. Commercial fisheries have the potential to indirectly affect fur seals by altering prey availability (*i.e.*, abundance, density, and distribution) or by competition between commercially exploited fish stocks consumed by fur seals. Historically, the commercial fishery had greater interaction with northern fur seals than it does today. U.S. commercial fisheries management in the Bering Sea and North Pacific Ocean has significantly changed in the past few decades. Historic estimates of bycatch of fur seals is relevant to the context of past threats, but does not represent the current level of interaction under domestic and foreign commercial fisheries practices.

3.2.12.1. Historic Incidental Catch (Bycatch) of Fur Seals in BSAI Commercial Fisheries

In the late 1970s, the incidental take of fur seals in commercial fisheries in the North Pacific Ocean was not considered large enough to have been a significant factor in the decline of the Pribilof Islands fur seal stock. Fur seal mortality related to trawl fisheries in the U.S. Exclusive Economic Zone (EEZ) has been relatively low. Loughlin *et al.* (1983) and Perez and Loughlin (1991) reported 48 fur seals were incidentally killed in foreign and joint-venture trawl fishing operations in U.S. waters between 1973 and 1987. They estimated a total incidental take mortality of 246 fur seals in both the foreign and joint U.S.-foreign commercial groundfish trawl fisheries from 1978 to 1988; similar numbers of fur seals were estimated taken by incidental mortality from 1966 to 1977 (Perez and Loughlin 1991). Perez (2003) reported 31 fur seals were taken by the domestic trawl fishery in Alaska and the North Pacific Ocean between 1989 and 2001.

Drift gill-net fishing for squid in the North Pacific began in 1978 and the rapid expansion of this high-seas gill-net fishery in the 1980s raised concerns that large numbers of marine mammals were being incidentally killed (Hobbs and Jones 1993). By the early 1980s, more than 700 commercial drift gill-net vessels fished about 10 months of the year and set approximately 40 to 60 km of gill-net per boat per night (representing 35,000 linear km of gill-net per night). In 1988, 134 fur seals (43 dead / 91 alive) were

incidentally taken, and in 1989, 80 fur seals (dead or unknown status) were incidentally taken (Hobbs and Jones 1993). Nine hundred (900) fur seals were incidentally taken during the 1990 and 1991 seasons of the high-seas squid fishery (Hobbs and Jones 1993).

Based on the observed number of fur seals taken in 1989 and 1990, Hobbs and Jones (1993) estimated the total incidental take to be 1,579 to 1,927 and 4,960 fur seals in these years, respectively. Although these fisheries operated from late May to December, most incidental take occurred during July and August. Hobbs and Jones (1993) indicated that the estimated mortality of fur seals in the drift-net fisheries was low in comparison to their abundance and concluded that impacts to the population were not sufficient to cause significant declines. The foreign high seas driftnet fisheries incidentally killed large numbers of northern fur seals, with an estimated 5,200 (95% CI: 4,500 to 6,000) animals taken during 1991 (Larntz and Garrott 1993). In 1992, commercial drift-net fishing in the North Pacific was halted, as a result of a global moratorium on large-scale high-seas drift-net fishing. Bycatch mortality due to high-seas drift-net fishing no longer exists at this historic scale, with exception of limited illegal foreign drift-net fishing.

3.2.12.2. Marine Mammal/Fishery Observer Program and Current Bycatch Estimates

Detailed information on U.S. commercial fisheries in Alaska waters (including observer programs, observer coverage, and observed incidental takes of marine mammals) is presented in Appendices 3-6 of the Alaska Stock Assessment Reports (http://www.nmfs.noaa.gov/pr/sars/region.htm).

Between 2010 and 2014, incidental mortality and serious injury of northern fur seals was observed in the following three of the 22 federally regulated commercial fisheries in Alaska monitored by fisheries observers: Bering Sea/Aleutian Islands flatfish trawl; Bering Sea/Aleutian Islands pollock trawl; and Bering Sea/Aleutian Islands Pacific cod longline fisheries. The total estimated mean annual fishery-related incidental mortality and serious injury rate in these fisheries from 2010 to 2014 is 1.1 northern fur seals (Table 3.2-2). Observer programs for Alaska state-managed commercial fisheries have not documented any mortality or serious injury of northern fur seals (Wynne *et al.* 1991, 1992; Manly 2006, 2007).

Table 3.2-2 Summary of incidental mortality and serious injury of the Eastern Pacific stock of northern fur seals due to U.S. commercial fisheries in 2010 and 2014 and calculation of the mean annual mortality and serious injury rate (Breiwick 2013; MML, unpublished data)

Methods for calculating percent observer coverage are described in Appendix 6 of the Alaska Stock Assessment Reports.

Fishery Name	Years	Data Type	Percent Observer Coverage	Observed Mortality	Estimated Mortality	Mean Estimated Annual Mortality
Bering Sea/Aleutian Is. flatfish trawl	2010	Observer	99%	0 (+1)[a]	0 (+1)[b]	0.2 (+0.2)[c] (CV = 0.04)
	2011		100%	0	0	
	2012		99%	0	0	
	2013		99%	0	0	
	2014		99%	1	1	
Bering Sea/Aleutian Is. pollock trawl	2010	Observer	86%	2	2.0	0.4 (CV = 0.07)
	2011		98%	0	0	
	2012		98%	0	0	
	2013		97%	0	0	
	2014		98%	0	0	
Bering Sea/Aleutian Is. Pacific cod longline	2010	Observer	64%	1	1.4	0.3 (CV = 0.52)
	2011		57%	0	0	
	2012		51%	0	0	
	2013		67%	0	0	
	2014		64%	0	0	
Total mean estimated annual mortality						1.1 (CV = 0.17)

[a] - Total mortality and serious injury observed in 2010: 0 in sampled hauls + 1 in an unsampled haul.

[b] - Total estimate of mortality and serious injury in 2010: 0 (extrapolated estimate from 0 observed in sampled hauls) + 1 (1 observed in an unsampled haul).

[c] - Mean annual mortality and serious injury for fishery: 0.2 (mean of extrapolated estimates from sampled hauls) + 0.2 (mean of number observed in unsampled hauls).

3.2.12.3. Entanglement

Entanglement from marine debris associated with the commercial fishing industry is a source of injury and mortality in fur seals (Fowler *et al.* 1990); records of entanglement of northern fur seals in marine debris have been kept since the late 1960s. Most data come from studies of sub-adult males collected during the commercial harvest between 1967 and 1985 (Scordino and Fisher 1983), and scientific roundups conducted after the cessation of the commercial harvest (Fowler 1987b; Fowler *et al.* 1992, 1994). The most common types of debris during the 1980s included trawl net webbing, plastic packing materials, and monofilament line.

The sub-adult male fur seal entanglement rate has fluctuated over time but was generally lower in the 1990s (~0.2%) than in the 1970s and 1980s (~0.4%) (NMFS 2007a). Robson *et al.* (1999) reported no difference between entanglement rates on St. Paul and St. George Islands over a 3-year period. Williams *et al.* (2004) reported that entanglement rates remained generally consistent from 1995 to 2003, and determined that approximately 20,000 seals would need to be sampled to detect a 50% change in the proportion of sub-adult males entangled. Williams *et al.* (2004) suggested consistent counting procedures and adequate sample size are important considerations when reporting trends in sub-adult male entanglement. The entanglement rate is less than 1% annually for sub-adult (2- to 4-year-old) male seals that are observed on the Pribilof Islands (NMFS 2007a). However, this rate does not account for seals that become entangled at sea and are unable to return to the breeding grounds, nor does it account for the percentage of adult fur seals that are entangled. Observations of fur seal entanglement at sea are limited, and the actual extent and significance of entanglement at sea is unknown (Fowler 1987b).

The rates of entanglement for adult females may be higher than that of adult males because of their smaller size and slower rate of growth. The relative size of females and sub-adult males (2- to 4-year-old) correlates well with the common mesh sizes of trawl net material. Growth rates of both male and female seal are similar until about the fifth year of life, when males increase dramatically in size (York 1987); meaning females remain smaller and susceptible to the common mesh sizes of trawl net material longer. In 1985, DeLong *et al.* (1988) estimated between 0.06 and 0.23% of adult females on select St. Paul rookeries were observed entangled in marine debris. Percent weight gain, weight at weening and survival of pups with entangled mothers were significantly lower than other pups. Entangled lactating females spent more time at sea feeding than non-entangled females or did not return to the rookeries at all (DeLong *et al.* 1988). A sample of adult females was counted from 1991 through 1999 during the counting of adult males on St. Paul to determine the percentage of adult females entangled (NMFS 2007a). Based on this data, Kiyota and Baba (2001) determined that the average incidence of entangled females over the entire survey years was estimated at 0.013% and that of females with scars caused by previous entanglement was 0.029% (total females counted = 244,225). The rate of female entanglement in 1998 based on scarred and entanglements observed was 0.039% (Stepetin *et al.* 2000) and was similar to previous estimates from Kiyota and Fowler (1994). Sub-adults of both sexes may be more likely to become entangled than adults.

Trites and Larkin (1989) modeled fur seal population trends and speculated that entanglement related mortality was likely contributing significantly to the decline observed through 1987. Trites and Larkin (1989) indicated a 2% to 5% reduction in adult female survival provided the best fit of model choices to the available trend data. Entanglement in marine debris is a plausible mechanism for the reduction in adult female survival in the late 1980s. Fowler (1985, 1987b) estimated entanglement mortality could be as high as 15% for seals from birth to age 3.

Entanglement studies on the Pribilof Islands are another source of information on fishery-specific interactions with fur seals. Fur seal entanglement in plastic packing bands has increased as a proportion of the total observed entanglements (Zavadil *et al.* 2003 and 2007). Based on entanglement rates and sample sizes presented in Zavadil *et al.* (2003), an average of 1.1 fur seals/year on the rookeries were entangled in pieces of trawl netting and an average of 0.1 fur seal/year was entangled in monofilament net. Zavadil *et al.* (2007) determined the sub-adult male entanglement rate for 2005-2006 to be between 0.15% and 0.35%. The mean entanglement rate in this 2-year period for pups on St. George Island was 0.06% to 0.08%, with a potential maximum rate of up to 0.11% in October prior to weaning. Female entanglement rate on St. George Island increased during the course of the 2005-2006 breeding seasons, reaching a rate of 0.13% in October; this rate increase coincided with the arrival of progressively younger females on the rookery throughout the season (Zavadil *et al.* 2007).

Entanglements of northern fur seals have been observed on St. Paul, St. George, and Bogoslof Islands. Since 2011, there has been an increased effort to include entanglement reports in the NMFS Alaska Region stranding database. Twenty (20) northern fur seals with circumferential neck entanglements were reported to the stranding network between 2008 and 2012. A summary of entanglements in fishing gear that were reported between 2010 and 2014 is provided in Table 3.2-3 (Helker *et al.* 2015, in prep.). Three northern fur seals entangled in commercial Bering Sea/Aleutian Islands halibut longline gear and nine northern fur seals entangled in commercial Bering Sea/Aleutian Islands trawl gear were reported to the NMFS Alaska Region stranding database in 2010-2014, resulting in minimum mean annual mortality and

serious injury rates of 0.6 and 1.8, respectively, in these fisheries (Table 3.2-3; Helker *et al.* 2015, in prep.).

An additional five northern fur seals entangled in commercial Bering Sea/Aleutian Islands trawl gear with serious injuries (two each in 2011 and 2012, and one in 2014) and two entangled in unidentified net with serious injuries (one each in 2011 and 2012) were disentangled and released with non-serious injuries in 2010-2014 (Helker *et al.* 2015, in prep.); therefore, these animals are not included in the mean annual mortality and serious injury rate in this report.

The total mean annual mortality and serious injury rate in commercial fisheries in 2010-2014 was 3.5 northern fur seals: 1.1 from observer data + 2.4 from stranding data. The minimum mean annual mortality and serious injury rate due to entanglement in fishing line (0.2), pot gear (0.2), gillnet (0.2), and unidentified fishing net (0.8) in Alaska waters in 2010-2014 was 1.4 northern fur seals. These entanglements cannot be assigned to a specific fishery, and it is unknown whether commercial, recreational, or subsistence fisheries are the source of the fishing debris. More thorough reporting of events has occurred since 2011, and there is significantly higher observation effort on the rookeries during the years of pup production (even years) than during odd numbered years, so this difference in the level of effort should be taken into consideration with estimates of entanglement based on opportunistic reports.

The Eastern Pacific stock can occur off the west coast of the continental U.S. in winter/spring; therefore, any mortality or serious injury of northern fur seals reported off the coasts of Washington, Oregon, or California during December through May will be assigned to both the Eastern Pacific and California stocks of northern fur seals. Between 2010 and 2014, three northern fur seal entanglements in trawl gear occurred off the U.S. west coast in December through May (Carretta *et al.* 2015; NMFS, unpubl. data), resulting in an average annual mortality and serious injury rate of 0.6 Eastern Pacific northern fur seals in these waters (Table 3.2-3). An additional northern fur seal that was stranded with a serious injury due to an unidentified fishery interaction in May 2012 in California, was treated and released (Carretta *et al.* 2015); therefore, it is not included in the mean annual mortality and serious injury rate in this report.

Table 3.2-3 Summary of mortality & serious injury of the Eastern Pacific stock of northern fur seals, by year and type, reported to the NMFS Alaska Region (Helker *et al.* 2015, in prep.) and NMFS U.S. West Coast Region (Carretta *et al.* 2015; NMFS, unpublished data), marine mammal stranding databases, in 2010-2014

Only cases of serious injuries are reported in this table; animals that were disentangled and released with non-serious injuries have been excluded.

Cause of Injury	2010	2011	2012	2013	2014	Mean Annual Mortality
Entangled in commercial BSAI halibut longline gear	0	0	0	0	3	0.6
Entangled in commercial BSAI trawl gear	0	2	1	0	6	1.8
Entangled in Bering Sea crab pot gear	0	1	0	0	0	0.2
Entangled in BSAI monofilament hook and line gear	0	1	0	0	0	0.2
Entangled in gillnet	0	0	0	0	1	0.2
Entangled in unidentified net	0	0	3	0	1	0.8
Entangled in trawl gear[a]	0	1	0	0	2	0.6
Entangled in marine debris	0	10	4	1	11	5.2
Entrained in power plant intake[a]	0	0	1	0	0	0.2
Sum of 2011, 2012, and 2014 events[b]	-	15	9	-	24	16
Total commercial fisheries						2.4
Total unknown (commercial, recreational, or subsistence) fisheries						2.0
Total marine debris						5.2
Total other sources (power plant entrainment)						0.2

[a] - Mortality or serious injury that occurred off the coasts of Washington, Oregon, or California in December through May was assigned to both the Eastern Pacific and California stocks of northern fur seals.

[b] - An increase in the number of reports is not necessarily an indication of an increase in occurrence of entanglements, but rather is a reflection of more thorough reporting of these events in the NMFS Alaska Region stranding database as of 2011. The average of the sum of mortality/serious injury events reported in 2011, 2012, and 2014 may be a more accurate number of annual mortality/serious injury for management purposes due to more thorough reporting for those years.

3.2.12.4. Trophic Interactions between the BSAI Fisheries and Northern Fur Seals

Commercial fisheries and fur seal presence in the Bering Sea overlap in range and target species from May through November. Northern fur seals are apex predators much like Steller Sea lions and as such, ecological interaction between northern fur seals and the groundfish fisheries are caused by the spatial and temporal overlap of fur seal foraging and commercial catch areas. Groundfish fisheries utilize a variety of gear types directed at pollock, Pacific cod, Atka mackerel, yellowfin sole, flathead sole, rock sole, Alaska plaice, and Greenland turbot. In the Pacific Ocean, commercial fisheries target both fur seal prey species and fish that compete with fur seals. The complexity of commercial fisheries in both the Bering Sea and the Pacific Ocean could reduce, alter, or redistribute the prey field of northern fur seals. Fisheries could directly or indirectly affect fur seal prey on either a local (*e.g.*, "localized depletion") or ecosystem-wide scales (NMFS 2007a, 2014).

Fisheries regulations implemented in 1994 (at 50 CFR 679.22(a)(6)) created a Pribilof Islands Habitat Conservation Zone (PIHCZ). Trawl and pot gear closures around the Pribilof Islands were established to protect king crab stocks, but were predicted to offer positive benefits for fur seals by limiting prey removals in waters surrounding the Pribilof Island rookeries. However, only northern fur seals that forage close to the islands would benefit from the trawl and pot gear closures by the theoretical increase in the availability of prey and decrease in disturbance. Recent tracking studies show that foraging trips of both adult female and sub-adult male fur seals extend well beyond the trawl closure boundaries of the PIHCZ. Partitioning of foraging habitat by lactating fur seals on the Pribilof Islands indicates that the PIHCZ

possibly benefits females from northwest St. Paul Island and provides less protection to the foraging habitat of females from southwest St. Paul Island or St. George Island (NMFS 2001a, 2003, 2005).

Groundfish fisheries harvest prey of northern fur seals (*i.e.*, pollock and Atka Makerel); competition, as a result of harvest rates, may vary depending on several factors. The potential competitive overlap between fisheries and northern fur seals is influenced by several spatial and temporal factors (NMFS 2001a). NMFS (2001a) considered the following regarding the likelihood of competition between fur seals and the commercial fisheries in the Bering Sea, and around the Pribilof Islands:

- Competition may vary depending on the availability of smaller prey in foraging areas;
- Forty-five percent (45%) of the catch from both fisheries (pollock and Atka mackerel) occurs during winter when female and sub-adult male fur seals are not commonly found in the areas used by fisheries;
- Fishery harvest rates during summer on adult pollock and Atka mackerel in areas used by fur seals are below the annual target rates for the fish stocks as a whole;
- The pollock fishery in the Bering Sea (summer season) begins on September 1, during the latter half of the pup rearing season (June to October);
- Fisheries for pollock do not target fish younger than 3 years of age, the preferred size by foraging fur seal (Gudmundson *et al.* 2006). The overall catch of Pollock smaller than 30 cm is small, and thought to be only 1% to 4% of the number of 1- and 2-year-olds each year in the EBS and GOA (Fritz 1996).

While these factors lower the probability of adverse impacts stemming from spatial or temporal concentration of fisheries in northern fur seal foraging areas, changes in harvesting activity and/or concentration of harvesting activity in space and time may differentially impact fur seal foraging habitat at both the population and sub-population level. NMFS (2001a) considered there to be a potentially conditionally significant adverse effect on fur seals from the fisheries given the uncertainty in the degree to which fur seals compete with the fishery for adult pollock in fur seal foraging areas and the lack of information on attributing factors to recent population declines. NMFS recognizes that there has been little new information on the indirect effects of commercial groundfish fisheries on northern fur seals in recent years. (NMFS 2007a, 2014a). Commercial fisheries may affect northern fur seals in ways similar to or different from those for Steller sea lions (NMFS 2001a, 2003, 2005). Numerous conservation actions are described in Section II of the Conservation Plan (NMFS 2007a) to increase our understanding of the relationships between fur seals, fish, and commercial fisheries. Future fur seal and fisheries research results may inform future management actions.

3.3. Northern Fur Seal Research Program

Research on northern fur seals has been conducted since at least 1909, when adult male fur seals were counted on the Pribilof Islands. A list of fur seal research that occurred between the 1940s and 2010 is provided on the MML website, at http://www.afsc.noaa.gov/nmml/library/nfs-investigations.php, with more recent investigations listed here http://www.afsc.noaa.gov/nmml/species/species_nfs.php#research. The more recent research programs (since 1990) have been driven by priorities identified in the 1993 Northern Fur Seal Conservation Plan (NMFS 1993) and the 2007 Conservation Plan (NMFS 2007a).

Northern fur seal research summarized in Table 3.3-1 depicts some of the key research conducted since 1993.

Table 3.3-1 Northern Fur Seal Research

NMFS Study Category	Location	Year(s)
Population Status and Trend		
Adult Males Census	San Miguel and the Pribilof Islands	1993 - 2002, 2004 and 2010 - 2014
Adult Males Census	Bogoslof Island	2005
Pup Census	Bogoslof Island	1993, 1994, 1995, 1997 and 2005, 2011
Pup Census	San Miguel Island	1993 - 2002, 2004 and 2005
Pup Census	Pribilof Islands	1994, 1996, 1998, 2000, 2002, and 2004. 2008, 2010, 2012, 2014
Pup Tagging and Re-sighting	San Miguel Island	1993 - 2005
Movements and Distribution		
Pup Migration	St. Paul Island	1996, 1997 and 2005
Pup Migration	St. George Island	1997 and 2005
Pup Migration	Bogoslof Island	2005
Bogoslof Island	San Miguel Island	2005
Health, Condition and Vital Parameters		
Condition indices	St. George Island	1993 - 2000, 2002 and 2004
Condition indices	St. Paul Island	1994 - 2002 and 2004
Condition indices	San Miguel Island	1994 - 2002, 2004 and 2005
Teeth Collection	Pribilof Islands	1993 - 2005
Teeth Collection	Bogoslof Island	2005
Genetic Sampling	Bogoslof and the Pribilof Islands	1995
Adult Female Blood / Hormone Sampling	St. Paul Island	2002
Adult Female Reproductive Studies	St. Paul Island	2005
Mortality		
Pup Necropsies	St. Paul Island	1993 - 2002, 2004 and 2005
Pup Necropsies	San Miguel Island	1996
Ecology, Diet and Energetics		
Adult Female Foraging	St. Paul Island	1994 - 1996, 1998, 2000 - 2002, 2004, and 2005 - 2014
Adult Female Foraging	St. George Island	1995, 1996 and 2004-2014
Adult Female Foraging	San Miguel Island	1996, 2001, 2004 and 2005
Adult Female Foraging	Bogoslof Island	1997 2005
Sub-adult Foraging	St. Paul Island	1999 and 2000
Scat Sampling	Pribilof Islands	1993 - 2002 and 2004
Scat Sampling	Bogoslof Island	1997 and 2005
Stable Isotope Sampling	Pribilof Islands	1997
Pup Diving Development	Pribilof Islands	1995 and 1996
Fisheries Interactions		
Entanglement Surveys	Pribilof Islands	1995, 1996, and 1997
Entanglement Surveys	Pribilof Islands	End 2009
Behavior		
Video Sampling	Pribilof Islands (Pribilof Project Office, NOAA, National Ocean Service)	End 2006
Multi-tasked		
Health, Condition and Vital Parameters Ecology, Diet and Energetics Fisheries Interactions Movements and Distribution	Northern Fur Seals (no specified location) (MML)	2005 - 2008

3.3.1. Research under Co-Management Agreements

NMFS entered into Co-Management Agreements with the Tribal Governments of St. Paul Island in 2000 and St. George Island in 2001. The Tribal Governments have expressed interest in a more comprehensive cooperative management regime for the northern fur seals, which would include shared responsibility for research, and addressing conservation issues for this stock. The Pribilof Islands Collaborative, together with scientists from the Alaska Fisheries Science Center, MML, and various universities, have identified key data gaps in fur seal research. Section A.8 of the Northern Fur Seal Conservation Plan (2007a) provides an overview of each of these research activities in greater detail and lists the priority recommendations for research going forward. A scientific research permit, issued on August 17, 2009[12], authorized ECO to fulfill their Biosampling, Disentanglement, and Island Sentinel Program responsibilities as established under the Co-Management Agreement between NMFS and the Aleut Communities. The permit, amended on July 17, 2013[13], increased the number of potential takes to: 1) increase the number of disentanglement events to be conducted; 2) increase the collection of biological samples from dead stranded and subsistence hunted marine mammals; and 3) increase haulout and rookery observations, monitoring, and remote camera maintenance. Samples may be exported to researchers studying the decline of northern fur seals. New research permits to both the Tribal Governments of St. Paul and St. George Islands are being processed for the 2016 to 2021 period.

3.4. Physical and Oceanographic Environment

The continental shelf areas of the BSAI and the GOA marine ecosystems make up about 74% of the total area (2,900,785 square kilometers [km^2]) of U.S. continental shelves (Hood and Calder 1981). This assessment focuses on the EBS.

3.4.1. Bering Sea Ecosystem

The Bering Sea is a semi-enclosed, high-latitude, subarctic sea and is considered to be a northern extension of the North Pacific Ocean. Shaped somewhat like a sector of a circle with its apex at the Bering Strait, the Bering Sea has a total area of 2.3 million km^2 (Hood and Calder 1981). Forty-four percent (44%) is continental shelf (depth < 200 m), 13% is continental slope, and 43% is deep-water basin where depths reach as much as 3,800 m along the western margin of the sea (Hood and Calder 1981).

The shelf consists of three fronts (outer-shelf, mid-shelf, and inner-shelf) along the 200-, 100-, and 50-m bathymetric contours, respectively (Kinder and Coachman 1978; Stabeno *et al.* 2002, 2012a). The broad continental shelf in the EBS is one of the most biologically productive areas of the world (Hunt *et al.* 2011) and important for foraging fur seals (NMFS 2001a).

3.4.1.1. Ocean Currents and Large-Scale Circulation

Ocean currents are capable of regulating climate through transportation of large amounts of heat, fresh water, oxygen, and nutrients (Coachman and Aagaard 1981). Likewise, each of these variables working together shape the migration and foraging strategies of adult male and female northern fur seals (Sterling

[12] *Federal Register*74 FR 44822

[13] *Federal Register* 78 FR 42756

et al. 2014). A number of large-scale oceanic currents occur within and between the Bering Sea, GOA, and surrounding oceans. Numerous straits and passes through the 2,000-km arc-shaped Aleutian archipelago connect the Bering Sea to the North Pacific Ocean. Waters from the Alaska Current enter the Bering Sea at Unimak Pass and, to a lesser extent, through other passes between Aleutian Islands.

Ocean circulation in the Bering Sea varies by season, year, and decade (Coachman 1986; Danielson *et al.* 2012). Circulation is generally anti-clockwise within the basin, with a weak and variable northwestward flow over the broad continental shelf adjacent to Alaska (Kinder and Schumacher 1981; Coachman 1986). As warm water from the Alaska Stream enters the Bering Sea and is cooled and transported through the anti-clockwise Bering Sea Gyre, large upwellings occur, which bring cold deep waters to the surface (Ohtani 1970; Coachman and Aagaard 1981; Coachman 1986). Eddies, ranging in diameter from 10 to 200 km, can be found throughout the Bering Sea and contribute to the vertical mixing of waters and nutrients important for primary and secondary productivity and important prey species for northern fur seals (Sterling *et al.* 2014). Eventually, Bering Sea water exits northward through the Bering Strait, or westward and south along the Russian coast, entering the western North Pacific via the Kamchatka Strait. Some resident water joins new North Pacific water entering Near Strait, which sustains a permanent gyre around the deep basin in the central Bering Sea (Coachman 1986).

3.4.1.2. Effects of Sea Ice on Productivity

Physical and biological oceanic conditions in the Bering Sea are influenced by the presence and extent of ice cover (McRoy and Goering 1974; Muench and Schumacher 1985; Niebauer 1981; Niebauer *et al.* 1981, 1990; NMFS 2001a). During extreme winter and early spring conditions, pack ice covers most of the eastern and northern continental shelf of the Bering Sea (Niebauer 1981, 1998; Niebauer and Day 1989), Inter-annual variability of ice coverage can be as great as 40% (Niebauer 1988, 1998), which affects the distribution of salinity, temperature, and nutrients (Hattori 1979; Hattori and Goering 1981). The formation and melting of the sea ice affects the transport of nutrients and organisms (Hattori and Goering 1981) and the overall productivity available to the higher trophic levels (Niebauer *et al.* 1990), including fur seals.

The annual increase in production in the Bering Sea begins in late February, with the development of the algal community in the sea ice (McRoy and Goering 1974). The production of this community increases with the passing of winter and probably reaches a maximum just before the ice melts completely. As the ice melts, a second spring bloom develops in the wake of the receding ice, accounting for between 10% and 65% of the total annual primary production (Niebauer *et al.* 1981; Niebauer *et al.* 1990). The nutrient-rich slope waters combine with summer solar radiation to create one of the world's most productive ecosystems. The dynamic biological and physical oceanic characteristic of the Bering Sea annual primary production cycle is critical to the foraging ecology of the northern fur seal.

3.5. Climate Change and Northern Fur Seals

There is clear evidence that changing climate is affecting resources in the EBS. Annual average temperatures in Alaska over the last 50 years have risen by about 3°F to 4°F (ACIA 2004). Atmospheric circulations and wind-driven patterns are capable of creating basin-scale variations in upwelling and driving large-scale oscillations (*i.e.*, fluctuations in temperature and other factors) (Francis *et al.* 1998; Hare and Mantua 2000; Minobe 2000, 2002; Mantua and Hare 2002). Significant climate variations result

from the interaction between the atmosphere, ocean, and other climate-related factors that can trigger various oscillations (Trenberth 1990; Trenberth and Hurrell 1994; Drinkwater *et al.* 2009).

Decadal or multi-decadal fluctuations (*i.e.*, oscillations) of atmospheric and oceanic conditions have the potential to cause abrupt transitions between different regimes in marine ecosystems (Minobe 2000; Mantua and Hare 2002; Overland *et al.* 2012). The Pacific Decadal Oscillation (PDO) affects the pattern of sea surface temperatures throughout the Pacific Ocean north of 20ºN (NRC 2003). While physical mechanisms that cause the PDO are unknown, the ecological regime shifts observed in the Bering Sea from 1970 to 2008 were coincident with significant changes in sea ice, sea surface temperature, and surface air temperature suggesting that PDO may best explain regime shifts in the Bering Sea (Zhang *et al.* 2010). The El Niño-Southern Oscillation (ENSO) is a pattern of pressure, temperature, and rainfall fluctuations that can have a global climate impact (Stabeno *et al.* 2007; Overland *et al.* 2012). ENSO events account for approximately one-third of the ice and sea surface temperature variability in the Bering Sea (Niebauer and Day 1989) and can have significant impacts on fish distribution and survival through reproduction, recruitment, and other processes in ways that are not yet understood (Hollowed *et al.* 1998, 2013), but which affect fur seals because of the significant relationship between foraging fur seals and pollock distribution and abundance (Joy *et al.* 2015).

The biological and oceanographic dynamics of the EBS have been modelled to detect trends or potential problems in marine ecosystems by evaluating estimates of biomass, consumption, diet, and turnover rates of populations or groups of populations (Christensen 1990). These efforts present a snapshot for a given time period providing a means to identify large-scale views of the ecosystem and highlight data gaps (Christensen 1990, 1992, 1994; Pauly and Christensen 1995). Reductions in seabirds and marine mammals (including northern fur seals and Steller sea lions), unusual algal blooms, and abnormally high water temperatures over the past few decades have many in the scientific community attributing these changes to climate change (ACIA 2004).

Major shifts have occurred in the abundance of fish in the Bering Sea over the past several decades (Anderson and Piatt 1999). The likelihood that these shifts in prey may be related to climatic regime shifts is well documented (*e.g.*, Beamish and Bouillon 1993; Benson and Trites 2002). It is recognized that the fish community in the Bering Sea has undergone a shift from one dominated by pelagic and semi-demersal species to a community with fewer pelagic species and a larger biomass of semi-demersal (walleye pollock and Atka mackerel) (Conners *et al.* 2002). Important fur seal prey species include pollock (Sinclair *et al.* 1994; Gudmundson *et al.* 2006; Zeppelin and Ream 2006) and the number of pollock consumed by fur seals in the Bering Sea is directly related to pollock recruitment (Hollowed and Wooster 1995) and pollock year-class strength (Sinclair *et al.* 1994, 1996). Also during the period from 1974 to 1978 (periods of high walleye pollock recruitment), female Pribilof fur seal feeding trip duration decreased suggesting that prey may have been more abundant or located closer to the colony during the post-1977 regime (Gentry 1998). Environmental conditions strongly influence pollock distribution, abundance, and year-class success of other important fur seal prey (Hollowed *et al.* 1998). In light of this, changes in environmental and oceanographic features may also influence year class success and survival of fur seals through their effects on the distribution and abundance of fur seal prey. While there is strong evidence that climate change is happening, the specific effects on northern fur seals are still uncertain (NMFS 2007a).

Subsistence activities are also vulnerable to effects of climate change. In 2004, the Cambridge University Press published the *ACIA*, which stated:

> *Climate-related changes in fish and wildlife distribution are very likely to result in significant changes in access to and the availability of traditional foods, with major health implications. A shift to a more Western diet is known to increase the risks of cancer, obesity, diabetes, and cardiovascular diseases among northern populations.*

The report also acknowledges the mental health effects of climate-related changes due to the potential for reduced subsistence opportunities and associated psychological stress of losing an activity considered vital to indigenous culture (ACIA 2004).

3.5.1. Consideration of Future Climate Condition in this SEIS

CEQ draft guidance published in December 2014 requires federal agencies to address climate change under NEPA stating, "Focused and effective consideration of climate change in NEPA reviews will allow agencies to improve the quality of their decisions". In February 2016, NMFS Alaska Fisheries Science Center published a draft *Climate Science Strategy for the Southeastern Bering Sea Large Marine Ecosystem* (Sigler *et al.* 2016), which describes efforts underway to increase data collection and distribution of climate-change information required to fulfill NMFS' mission. Additionally, in June 2016, NMFS OPR implemented a revised policy for treating climate change uncertainty in ESA decisions. NMFS implements this guidance when conducting analyses and making determinations in support of ESA decision-making in coordination and consultation with OPR. While northern fur seals are not designated as an ESA species, the assessment of climate change in this SEIS addresses aspects of the new NMFS OPR policy as described below (2016):

> *The Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report (AR5), presented four Representative Concentration Pathways (RCPs) to assess future climate changes, risks, and impacts. The RCPs are used for making projections based on population size, economic activity, lifestyle, energy use, land use patterns, technology, and climate policy. They describe four different 21st Century pathways of Greenhouse Gas (GHG) emissions and atmospheric concentrations, air pollutant emissions, and land use. The IPCC did not identify any scenario as being more likely to occur than any other. However, as with any technical issue regarding resource management that involves uncertainties, we must choose a reasonable management approach that takes into account current knowledge and allows for revisiting the approach as new information emerges. In cases of significant uncertainty, it is appropriate to assume conditions similar to the status quo until new information suggests a change is appropriate. Therefore, as a practical way forward, and consistent with the approach taken for the 2014 coral listing analysis and decision, we will evaluate conditions as projected under RCP 8.5. Likewise, we assumed conditions similar to the status quo in our 2008-2012 listing analyses and decisions for ribbon, spotted, ringed, and bearded seals (although those analyses predated IPCC's development of the scenarios discussed in AR5)."*
> *"Climate change may result in some potentially beneficial effects as, for example, new suitable habitat is created in northern, deeper, or higher elevation areas. Listing*

decisions, recovery plans, interagency consultations and other ESA decisions all must evaluate potentially beneficial or offsetting effects during the decision-making process. When the best scientific information is fairly certain of the relative magnitude of the effects, the agency will treat them as such, regardless of whether beneficial or detrimental effects are more likely; when uncertain of the relative magnitude of effects, more weight will be given to the detrimental effects, consistent with the institutionalized caution approach.

Further, CEQ issued guidance on consideration of greenhouse gas emissions and the effects of climate change in NEPA reviews on August 1, 201614. This guidance is meant to facilitate compliance with existing NEPA requirements and provide a common approach for assessing their proposed actions, while recognizing each agency's unique circumstances and authorities. This guidance is applicable to all federal actions subject to NEPA, including site-specific actions, certain funding of site-specific projects, rulemaking actions, permitting decisions, and land and resource management decisions. Consistent with NEPA, NMFS must consider the extent to which the development of a northern fur seal subsistence program on St. Paul Island would contribute to climate change through GHG emissions. In addition, NMFS must take into account the ways in which a changing climate may impact the proposed action or any alternative actions, change the action's environmental effects over the lifetime of those effects, or alter the overall environmental implications of such actions. Commensurate with the guidance, Section 3.5 describes climate change effects within the Project area and the potential implications on the fur seal population. Given that the purpose and need for this action is specifically focused on northern fur seal harvest, there would be no effects on climate change resulting from the alternatives. Section 4.4.8 discusses climate change with respect to the potential cumulative effects it may have on the fur seal population. While the assessment cannot predict specific beneficial or adverse effects of climate change, a qualitative analysis has been undertaken.

3.6. Seabirds

The Pribilof Islands are known for their bird populations. Seabirds spend the majority of their life at sea rather than on land (Hunt *et al.* 1981a, 1981b), but an estimated 2.7 million seabirds migrate to the Pribilof Islands each summer to breed and raise their young. About 2.5 million seabirds occupy St. George Island during the breeding season; the island has eight times more cliff-face habitat than St. Paul Island. Thirty-eight (38) species of seabirds breed in Alaska (Hunt *et al.* 1981c; Hunt and Byrd 1999), 13 of which are known to nest in the Pribilof Islands (Table 3.6-1). The most numerous include thick-billed murre (*Uria lomvia*), common murre (*Uria aalge*), red-legged kittiwake (*Rissa brevirostris*), black-legged kittiwake (*Rissa tridactyla*), least auklet (*Aethia pusilla*), crested auklet (*Aethia cristatella*), parakeet auklet (*Aethia psittacula*), tufted puffin (*Fratercula cirrhata*), horned puffin (*Fratercula corniculata*), red-faced cormorant (*Phalacrocorax urile*), and northern fulmar (*Fulmarus glacialis*). The U.S. Fish and

[14]"Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews", Memorandum for Heads of Federal Departments and Agencies, Center for Environmental Quality, Washington D.C., August 1, 2016. 33 pp.

Wildlife Service (2006) estimated that 80% of the world's red-legged kittiwake population nests on St. George Island. Other seabird species recorded in small numbers, but not necessarily breeding on the islands every year, are the pelagic cormorant (*Phalacrocorax pelagicus*) and glaucous-winged gull (*Larus glaucescens*). St. George Island's murre colony is the largest in Alaska, with 1.5 million thick-billed murres. Population trends differ among species and vary depending on differences in food webs and environmental factors (Hunt *et al.* 1981b, 1981c).

Table 3.6-1 Number of Adult Breeding Seabirds Observed on the Pribilof Islands, Alaska

Species	St. George Island	St. Paul Island	Otter Island	Walrus Island
Northern Fulmar (*Fulmaris glacialis*)	53,980	1,500	83	--
Red-faced Cormorant (*Phalacrocorax urile*)	5,000	2,500	40	42
Glaucous-winged Gull (*Larus glaucescens*)	1	1	--	--
Black-legged Kittiwake (*Rissa tridactyla*)	62,568	18,140	2,096	100
Red-legged Kittiwake (*Rissa brevirostris*)	193,930	1,175	338	--
Common Murre (*Uria aalge*)	201,913	14,243	1	1,021
Thick-billed Murre (*Uria lomvia*)	1,098,600	76,065	1	50
Unidentified Murre (*Uria spp.*)	--	--	12,800	--
Parakeet Auklet (*Aethia psittacula*)	150,000	34,000	1	20
Least Auklet (*Aethia pusilla*)	250,000	23,000	1	300
Crested Auklet (*Aethia cristatella*)	28,000	6,000	1	1
Tufted Puffin (*Fratercula cirrhata*)	6,000	1,000	1	--
Horned Puffin (*Fratercula corniculata*)	28,000	4,400	1	2
Total Cormorant (all cormorant species combined)	5,000	2,500	40	42
Total Murre (all murre species combined)	1,300,513	90,308	12,802	1,071
Total of all species combined	2,077,991	182,023	15,357	1,535

Source: U.S. Fish and Wildlife Service Beringian Seabird Colony Catalog (2005).

Seabird populations and colonies are not static on the Pribilof Islands (Hunt and Byrd 1999). On St. Paul Island, red-legged and black-legged kittiwakes, common and thick-billed murres all experienced declines when analyzed during a 30-year time series study beginning in 1976. Only black-legged kittiwake numbers have increased during the past decade, but still remained far below 1976 numbers. St. George populations have either remained stable or rebounded after declining during the 30-year analysis period (Byrd *et al.* 2008). Interestingly, rates of productivity for kittiwakes and for murres were similar between St. Paul and St. George, suggesting similar responses to summer conditions. Differential mortality of post-fledging juveniles or adults from the two islands may be responsible for the dissimilarities in population level responses on each island (*i.e.*, summer food stress did not cause differences in productivity, but was significant enough to cause physiological consequences that reduced survival). Immigration from St. Paul to St. George, probably by juveniles, may also be a factor (Byrd *et al.* 2008). The reason for the seabird declines is not entirely clear, but scientific studies suggest it is linked to sea surface temperatures, prey availability, and quality (Hunt and Byrd 1999; Kitaysky *et al.* 2006).

3.7. Other Marine Mammals

The BSAI supports one of the richest assemblages of marine mammals in the world (Fay 1981). Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry *et al.* 1982). Twenty-seven (27) marine mammal species are present, including Pinnipedia (*i.e.*, seals, sea lions, and walrus), Cetacea (*i.e.*, whales, dolphins, and porpoises) (Fay 1981; Lowry and Frost 1985; Springer *et al.* 1999), polar bears and sea otters (Order *Carnivora*). The St. Paul

Sentinel Program has documented incidental sightings of marine mammals since 2006 (Table 3.7-1). Seven species of large whales that occur in Alaska and infrequently seen near the Pribilof Islands are listed under the ESA, including the North Pacific right whale (*Eubaleana japonica*), fin whale (*Balaenoptera physalus*), sei whale (*B. borealis*), blue whale (*B. musculus*), sperm whale (*Physeter microcephalus*) (near the northern limits of its range), bowhead whale (*Balaena mysticetus*) (near the southern limits of its range), and the humpback whale (*Megaptera novaeangliae*) (NMFS 2001a).

Table 3.7-1 Sentinel Program Marine Mammal Observations 2006 - 2016

Species	Counts
California Sea Lion	2
Fin Whale	3
Harbor Porpoise	2
Harbor Seal	226
Killer Whale	17
Northern Elephant Seal	2
Ribbon Seal	2
Ringed Seal	1
Sei Whale	1
Sperm Whale	1
Spotted Seal	1
Walrus	11
10 Year Total	**269**

3.7.1. Cetaceans

A large number of small cetaceans are found in the waters near the Pribilof Islands including killer whales (*O. orca*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), harbor porpoises (*Phocoena phocoena*), Dall's porpoises (*Phocoenoides dalli*), and several species of beaked whales (Lowry *et al.* 1982). Many of these species are near the limits of their northern or southern ranges (Haley 1986; Hanna 2008; Preble and McAtee 1923). The bowhead whale is a species near its southern limit. Species near their northern limits are the Dall's porpoise, harbor porpoise, northern giant bottlenose or Baird's beaked whale (*Berardius bairdii*), sperm whale and the North Pacific right whale. The killer whale occurs both north and south of the Pribilof Islands, and may be seen feeding on fur seals. Also, occasionally observed near the Pribilof Islands is the non-ESA listed minke whale (*B. acutorostrata*). In 1915, a harbor porpoise was found at Northeast Point, St. Paul Island, and during the following winter, a school of 13 were forced on shore on St. George Island by drift ice (NOAA 2014). The range of the non-ESA listed gray whale (*Eschrichtius robustus*) includes the Pribilof Islands.

3.7.2. Sea Otters

Sea Otters (*Enhydra lutris*) abundant at the time of Russian discovery of the Pribilof Islands in 1786 were nearly extirpated from the Pribilof Islands by the early to mid-19th Century. Purportedly, as many as 5,000 sea otters were taken from St. Paul Island during the first year of its human settlement (Preble and McAtee 1923). "A dead one was picked up on the beach of St. Paul in 1895 and another on St. George somewhat later" (Hanna 1923). They are now considered uncommon to rare. NOAA filmed a single sea otter feeding in the nearshore waters of St. George Island during 2004 (NOAA 2014)[15].

[15] NOAA. 2014. Historic Preservation and Environmental Restoration of Pribilof Islands, at http://pribilof.noaa.gov/welcome.html. August 26, 2013

3.7.3. Polar Bear

The polar bear (*Ursus maritimus*) is a rare visitor to the Pribilof Islands. In the late 1800s and early 1900s, polar bear arrived in conjunction with the ice pack (Preble and McAtee 1923; Ray 1971). They were last seen on St. George Island in 1915 (NOAA 2014).

3.7.4. Pinnipeds Other than Northern Fur Seals

Three families of pinnipeds are represented in the action area; Otariidae, the eared seals (Steller sea lion and northern fur seal), Odobenidae, the Pacific walrus; and Phocidae, the true seals (harbor, spotted, bearded, ringed, and ribbon) (Lowry *et al.* 1982; NMFS 2001a, 2004). Species near their southern limits are the ringed seal (*Phoca hispida*), bearded seal (*Erignathus barbatus*), and walrus (*Odobenus rosmarus* divergens. Species near their northern limits are the Pacific harbor seal (*Phoca vitulina richardii*) and Steller sea lion (*Eumetopias jubatus*).

3.7.4.1. Steller Sea Lions

Steller sea lions range within the North Pacific Ocean rim from northern Japan to California (Loughlin *et al.* 1984), with centers of abundance and distribution in the GOA and Aleutian Islands, respectively. Pupping and breeding occur during June and July in rookeries on relatively remote islands, rocks, and reefs (NMFS 1998a, 2004). Females demonstrate site fidelity, and generally return to the rookeries where they were born to mate and whelp (Alaska Sea Grant 1993, Calkins and Pitcher 1982, Loughlin *et al.* 1984; Harvey *et al.* 2008). Although most often found within the continental shelf region, they can also be found in pelagic waters (Bonnell *et al.* 1983; Fiscus *et al.* 1976; Kajimura and Loughlin 1988; Kenyon and Rice 1961; Merrick and Loughlin 1997).

The Pribilof Islands were once home, breeding grounds, and haulouts for thousands of Steller sea lions (20,000 to 25,000 on St. Paul Island and 7,000 to 8,000 on St. George Island with a few breeding on Walrus Island) (Preble and McAtee 1923; Elliott 1875). Osgood *et al.* (1915) wrote:

> *Until comparatively recent times, sea lions were found in thousands on both St. Paul and St. George Islands…Where formerly there were many thousands of the huge creatures, there are at present only a few hundred on both islands.*

Northeast Point was documented as the major sea-lion rookery on St. Paul Island (Preble and McAtee 1923; Osgood *et al.* 1915). St. George Island held at least three sea-lion rookeries: Sea Lion Point (near Garden Cove), East Rookery and Tolstoi Point. A sea-lion rookery may have also existed at Sea Lion Rock (Kenyon 1962; Preble and McAtee 1923; Osgood *et al.* 1915; Hanna 2008). Sea lions were heavily harvested on the Pribilofs as a result of their perceived competition with fur seals for beach space, and for their skins as coverings for the bidars (Kenyon 1962). In 1916, roughly 400 Steller sea lions were counted on the Pribilof Islands at the height of the breeding season; in 1922, only 1,000 animals were observed (Hanna 2008). Sea lions were still present on Walrus Island during the first decade of the 21st century; Walrus Island represents the northernmost breeding colony in the Bering Sea (Alaska Fisheries Science Center 1996).

The western population of Steller sea lions, including those on the Pribilof Islands, was listed as threatened under the ESA throughout its range on 26 November 1991[16] as a result of significant declines in the population (Merrick *et al.* 1987; NMFS 1992, 2008). In 1997, NMFS reclassified Steller sea lions as two distinct population segments (DPS) under the ESA[17]. On June 5, 1997, the population segment west of 144°W, Cape Suckling, Alaska, was reclassified as endangered [18] due to continued declines (Loughlin *et al.* 1984; NMFS 1992, 2008). Steller sea lions on the Pribilof Islands are included in the Western DPS. The Eastern DPS continued to increase in abundance (NMFS 2008) and on April 18, 2012, NMFS proposed to delist this DPS[19] from the List of Endangered and Threatened Wildlife. The final rule delisting the Eastern DPS of Steller sea lions was published on November 4, 2013[20]. Although the Western DPS Steller sea lion numbers are considered endangered, they are still hunted for subsistence purposes on the Pribilof Islands (Wolfe and Mishler 1998; Wolfe *et al.* 2005, 2009; NMFS 2014a).

Similar dietary requirements are important characteristics shared by fur seals and sea lions (Lowry *et al.* 1989); however, there is currently no evidence of direct competition between the two mammals as they consume different size and age classes of prey. Both species may also indirectly compete with commercial fisheries in the area (Lowry and Frost 1985; NMFS 2001a, 2003, 2005). In the Bering Sea, the Steller sea lion diet consists of a variety of schooling fishes (*e.g.*, pollock, Atka mackerel, Pacific cod, flatfish, sculpin, capelin, Pacific sand lance, rockfish, Pacific herring, and salmon), and cephalopods, such as octopus and squid (Calkins and Goodwin 1988; Lowry *et al.* 1982; Merrick and Calkins 1995; Perez 1990). On the Pribilof Islands, sea lion diets overlap with those of fur seals with regard to walleye pollock (NMFS 2001a). The potential for indirect competition between sea lions and commercial fisheries is well-established (Lowry *et al.* 1982, 1989; NMFS 2000, 2001a, 2001b, 2014b), and the possibility of similar competition between commercial fisheries and northern fur seals does occur (NMFS 2001a, 2005, 2014a). Interspecies dynamics between Steller sea lions and northern fur seals is discussed further in Chapter 4 as part of the effects of commercial fishing.

3.7.4.2. Pacific Walrus

The Pacific walrus ranges primarily in the shelf waters of the Bering Chukchi Seas (Allen 1880). During the summer, most of the population congregates at the southern edge of the Chukchi Sea pack ice between Long Strait, Wrangell Island, and Point Barrow (Fay *et al.* 1984); the remainder of the population, primarily adult males, occupies the Bering Sea (Brooks 1954; Burns 1965; Fay 1955, 1982; Fay *et al.* 1984). During the Russian tenure on the Pribilof Islands, walrus were believed to be present in sufficient numbers to allow an annual harvest. St. George, St. Paul, and Walrus Islands appear to have been walrus haulouts. According to an interview conducted at St. George Island (E. Philemonoff, reported in NOAA 2014), many walrus lined the beach between Sea Lion Point and Tolstoi Point. Walrus remains found on the islands have been predominantly male; therefore, no indication exists that walrus utilized these islands for breeding purposes (Elliott 1875; Preble and McAtee 1923). Human habitation of St. George and St.

[16] *Federal Register* 55 FR 49204

[17] *Federal Register* 62 FR 24345

[18] *Federal Register* 62 FR 30772

[19] *Federal Register* 77 FR 23209

[20] *Federal Register* 78 FR 66140

Paul Islands is credited with the disappearance of walrus from these islands. The last report of a significant walrus haulout on the Pribilof Islands was Elliott's 1872 observation of at least 150 males on Walrus Island (Elliott 1875). Preble and McAtee (1923) summarized walrus sightings on the Pribilof Islands up through 1918. Walrus occasionally appear on the islands to this day, although more typically as weakened or dead animals. Two dead walruses were found in January 2006 on St. George Island beaches, one near Tolstoi Point and the other near East Rookery (Andrew Malavansky 2006, Pers. Comm., reported in NOAA 2014). These occurrences may have coincided with and been related to pack ice located within two miles of St. George Island during the same period. Bones still commonly appear in the dunes and beaches about Northeast Point on St. Paul Island. The Pribilof Islands is currently considered at the southern limit of the range of this species.

3.7.4.3. Harbor Seals

In 2010, NMFS and their co-management partners, the Alaska Native Harbor Seal Commission, separated harbor seals into 12 separate stocks, based largely on the genetic structure. Westlake and O'Corry-Crowe's (2003) analysis of genetic information revealed population subdivisions, suggesting a direct relationship between genetic differences within Alaska (and most likely over their entire North Pacific range) and geographic distance. Given the genetic samples were not obtained continuously throughout the range, a total evidence approach was used to consider additional factors such as population trends, observed harbor seal movements and traditional Alaska Native use areas in the final designation of stock boundaries. This represents a significant increase in the number of harbor seal stocks from the three stocks (*i.e.*, Bering Sea, GOA, Southeast Alaska) previously recognized. Harbor seals found on St. Paul Island are considered part of the Pribilof Islands Stock (Allen and Angliss 2015).

Allen and Angliss (2015) state harbor seal counts in the Pribilof Islands ranged from 250 to 1,224 in the 1970s, and between 119 and 232 in the 1980s and 1990s. Prior to July 2010, the most recent count was in 1995 and reported a total count of 202. Roughly, 185 adults and 27 pups were observed on Otter Island in 2010. The 2010 estimate for all the Pribilofs was 232 harbor seals. The current population trend in the Pribilof Islands is unknown. Historically, two rookeries were located on St. Paul Island; the first near the now abandoned Russian village of Marunich on the north shore, and the other at the Southwest Point of the island (NOAA 2014). Recent subsistence surveys (Wolfe *et al.* 2005, 2009) indicate that very few harbor seals are harvested by residents on St. Paul and St. George Islands on an annual basis.

3.7.4.4. Spotted Seals

Spotted seals are distributed along the continental shelf of the Beaufort, Chukchi, Bering, and Okhotsk seas south to the northern Yellow Sea and western Sea of Japan (Shaughnessy and Fay 1977). They are known to occur around the Pribilof Islands (the southern end of their range), Bristol Bay, and the eastern Aleutian Islands; eight known breeding areas have been identified (Shaughnessy and Fay 1977). Boveng *et al.* (2009) grouped those breeding areas into three DPSs on the basis of genetic composition, potential geographic barriers, and significance of breeding groups. They include the Bering DPS, which includes breeding areas in the Bering Sea; the Okhotsk DPS; and the Southern DPS, which includes spotted seals breeding in the Yellow Sea and Peter the Great Bay in the Sea of Japan. The Bering DPS is considered the Alaska stock of the spotted seal. Preferred habitat for spotted seals is the "front zone" of pack ice, generally rectangular floes 10 to 20 m in diameter with brash ice or open water in between (Burns 1970).

3.7.4.5. Bearded Seals

Bearded seals are circumpolar in their distribution, extending from the Arctic Ocean south to Hokkaido in the western Pacific. In Alaskan waters, bearded seals occur on the continental shelves of the Bering Sea, Chukchi Sea, and Beaufort Sea (Johnson *et al.* 1966; Burns 1967, 1981a; Burns and Frost 1983; Kelly 1988a). The Pribilof Islands are considered to be the southern extremity of their range. The presence of several bearded seals on a St. George Island beach in 1900 was postulated to be associated with the ice pack near the island that year (NMFS 2014a). Only one Alaska bearded seal stock is recognized in U.S. waters. Early estimates of the Bering- Chukchi Sea population range from 250,000 to 300,000 (Burns 1981a; Burns *et al.* 1981; Popov 1976). Conn *et al.* (2014) reported an estimate of 299,174 (95% CI 245,476 to 360,544) bearded seals in the Bering Sea using data from a more extensive, fixed-wing survey conducted during April and May of 2012 and 2013; however, these data are preliminary and are still being analyzed.

Bearded seals are pagophilic, meaning they inhabit the seasonally ice-covered seas of the Northern Hemisphere where they whelp and rear their pups, and molt their coats on the ice in the spring and early summer (Burns and Frost 1979; Burns 1981a; Burns 1967).

On December 28, 2012, bearded seals were listed as threatened under the ESA and as depleted under the MMPA[21], but the ruling was vacated by a U.S. District judge in 2014.

3.7.4.6. Ringed Seals

Ringed seals have a circumpolar distribution in all Arctic Ocean waters (Kelly 1988b). In the eastern North Pacific Ocean, they are found in the southern Bering Sea and range as far south as the seas of Okhotsk and Japan. They have an affinity for ice-covered waters and are well adapted to occupying seasonal and permanent ice. They remain in contact with ice most of the year and pup on the ice in late winter and early spring (McLaren 1958). Only the Alaska stock is recognized in U.S. waters (Allen and Angliss 2015). Preliminary analysis of 2012 data from the U.S. surveys produced an estimate of about 170,000 ringed seals in the U.S. EEZ of the Bering Sea in late April; however, these data are preliminary and are still being analyzed (Conn *et al.* 2014).

Ringed seals were listed as threatened under the ESA in 2012 and as depleted under the MMPA. In 2014, NOAA submitted a proposal for critical habitat designation in the Bering, Beaufort, and Chukchi seas, which is currently under review[22].

3.7.4.7. Ribbon Seals

Ribbon seals inhabit the North Pacific Ocean and adjacent fringes of the Arctic Ocean. In Alaskan waters, ribbon seals are found in the open sea, on the pack ice, and on shore-fast ice (Kelly 1988c). They range northward from Bristol Bay in the Bering Sea into the Chukchi and western Beaufort seas (Braham *et al.* 1984; Burns 1970; 1981b). Ribbon seals are associated with the northern part of the ice front in the central and western parts of the Bering Sea (Burns 1970; Burns *et al.* 1981). In May and through mid-

[21] *Federal Register* 77 FR 76740

[22] *Federal Register* 79 FR 73010

July, as the ice recedes, seals move farther north in the Bering Sea, where they haulout on the receding ice edge and remnant ice (Burns 1970; 1981b; Burns *et al.* 1981). NOAA reported (2014):

> *One of these beautiful animals [ribbon seal] was taken 84 miles west of St. Paul Island in 1896; a native of St. George, George Merculief, shot one from shore in 1900 and another was seen at the Myak of that island, hauled up with the other hair seals, during the winter of 1916.*

A reliable abundance estimate for the Alaska stock of ribbon seals is currently unavailable. Burns (1981b) estimated the Bering Sea population at 90,000 to 100,000.

3.7.5. Land Mammals - Caribou (Reindeer)

Twenty-five (25) "reindeer" (*Rangifer tarandus*) were introduced onto St. Paul Island in 1911 (Hanna 1923). By 1921, the population had grown to 250 animals (Preble and McAtee 1923), and by 1938, there were about 2,000 reindeer on St. Paul Island (Thompson 1954). Poaching, harsh winter weather and starvation resulting from overgrazing severely depleted the St. Paul herd in the 1940s (Scheffer 1951; Thompson 1954). In 1950, only eight reindeer remained on St. Paul Island; subsequently in 1951, 31 reindeer were brought to the island from Nunivak Island (Thompson 1954). Currently, several hundred reindeer roam St. Paul Island. While the reindeer are currently hunted by the residents of St. Paul Island, the subsistence use of this species is relatively small when compared to Aleut subsistence use of marine resources.

3.8. Pacific Halibut

Pacific halibut (*Hippoglossus stenolepis)* (hereafter halibut) are among the largest teleost (ray-finned) fish in the world. Halibut inhabit the continental shelf of the North Pacific Ocean and the Bering Sea. They range between the North American coast from Santa Barbara, California to Nome, Alaska and also occur along the Asiatic coast from the Gulf of Anadyr, Russia to Hokkaido, Japan. Halibut are demersal, living on or near the bottom, and prefer water temperature ranging from 3 to 8 degrees Celsius (°C).

Halibut are strong swimmers and carnivorous feeders. When young, larval halibut feed on plankton. As they grow older (1 to 3 years), they will feed on small shrimp-like organisms and small fish. As halibut increase in size, fish such as cod, sablefish, pollock, rockfish, sculpins, turbot, and other flatfish become a more important part of the diet. Although primarily bottom dwelling, halibut often leave the bottom to feed on pelagic fish such as sand lance and herring. Other prey species include octopus, crabs, and clams, and an occasional smaller halibut. Crabs with a carapace width of up to 7 inches have also been found in the stomachs of halibut, although halibut do not appear to be a primary predator of crab. The size, active nature, and bottom dwelling habits make halibut less vulnerable to predation; however, they are occasionally eaten by marine mammals and sometimes prey for other fish (International Pacific Halibut Commission [IPHC] 1998). Halibut are an important species in terms of both subsistence, as well as commercial harvest, for St. Paul residents. Additional information on the socioeconomic importance of halibut is included in Section 3.9.8.

3.9. Social, Economic and Cultural Environment

The proposed action affects the Alaska Native community of St. Paul Island. This section first describes the population size, trends, and ethnic composition of St. Paul, along with similar characteristics of other communities in the Pribilof and Aleutian Islands. A brief description of the St. Paul economy and employment trends since the cessation of the commercial harvest of fur seals, as well as the regulation of subsistence harvest, is also included. St. Paul's economy is unique in Alaska, having been based exclusively on revenue generated by NMFS through 1984 from the commercial harvest of northern fur seals for their pelts. In the early 1980s, the U.S. began the process of transferring its prior municipal and administrative responsibilities to island self-governance and endowed a $20 million trust to establish economies on the Pribilofs not based on sealing. The subsistence use patterns and trends are an important component of the social, economic, and cultural environment on St. Paul Island. In this case, subsistence is described not exclusively as "meat" in a nutritional sense but as part of a complex relationship between sociocultural aspects and consumptive value. Finally, this section also discusses the relationship between subsistence and food security.

3.9.1. Population

The Pribilof Islands were first discovered by Russian explorers in June 1786, and the exploitation of fur seals began almost immediately thereafter. Beginning in 1788, the Russian American Company relocated Aleuts from Siberia, Atka, and Unalaska to the Pribilof Islands and forced them to hunt fur seals for commercial trade (Veltre and Veltre 1981). The contemporary population of the communities of St. Paul and St. George trace their ancestry to those original hunters.

Census data indicate that the population size and ethnic composition of St. Paul Island has changed modestly since 1980. St. Paul (and St. George) has maintained a much higher Alaska Native population than any other community in the BSAI region (Table 3.9-1). There were 483 Alaska Natives residing there in 1980, and in 2010 there were 394 (88% and 82% of the total population, respectively) (NMFS 2003). A population increase in 1990 was sustained through much of the decade before the decline to the current level (Huntington *et al.* 2009).

Table 3.9-1 Census Data for Alaskan Communities

Census Year	Total Population	Alaska Native Population (%)
1980	551	483 (88%) *
1990	763	504 (66%) **
2000	457	393 (86%) ***
2010	479	394 (82%) ***

* 1980 Census Data for Alaskan Communities, IHS 1981
https://www.ihs.gov/alaska/includes/themes/newihstheme/display_objects/documents/other/1980_census_data_for_Alaskan_communities.pdf
** 1990 Census Data. http://labor.alaska.gov/research/census/histpdfs/1990char.pdf, Page 23
*** Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. Little. 2013. Community profiles for North Pacific fisheries - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 6, 348 p.

3.9.2. Employment, Income and Local Revenue

In 1979, NMFS employed 62 of the 100 near full-time employees on St. Paul Island (Management and Planning Services 1980). The overall labor participation rate (*i.e.*, the percentage of the total population holding near full-time employment) was 20%, this is approximately 50% lower than the participation rate for communities with developed economies (Management and Planning Services 1980). Alternatively, the employment rate was estimated at 26% in 1980, and increased to 57% and 51% in 1990 and 2000, respectively. NMFS total expenditures in 1979 related to the operation and administration of the Pribilof Islands was about $4.1 million, which included about $2,133,400 for the administration of St. Paul Island (Department of Commerce [DOC] 1985; Management and Planning Services 1980).

From 1980 to 1984, NMFS transitioned all "municipal" employees to the City of St. Paul, which had become a Second Class city in 1971. NMFS annual funding for the administration of the Pribilof Islands continued through 1985 (Table 3.9-2) (DOC 1985). However, in 1984 the Pribilof Island Program was terminated as its foundation was based on the commercial fur seal harvest. These costs do not include those for fur seal research, which were on average $330,000 annually in the 1980s. In addition, NMFS funded $150,000 annually in other transition costs, including commercial and subsistence harvest monitoring in 1984 and 1985 not shown in Table 3.9-2.

Table 3.9-2 NMFS Costs for the Administration of the Pribilof Islands Program 1979-1985

Fiscal Year	Actual Obligation
1979	$4,149,600
1980	$5,143,300
1981	$5,328,200
1982	$5,473,800
1983	$5,949,500
1984	$1,377,600
1985	$2,556,000 (Estimated)

In 1984, the DOC established a $20 million trust to "promote the development of a stable, self-sufficient enduring and diversified economy not dependent upon sealing" (16 U.S.C. §1166(a)(1)). Alternatively, the State of Alaska and Aleut representatives from the Pribilof Islands recommended NMFS continue a 5-year, full-level appropriation during the transition period beginning in 1984. St. Paul's portion of this economic development trust was $12 million. The State of Alaska appropriated more than $30 million in 1983 and 1984 for Pribilof Island boat harbors. The St. Paul commercial halibut fishery started in 1981, 33 small fishing boats (16 to33 feet) participated in the halibut and crab fisheries by 1983, and a Trident Seafoods crab processing plant was built in 1989.

Huntington *et al.* (2009) reported the annual median household income on St. Paul in 1980, 1990, and 2000 was $22,813, $39,922, and $50,750, respectively. The average per capita income in St. Paul between 2009 and 2013 was approximately $20,901, with a median family income of $39,583 (U.S. Census Bureau 2013). In 1999, average per capita income was $18,408 and median family was $51,750 (U.S. Census Bureau 2000). With a 34% decrease in median family income in the last 15 years, there may be even greater reliance on subsistence sources of food.

The local commercial halibut fishery got its start on St. Paul Island in 1981, and a crab processing plant was built several years later that also processes halibut (NMFS 2005). Local residents hold commercial fishing permits for halibut, a few own halibut individual fishing quotas. Crab is also processed on seafood processing vessels in the harbor on St. Paul and offshore by floating processors. Crab rationalization changed harvest and processing restrictions for commercial crab fisheries around the Pribilof Islands.

St. Paul's primary economic sector is commercial fishing. St. Paul is the only member community in the CBSFA, a Community Development Quota (CDQ) group that provides economically disadvantaged communities in western Alaska with the opportunity to generate capital with which they could develop stable local economies based on the fishing industry.

Through the CDQ program, St. Paul is allocated 85% of the halibut quota for their unit while the remaining 15% of the quota is allocated to the Aleutian Pribilof Islands Community Development Association (*i.e.*, a group representing St. George) (IPHC 4C[23]). In 2016, CBSFA's portion of the total allowable catch (quota) for halibut is 311,780 pounds (NOAA 2016). While CBSFA owns several crab vessels[24], local fishermen engage almost exclusively in the halibut fishery (Alaska Department of Fish and Game [ADFG] 2010). The average ex-vessel gross revenue for St. Paul was more than $2.15 million from 2003 to 2013 (North Pacific Fishery Management Council [NPFMC] 2015). The total number of St. Paul-based BSAI halibut fishermen has ranged between approximately 20 to 30 residents between 2000 and 2010 (NPFMC 2015). Additional information on management of the halibut fishery is included in Section 3.8.

Trident Seafoods owns and operates a large seafood processing facility on St. Paul, providing a variety of employment opportunities for residents during the BSAI crab season in the fall and winter. The plant also processes locally caught halibut during the summer providing additional employment opportunities. City revenue relies heavily on fish taxes from the processing plant with the majority coming from the crab fishery. For this reason, St. Paul is fiscally susceptible to any declines in the crab fishery such as occurred 1999 to 2000. Local tax revenues in St. Paul were more than $3 million in 1999, but decreased in 2000 to $731,000. Taxes in 2008, however, were back up again at nearly $4 million (ADFG 2010). According to an NPFMC report (2015), the average gross wholesale revenue for shore-based processors on St. Paul, Akutan and Unalaska (combined) receiving BSAI halibut was $24.9 million from 2003 to 2013, representing more than 80% of the total revenue for all participating communities (Alaska Fisheries Information Network 2015 as reported in NPFMC 2015). The crab fishery has become more stable in recent years due to rationalization. CBSFA has reinvested profits from the crab fishery into local infrastructure such as cranes, a small boat harbor, and a new boat maintenance facility (ADFG 2010).

3.9.3. Commercial Harvests of Northern Fur Seals on the Pribilof Islands

Details of the fur seal harvest and management under Russian ownership can be found in numerous other references including Roppel (1984); Gentry (1998); Scheffer *et al.* (1984). The fur seal population was reportedly thriving and was sustaining an annual harvest of several thousand males when the U.S. purchased Alaska in 1867 (York and Hartley 1981). During the first 2 years following the purchase of

[23] http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/chart03_bs.pdf

[24] CBSFA owns two crab vessels outright, two vessels at 75% and two additional vessels at 35%.

Alaska by the U.S., the fur seal harvest ensued without restrictions. Multiple individual harvesting companies arrived in the Pribilofs for the 1868 season and approximately 240,000 seals were killed during that season on island. These first 2 years of tax revenues were generated for the U.S. Treasury on the sale of skins, and the island economics immediately following the departure of the Russians are largely unknown.

In 1870, a 20-year sealing lease was awarded to the Alaska Commercial Company by the U.S. government, which provided housing, food, and medical care to Aleuts in exchange for harvesting seals. The Alaska Commercial Company paid the U.S. government annual rent of $55,000.00, plus $2.625 per skin taken up to the maximum quota of 100,000 per year. A second 20-year lease was awarded to the North American Commercial Company in 1890, but by then, northern fur seals had been overharvested, annual harvest quotas were never reached and the resultant skin sales were substantially lower than projected. Subsequently, St. Paul became severely impoverished due to the lack of other sources of income.

The 20-year lease arrangement to a single company on the Pribilof Islands caused the remaining sealing companies to focus their operations at sea where U.S. jurisdiction was in dispute across the fur seal migratory range. The history of pelagic sealing (1875 to 1909), its impact on the fur seal population, and a subsequent treaty that banned pelagic sealing is found in Roppel and Davey (1965) and Gentry (1998). At the peak of pelagic sealing (1891 to 1900), more than 42,000 fur seals (mostly lactating females) were taken annually in the Bering Sea (Scheffer *et al.* 1984). The pelagic fleet sold 279,396 skins from 1872 to 1889 (Rogers 1976). However, this does not account for the total number of seals killed because the number of seals struck and lost is unknown.

The Fur Seal Treaty of 1911 prohibited international pelagic sealing by the signatory countries of Great Britain, Japan, Russia, and the U.S. Commercial harvests on land were banned by Congress from 1911 to 1917, and the lease program was terminated and the U.S. government took over direct management and operation. At this time, harvest levels were initially managed by a general seal quota, and subsequently changed to only harvest non-breeding males. More than 6 million northern fur seals were harvested commercially under the U.S. control of the Pribilof Islands.

The population grew rapidly after the cessation of pelagic sealing until the mid-1940s. From 1918 to about 1941, the Pribilof Island fur seal stock grew at 8% per year under a harvest, which ranged from 15,862 animals in 1923 to 95,016 animals in 1941 (Roppel 1984). In 1941, Japan abrogated (revoked) the 1911 convention on the grounds that fur seals were too numerous and were damaging Japanese commercial fisheries. No commercial harvest took place in 1942 due to World War II and the Aleut evacuation and internment in camps at Funter Bay, AK (Kohlhoff 1995s). In 1943, Aleuts were returned to harvest seals on the Pribilofs during the summer and returned to their internment camp in Funter Bay. The harvest levels from 1943 to 1955 averaged about 70,000 fur seals per year (Roppel 1984).

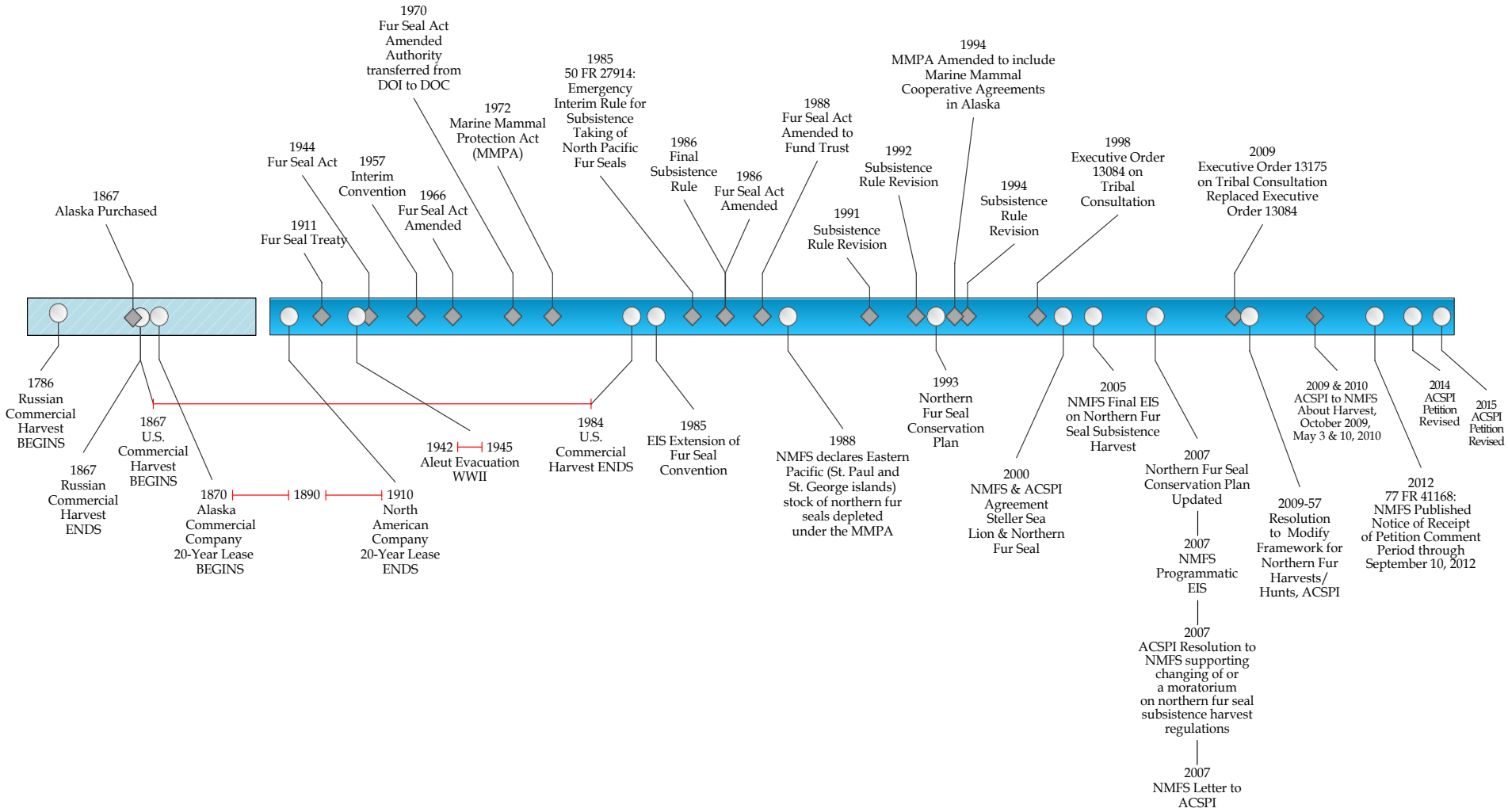
Revenue from the commercial harvest of fur seals was substantial and profitable for the U.S. Treasury until the Fiscal Year 1982 (DOC 1985). In 1970, the U.S. received about $2.2 million in revenue, but by 1983, that revenue was about $143,000. Therefore, in 1983 the Pribilof Islands Program was terminated, including jobs and community services for island residents (NMFS 1985). In 1984, NOAA funding obligations were largely reduced to costs associated with the federal facilities transfer to the islands, a harvest contract to the Tanadgusix Corporation (TDX) to commercially harvest fur seals for their skins at

a cost of $500,000, and continuing responsibilities in fur seal management harvest oversight ($150,000) (NMFS 1985). In addition TDX was able generate additional revenue from sales of about 30,000 unprocessed skins backlogged from 1981 through 1983 and byproducts from the 1984 harvest to include seal sticks (*i.e.*, baculum) and meal for dog food and crab bait. TDX commercially harvested 22,066 fur seals on behalf of the U.S. in 1984.

A report from the National Advisory Committee on Oceans and Atmosphere (1985) reported that the cost for the U.S. government to conduct the 1984 harvest was about $1.1 million; the gross total annual subsidy between the mid-1970s and mid-1980s was approximately $5 to $6 million, annually. Between 1979 and 1983, NOAA was funded to administer the Pribilof Island Program at between $4.1 and $5.9 million, annually. This included funds for the administration of the Pribilof Islands (*i.e.*, providing municipal, health, and education services for both communities) and conduct of the fur seal harvest. It did not include funding for the fur seal research programs, which also averaged $330,000, annually (NMFS 1985).

Figure 3.9-1 provides a detailed timeline showing the regulatory and legal history of federal actions related to northern fur seals on St. Paul Island.

Figure 3.9-1 Regulatory and Legal History of Federal Actions Related to Northern Fur Seals on St. Paul Island



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3.9.4. Aleut Culture, the Subsistence Economy and Northern Fur Seals

Historically, Aleuts occupied islands throughout the Aleutian Archipelago and, based on archeological data dating back 4,000 years, had adapted a lifestyle in which all basic necessities came from the sea (Veltre and Veltre 1981). Pribilovians are descendants of the Aleuts that settled along the Aleutian Archipelago and refer to themselves as Unangan, meaning "the coast" or "seashore". The Alaska Native portions of both communities on the Pribilof Islands maintained many aspects of a traditional subsistence lifestyle, consuming fur seals, sea lions, seabirds, fish and berries, and utilizing the non-edible portions to create handicrafts through the 1980s (Veltre and Veltre 1981, 1987). The Aleut word used as reference to autumn is "Kimadgim tugida," which translates to "time of fur seal hunting" (NMFS 2014a).

Northern fur seals were likely available at sea during much of the year to some Aleutian Island communities. Records of subsistence harvests prior to the 1860s indicate a focus on pups of the year, with thousands harvested annually during the late 1800s. A tradition of hunting northern fur seal pups (*i.e.*, young of the year) is supported by historical and archeological records from the Aleutian region. The prevalence of the remains of young seals discovered in Aleutian archeological excavations seem to indicate a preference for or a higher availability of this younger age class (Lippold 1966). Likewise, Yesner (1977) reported 70% of the northern fur seal bones at Aleutian Island archeological sites were from pups. Bones from pre-weaned northern fur seals have also been found in middens (*i.e.*, refuse heaps), providing further evidence of their presence in the Aleut diet and region historically (Newsome *et al.* 2007). Jochelson (1966) reported Aleut hunters mostly killed migrating northern fur seal pups passing through the islands. Pribilovian testimony from during the Fur Seal Arbitration also indicated the most highly prized food was from pups (reported in NMFS 2014a).

A detailed understanding about Aleut beliefs prior to European contact is not well defined, although early Russian priests reported that Aleuts followed the guidance of local shamans (indigenous priests or ritual specialist) regarding hunting taboos, weather, and predictions for the future. Sunlight and seawater were regarded as sacred sources of life. Data summarized by Laughlin (1980) from a "pre-contact" archeological site on Umnak Island indicate that while estimates may vary (up to approximately 10%) depending on the specific location or time of year, the Priblovians' subsistence diet was distributed amongst locally available natural resources with greater dependency on marine mammals. An example of the distribution of resources was likely to have been similar to the following: marine mammals 30%; fish 30%; birds and eggs 20%; invertebrates 15%; and plants 5% (as cited in Veltre and Veltre 1981). While limited data make it difficult to state what a "typical" subsistence ratio was across the Aleutian Islands, McCartney (1977; 1982) indicated that these percentages represent likely orders of magnitude in terms of their importance as food. Veltre and Veltre (1981) build on this discussion adding that it is important to also recognize that the food sources available in the Pribilof Islands such as St. Paul are very different from other locations in the Aleutians. For example, no anadromous fish streams are found on St. Paul though a few mistakenly enter Salt Lagoon each year and caught locally, thus fur seals are the most reliable source of fresh meat.

Subsistence harvests from 1870 to 1917 were first recorded during leases to the Alaska Commercial Company and North American Commercial Company. Harvests during this period were highly coordinated, organized, and supervised by the U.S. government agents. Pribilovians would gather, sex,

and harvest male pups primarily in October and November, prior to weaning (Jordan 1898). St. Paul harvested an average of 3,133 northern fur seal pups from 1870 – 1890 (Table 3.9-3).

The commercial harvest for skins altered the typical Aleut subsistence lifestyle because of the availability of excess meat on a daily and seasonal basis (Veltre and Veltre 1987). Once the commercial harvest was completed and skins were processed and barreled for transport off-island, the Pribilovians began a seasonal transition to hunting and gathering subsistence resources for the winter and spring. The Unangan maritime culture has revolved around harvesting and hunting marine resources, including northern fur seals. The Unangan use diverse sharing networks built on community cooperation to create their subsistence economy (APIAI 2015).

Table 3.9-3 The Cumulative Northern Fur Seal Pup Harvest for St. Paul Island

Year	St. Paul Island
1870	2,800
1871	2,877
1872	5,121
1873	5,489
1874	4,897
1875	3,745
1876	3,958
1877	5,007
1878	5,206
1879	5,071
1880	4,413
1881	No Harvest
1882	No Harvest
1883	2,982
1884	2,741
1885	2,788
1886	2,824
1887	2,177
1888	2,178
1889	2,280
1890	2,364
1891	No Harvest
Total	68,918

Source: Jordan 1898

Jordan (1898) indicated a quota of 72 pups per family in 1872, and 12 per person in 1890 on St. Paul. Elliot (1881) indicated 22 to 30 pups harvested per person on St. Paul with an approximate population of 218 people in 1873. The desire to harvest seal pups was noted by a treasury agent on St. George Island, in which he wrote, “Today is for pup driving, the greatest day in the life of the Aleuts” (St. George Log Book 1887, reported in NMFS 2014a). The Russian and American island agents maintained this subsistence use of seal pups until 1890.

The termination of the seal pup harvest in 1891 was implemented as a conservation measure to help the recovery of the northern fur seal herd from pelagic sealing. That year, a village meeting about the termination of the pup harvest was held on St. Paul, with the Native peoples agreeing to forego seal pup harvest “if by so doing they would aid the government to protect seal life on the islands” (St. Paul Log book 1891, reported in NMFS 2014a). Although they agreed to the government’s conservation proposition, the Pribilovians still considered the termination of the pup harvest to be a harsh and extreme

measure. In his deposition during the Fur Seal Arbitration (Volume 3 1893 p. 101), Chief Kerrick Artomanof of St. Paul said (reported in NMFS 2014a):

> *The pup seals are our chicken meat, and we used to be allowed to kill 3,000 to 4,000 male pups every year in November, but the Government agent forbade us to kill any more, and he gave us other meat in place of pup meat; but we do not like any other meat as well as pup-seal meat.*

This local sentiment is continued to this day, and there is no alternative fresh fur seal meat available on the Pribilof Islands at this time of year due to current harvest restrictions.

Government records indicate that Pribilovians were allowed to retain the pelts from subsistence pup harvests to barter and trade (St. George Agent Log Book 1887), unlike all other pelts. Numbers of seals reported as killed for food are significantly lower after 1895 than in earlier years, possibly reflecting seals used for food during the commercial harvest season and not a pup harvest as recorded in prior years.

Although the population recovered after the cessation of pelagic sealing under the Fur Seal Treaty, the seal pup harvest was never reinstated. Many of the records for food harvests are incomplete or were inconsistently reported after the fur seal population recovered; therefore, a quantitative comparison of the subsistence food harvest before and after the Fur Seal Treaty is not possible.

During the 1950s and afterwards, harvests for food became less the duty of the lessee or the government and more a responsibility of local residents. Records are incomplete and may represent a subset of those seals harvested for skins. Seal carcasses were available on the killing ground following the commercial harvest for anyone who needed food (Veltre and Veltre 1981). Residents took meat for immediate needs and for the winter season. Residents of St. George, where commercial sealing was banned in 1972, conducted a small subsistence harvest of their own and obtained meat from the St. Paul commercial harvest (Zimmerman and Letcher 1986).

It is evident that St. Paul Island residents have a need for long-term sustainable use of northern fur seals for subsistence purposes of cultural continuity, food, clothing, arts, and crafts. The 2014 St. Paul petition to modify the harvest regulations describes their subsistence need for fur seals to include a longer season than currently authorized under the federal regulations. During the 1986 emergency rulemaking[25] comments from the St. Paul TDX and Tribal Government both requested an extended season, a "family-style" organization, and preference for seals based on food quality, not skin quality, as was the case for the commercial harvest season. The Pribilovian subsistence code of ethics includes hunting practices, sharing resources, and respecting elders. Women and children continue to be involved in the harvest of fur seals, and have extended their roles beyond gathering seal meat from the killing grounds as occurred during the commercial period. The current subsistence harvest on St. Paul has progressed into a "family-style" organization despite regulatory restrictions prescribing how to harvest rather than a flexible arrangement where positive outcomes allow the community to meet their need and adapt to changing economic and cultural conditions. During winter months, salted and frozen fur seal is shared along extended family lines and supplemented with Steller sea lion and reindeer meat (APIAI 2015).

[25] *Federal Register* 51 FR 24828

3.9.4.1. Fur Seal Harvest Management under the FSA and the MMPA

Following the Fur Seal Treaty of 1911, Congress passed the FSA of 1912[26], incorporating the Fur Seal Treaty as a U.S. statute. The signatories of the 1911 Treaty ratified a revised agreement in 1957, the "Interim Convention on the Conservation of North Pacific Fur Seals, for the conservation, research, and harvesting of fur seals" (the Convention). The authority of the 1957 Convention was extended in 1963, 1969, 1976 and 1980, and the FSA was amended in 1966 (16 U.S.C. 1151-1187, P.L. 89-702, November 2, 1966, 80 Stat. 1091) to address revisions in the Convention and to domestically implement the Convention[27] by, among other things, providing for the administration of the Pribilof Islands as a special reservation for the purpose of conserving, managing, and protecting the North Pacific fur seal population. Several of the major purposes of the FSA were to give the Secretary of Interior broader discretion in the administration of the Pribilof Islands, encourage self-government, and provide certain benefits for the residents of the islands. The 1966 statute prohibited, except under specified conditions, the taking, including transportation, importing or possession, of fur seals and sea otters. Exceptions were authorized for Indians, Aleuts, and Eskimos who dwell on the coasts of the North Pacific Ocean, who are permitted to take fur seals and dispose of their skins. The statute also authorized the Secretary of Interior to conduct scientific research on the fur seal resources of the North Pacific Ocean. The functions authorized by the FSA were transferred from the Secretary of Interior to the Secretary of Commerce in 1970[28].

From 1957 thru 1984, the harvest of fur seals in the Pribilof Islands was conducted under authority of the Convention. The terms of the "Convention" were set to expire on October 14, 1984, unless extended, once again, at that time. Having concerns at that time regarding the inconsistency between the commercial harvest provisions of the Convention and the FSA, with the MMPA, the U.S. Departments of State and Justice, and the MMC, determined that no commercial harvest could be legally conducted in the U.S. under the MMPA, leading to apprehension as to whether negotiations to modify the Convention should be initiated (DOC 1985). The Secretary of State began immediate negotiations to rectify the inconsistencies, and align the Convention with the MMPA. While there was general agreement amongst the Party members that the concerns raised by the U.S. were valid, the general belief amongst the other Parties was that these concerns could be fully accommodated by the existing Convention language. The Party Governments clearly indicated to the U.S. that any attempt to interject major changes or to restructure the Convention would be opposed (DOC 1985). Therefore, the U.S. was unable to obtain agreement of the Parties to modify the Convention, and the Convention was allowed to expire on October 14, 1984. With the expiration of the Convention, the mechanism for regulating the commercial harvest of fur seals on the Pribilof Islands was lost as were the fur seal subsistence resources of the residents of St. Paul Island, taken in large part during the commercial harvest. The FSA did not apply to subsistence takes of fur seals by those living on the Pribilof Islands.

There was no commercial harvest in 1985 because the Convention was not in effect. However, that fact did not prohibit subsistence takes, and there was effectively no limit on the number of animals that could

[26] 37 U.S. Statutes at-Large 373; 499-502, August 24, 1912

[27] "To implement…provisions of the Convention, Congress enacted the Fur Seal Act of 1966." Fouke Co. vs. Mandel, 386 F. Suppl. 1341 (D.Md. 1974). Also see 1966 U.S. Code Congress and Admin. News 3628.

[28] DOC, the 1970 Reorganization Plan No. 4

be taken for subsistence uses, absent some action of NMFS. NMFS concluded that an emergency interim rule was necessary to restrict the subsistence harvest levels. The authority for this action was less than clear, since most of the Secretary's authority to act under the FSA was tied to actions by the North Pacific Fur Seal Committee (NPFSC) under the Convention, and since MMPA Section 101(b) only allowed restrictions on Native Alaskan subsistence takes if the stock has been designated as depleted[29]. The preamble to the 1985 emergency rule noted that "if no action is taken by the Senate to ratify the protocol [clearly the Senate believed the United States would eventually ratify the Treaty, which it did not] it will be necessary to issue permanent regulations to replace this…rule." Significantly, it also noted that "in the absence of a functioning Convention, it is not clear what authority should be used for these regulations."

Section 103(b) of the FSA states " Indians, Aleuts, and Eskimos who live on the Pribilof Islands are authorized to take fur seals for subsistence purposes as defined in Section 109(f)(2) of the MMPA, under such conditions as recommended by the NPFSC and accepted by the Secretary of State pursuant to regulations promulgated by the Secretary of Commerce." Therefore, under the FSA, subsistence takes by Pribilovians could only be allowed under conditions recommended by the NPFSC, and authorized under NMFS regulations consistent with the MMPA.

NMFS issued an emergency interim rulemaking on July 8, 1985[30] to regulate a subsistence-only harvest of fur seals for the 1985 season of 3,358 sub-adult males. The resulting harvest was the first subsistence-only harvest held on St. Paul Island since 1916 (Zimmerman and Letcher 1986). However, for the 1985 interim rule NMFS relied on Section 105(a) the FSA, which authorized the Secretary to "prescribe such regulations with respect to the taking of fur seals on the Pribilof Islands…as he deems necessary and appropriate for the conservation, management, and protection of the seal population…" As noted in the preamble to 1985 rule NMFS evaluated whether to regulate subsistence harvest under the FSA or MMPA. NMFS determined in 1985 that the general rulemaking authority of the FSA was the most appropriate for regulating subsistence harvest.

The 1985 emergency rule implemented all aspects of the commercial harvest process including humane killing. However, the discontinuation of the commercial fur seal harvest under the MMPA had significant economic and social consequences to the community and residents of St. Paul. The main differences between the implementation of the commercial and subsistence harvests were the scale of killing, the regulatory restrictions on the subsistence harvest, and the federal government no longer employed Pribilovians to conduct the commercial harvest. Under the Convention, about 20 to 30 commercial harvests occurred annually on St. Paul, killing on average about 32,228 seals per year (resulting in about the same number of skins). The skins collected during the St. George subsistence harvest were processed and sold by the government until the transition of the killing operation to TDX in the early 1980s. There are no data to indicate what percentage of meat from those 32,228 seals was used for subsistence because carcasses were considered by NMFS as excess to the commercial harvest. Any portion of the carcass not

[29] NMFS designated the Pribilof Islands northern fur seal stock depleted under the MMPA on June 17, 1988 *(Federal Register* 53 FR 17888). Until then it did not have the authority under the MMPA to regulate subsistence harvests for those marine mammal stocks used for subsistence purposes.

[30] *Federal Register* 50 FR 27914

obtained by subsistence users was either disposed on island or processed into meal at the by-products plant also operated by the government.

The 1985 emergency regulations allowed the government to receive and process skins from the subsistence harvested fur seals on St. Paul and St. George. More than 1,000 subsistence harvest skins were processed in the 1970s and held by NMFS on St. George, and ultimately were disposed-of due to their degraded condition in early 2000 during rehabilitation of NMFS facilities. Skins from the St. Paul subsistence harvests in 1985 were not processed or held by NMFS. The 1985 emergency regulations were revised in 1986 to authorize continued subsistence harvests on the Pribilof Islands under regulations setting an annual upper and lower harvest range, based on the subsistence need of the communities.

NMFS published a final rule on July 9, 1986[31], to regulate the subsistence harvest of fur seals in the Pribilof Islands for 1986 and subsequent years. NMFS revised and published the 1986 final regulations from the emergency interim regulations the following year under the MMPA (16 U.S.C. 1361[32]) and, again, under Section 105(a) of the FSA (15 U.S.C. 1151). It is not clear whether NMFS determined if [as it said it would in the 1985 Preamble] the FSA or MMPA was the appropriate statute for regulating the harvest at this time.

The revised 1986 regulations[33] included the following new restrictions for St. Paul that:

1. Set the subsistence harvest level to a range of 2,400 to 8,000;
2. Added the need to publish a summary by April 1 of the preceding year's harvest in the Federal Register and a discussion of the number of seals needed in the current year for a 30-day public comment period;
3. Added a 5-day per week harvest schedule on St. Paul Island, but that none of the seven specified haulout areas could be harvested more than once per week;
4. Added a clause for the NMFS AA to terminate the harvest when the number of female seals taken in the harvest, as June 30 exceeds one half of 1% of the total harvest;
5. Added a clause for the NMFS AA to terminate the harvest if five females are harvested during any 7-day period after August 8;
6. Added the clause requiring "*Pribilovians who engage in the harvest of seals are required to cooperate with scientists engaged in fur seal research on the Pribilof Islands who may need assistance in recording tag or other data and collecting tissue or other fur seal samples for research purposes*";
7. Removed the responsibility of NMFS representatives to weigh meat taken for subsistence use on a daily basis; and

[31] *Federal Register* 51 FR 24828

[32] *Federal Register* 51 FR 24828

[33] *Federal Register* 51 FR 24828

8. Removed the option for Pribilovians to transfer skins taken for subsistence purposes to the U.S. Government.

The purpose of the regulations[34] was to manage the harvests of fur seals at a level that would satisfy the subsistence needs of the Pribilof Aleuts. Pursuant to the regulations, the harvest was initiated when NMFS published a proposed annual estimate of subsistence need for St. Paul and St. George Islands. Since 1985, with a few exceptions (see below for harvest extension process included in the regulations from 1986-1993), the subsistence harvest has been limited to a 47-day harvest season (June 23 to August 8), during which only sub-adult male seals could be taken using humane harvesting methods[35]. To manage the population, harvest regulations restricted the sex and age of the seals, method of harvest, and the season they could be harvested. The regulations prohibit any taking of pups, adults, or the intentional taking of sub-adult female fur seals. The August 8 deadline was chosen to avoid an unacceptable number of accidental female fur seal mortalities, since immature female seals typically arrive at the rookeries in large numbers by then. Immature females and males are often intermixed at most locations and not easily distinguished to avoid females.

The AA for Fisheries is required by regulation to determine when the annual harvest should be terminated. This decision is made when it is determined that the subsistence needs of the Pribilof Aleuts have been met, or on August 8 of each year, whichever comes first. From 1986 to 1991, if the subsistence needs of either community had not been met by August 8, the AA could extend the harvest period for a period until September 30[36].

In 1986 and 1987, ACSPI requested extensions to the harvest season, which were granted by NMFS. However, the extensions of the harvest resulted in the next harvest to occur on September 27, 1896, and resulted in 16 female fur seals being taken and immediate suspension after the first harvest day during the extension. In 1987, five females were taken during the first harvest day in the extension period (one was taken on August 6 during the normal harvest season) and the harvest was suspended. Therefore, following the August 1, 1988 notice by NMFS[37], ACSPI requested a change in the regulations to allow the subsistence harvest to begin June 23, 1 week earlier than the June 30 start date[38]. The request cited a community need for fur seal meat before June 30 because of a lack of meat remaining from the previous year's take, and the possible inability to harvest their quota of seals unless the harvest is extended each year. NMFS did not take action until 1992 when they published a final rule eliminating the harvest extension option and modified the season to begin on June 23 (instead of June 30[39]), and removed

[34] 50 CFR 215 Subpart D--Taking for Subsistence Purposes

[35] MMPA, Section 3. Definition (40, 16 U.S.C. 1362) states that “For the purposes of this chapter the term "humane" in the context of the taking of a marine mammal means that method of taking, which involves the least possible degree of pain and suffering practicable to the mammal involved.”

[36] Section 215.32(t)(2) authorized the AA for Fisheries to extend the harvest period until 30 September if, by 8 August, the subsistence needs of the Pribilof Aleuts were not met, and the number of female seals taken during the harvest was low.

[37] *Federal Register* 53 FR 28886

[38] 50 CFR 215.32(c)(I)

[39] *Federal Register* 57 FR 33900

Sections (f)(2) and (f)(2)(i-iii) of the regulations, which limited the accidental killing of sub-adult females during the extension of the harvest[40].

The last major revision to the fur seal regulations on St. Paul Island occurred on May 13, 1994, prior to the 1994 subsistence harvests. NMFS published a proposed rule to adopt a 3-year harvest setting process rather than setting quotas annually[41]. The annual regulatory process was time consuming, regarded as intrusive by local residents, and since the number of seals taken for subsistence purposes had been relatively consistent each year since 1989, it was determined that setting the ranges for a 3-year period would improve the process. The final rule for this change was published on July 12, 1994[42], setting the harvest ranges for the period 1994 to 1997 at the same levels that had been established for the 1992 and 1993 harvest seasons. This 3-year process has been repeated since 1994 and the same harvest ranges have been maintained.

Since 1985, and following the depletion designation, management of the northern fur seal subsistence harvest on the Pribilof Islands has occurred under a shared FSA and MMPA authority. Although more emphasis is placed on the MMPA, NMFS has relied on Section 105(a) of the FSA as the authority for the 1986 final rule, under which NMFS still operates. The continued authority of the FSA has been questioned since the Convention ceased to exist in 1984. The FSA was enacted to implement the Convention; however, the FSA no longer supported the Convention after it expired on October 14, 1984. Therefore, some argue that the MMPA should now be the authority to govern the subsistence takes of the depleted stock of northern fur seals on the Pribilof Islands.

It was not until the MMPA was amended in April 1994 to include Section 119, *Marine Mammal Cooperative Agreements in Alaska*, that it became clear that the intent of Congress was that the management of subsistence species in Alaska should be cooperatively managed under the MMPA between Tribal Governments or their delegated Alaska Native Organizations, and the federal government through the development of Co-Management Agreements to "… conserve marine mammals and provide co-management of subsistence use by Alaska Natives." Specifically, the Co-Management Agreement[43] between the Pribilof Community of St. Paul an NMFS is specific to the conservation and management of northern fur seals and Steller sea lions on St. Paul Island with particular attention to the subsistence harvest, hunting, and use of these animals; (see Chapter 1.5 of this Draft PEIS). It is clear from intent that the co-management process established under Section 119 of the MMPA should now be the sole authority to govern the subsistence takes of the depleted stock of northern fur seals on the Pribilof Islands.

3.9.5. Section 119 and Co-Management of the Subsistence Harvest

The MMPA, Section 119 established a formal framework to develop agreements, to "enter into cooperative agreements [Agreements] with Alaska Native Organizations to conserve marine mammals and provide co-management of subsistence use by Alaska Natives." The Agreements in the Pribilof

[40] *Federal Register* 57 FR 33900

[41] *Federal Register* 59 FR 16849

[42] *Federal Register* 59 FR 35471

[43] Co-Management Agreement between ACSPI and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (signed on June 13, 2000)

communities of St. Paul and St. George are specific to the conservation and management of northern fur seals and Steller sea lions, with particular attention to the subsistence take and use of these animals. The northern fur seal subsistence harvest regulations were not revised to reflect the intent of the 1994 amendments for greater cooperation and flexibility regarding subsistence harvest management. NMFS and ACSPI entered into an Agreement on June 13, 2000[44] to work in partnership to achieve the following:

- Promote the conservation and preservation of fur seals and sea lions;
- Use traditional knowledge, wisdom and values, and conventional science to establish management actions for the protection and conservation of fur seals and sea lions on the Pribilof Islands;
- Establish a process of shared local responsibilities regarding the management and research of fur seals and sea lions on behalf of the citizens of the U.S.;
- Identify and resolve through a consultative process any management conflicts that may arise in association with fur seals and sea lions on the Pribilof Islands; and
- Provide information to hunters and the affected community, as a means of increasing the understanding of the sustainable use, management, and conservation of fur seals and sea lions.

The Agreement specifies that NMFS and ACSPI will review, recommended, and advise on revisions to federal regulations governing fur seals and sea lions. It was also recognized that regardless of the provisions of the Co-Management Agreement, they do not supersede the restrictions of the harvest regulations at 50 CFR 216.71-74.

The ACSPI and NMFS have emphasized that a successful partnership incorporates trust, close cooperation, and communication. The Agreement includes an entire sub-section (7) titled "Co-Managing the Harvest", describing the roles and responsibilities of the tribal representatives and NMFS. Beginning in 2000, the upper and lower fur seal harvest take ranges have been discussed every 3 years with each Tribal Government (*i.e.*, St. Paul and St. George) as part of building a co-management relationship, developing local capacity for co-management of fur seal harvests, and understanding the cultural significance of fur seals. The co-management relationship has also facilitated tribal consultations with NMFS on federal actions that may affect the northern fur seal subsistence harvest. Perhaps the most significant tenet in the Agreement is the concept of shared management and responsibilities between members of the Tribal Council and NMFS in the conservation and management of fur seals and sea lions.

It follows that the most critical 'issue' identified throughout the scoping process was the need for an increased role of co-management in the development and monitoring of the Pribilof Island program for fur seals going forward. The continued reliance on federal regulations in the overall management and monitoring of fur seal subsistence is viewed as being contrary to the language and intent of Section 119, and the 1994 amendments to the MMPA. For example, under the petitioned alternative, the NMFS Pribilof Islands Program would continue research to monitor the abundance, growth rates, vital rates, and overall status of the northern fur seal population. The St. Paul Island ECO Program, and the

[44] Co-Management Agreement between ACSPI and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (signed on June 13, 2000)

harvesters/hunters via the NMFS and ACSPI Co-Management Council, would be more effective at addressing issues related to the implementation of, and effectiveness of, the fur seal subsistence harvest and hunt to meet the subsistence needs.

3.9.5.1. Role of Co-Management in Reporting

Reporting of all harvest and hunting activities to the ACSPI and ultimately the Co-Management Council would be a critical component of the monitoring requirements under co-management. The Co-Management Agreement has already outlined the needs for accurate reporting. Reporting need be easy and address the level of participation, number of animals taken directly, and animals struck and lost. The duration of time between the actual hunt or harvest and reporting should be managed according to the risk of the aforementioned biases influencing the results.

The use of recall forms or active engagement in real time will be determined by the Co-Management Council in the development of the monitoring program. Anonymity is often an important element of effectively encouraging participation of users. Reporting and monitoring requirements, which are not supported by a majority of users, are often ineffective, result in significant nonresponse bias, which in turn creates under-estimates of take and over-estimates of performance, and nearly always are not successful as a long-term management tool.

It is important that reporting includes presenting results of the monitoring back to the community, hunters, and harvesters. Subsistence users must see evidence of their participation in monitoring promotes informed co-management decisions. Understanding the mechanisms underlying struck and lost rates or the accidental taking of a female seals are critical to working with users to make improvements in performance not to create uninformed and inflexible restrictions. Accurate information and input from subsistence users will help the Co-Management Council determine when uncontrollable circumstances create conservation concerns or hunters and harvesters behaviors can be adapted to make improvements.

3.9.5.2. Standards for Determining Taking of Fur Seals for Subsistence are Humane & Not Accomplished in a Wasteful Manner

The northern fur seal subsistence harvest regulations at 50 CFR 216.71 describe Allowable Take of Fur Seals. The regulatory text of this section reads: Pribilovians may take fur seals on the Pribilof Islands if such taking is (a) for subsistence uses, and (b) not accomplished in a wasteful manner.

The regulations under all Alternatives will retain the provisions in 50 CFR 216.71 ‘not accomplished in a wasteful manner’[45]. NMFS has discussed the complex and controversial issue of waste in detail beginning in the emergency rule on July 8, 1985 (50 FR 27914), again on August 3, 1992 (57 FR 34081), and finally on August 6, 1993 (58 FR 42027). In summary, NMFS has described the three facets to the definition of the term “wasteful manner”. First, it means any taking that is likely to result in the killing of fur seals beyond those needed for subsistence purposes. Second, wasteful manner includes takings that result in the waste of a substantial portion of the fur seal. Lastly, it means employment of a taking method, which is not likely to ensure the killing and retrieval of the fur seal (50 FR 27914).

[45] 16 U.S.C., Sect. 1371(b)(3)

The methods of conducting the subsistence harvest of fur seals on the Pribilof Islands following the 1985 regulations were determined by NMFS and independent veterinary review to be the most humane and least disruptive method of commercial harvest possible. A Humane Observer is not required by regulations, but has been mutually agreed upon by NMFS and ACSPI to provide an independent assessment of the conduct being 'humane' and 'non-wasteful'. Humane is defined in the MMPA as that method of taking which involves the least possible degree of pain and suffering practicable to the animal involved.

Incorporation of the principles of the petitioned alternative has begun informally over the past decade. Recent harvest monitoring and management have been implemented as collaboration among NMFS representatives, ECO staff, and the Humane Observer. In 2010, NMFS and ACSPI analyzed the proportion of females killed accidentally in the harvest and noted an increase in the proportion from less than 0.004 to 0.01. Beginning in 2012, the Humane Observer provided training and oversight to tribal employees to transition this responsibility entirely to ECO staff by 2015. An independent certified veterinarian served as the Humane Observer for the harvest from 1987 to 2014. The Humane Observer works during the harvest season with ECO staff, the harvest foreman, and NMFS representative, and at the end of each season provides a report for the record. Since the adoption of the co-management process the number of females accidentally killed has remained below the threshold of five established in the agreement (7)(e)(i). Through co-management, NMFS representatives, ECO staff, and the Humane Observer have worked collaboratively to train harvesters to identify females and circumstances likely to result in females occurring in the harvest. The 2015 proportion of females killed accidentally in the harvest is 0.006. We anticipate these efforts will continue to improve the ability of harvesters to detect and avoid females accidentally herded from their hauling grounds to the killing fields. At the end of each harvest season, NMFS representatives review and reconcile the final harvest reports from each island and the Humane Observer. The reports summarize the number of seals killed, details on gathering and herding, environmental conditions, health condition of the seals, research and other issues that influence the conduct and management of the harvest. Copies of these reports can be accessed through the NMFS website at: https://alaskafisheries.noaa.gov/pr/fur-seal.

3.9.6. Non-Consumptive Value of Northern Fur Seals

The non-consumptive direct use benefits of healthy marine ecosystems are important to many Alaska residents and non-residents. They may value these ecosystems for recreational, aesthetic, and spiritual reasons. For some individuals, they may be a key benefit to living in the state and integral to a "sense of place." For example, a major mail survey of Alaska voters conducted in 1991 found that 14 percent of Alaskans took at least one overnight trip with the primary purpose of viewing wildlife (McCollum and Miller 1994). Colt (2001) estimated that Alaskans took more than 107,000 "person-trips" in 1999 with the main purpose of wildlife viewing. The opportunity to view northern fur seals in the wild is limited to the Pribilof Islands, but regulatory restrictions prohibit the unauthorized public (*i.e.*, everyone except permitted scientists and subsistence users) from approaching fur seal breeding and resting areas except for three on-island viewing blinds. Tourist opportunities on the Pribilof Islands have been developed by the TDX on St. Paul Island. The contribution to the community or general public is unknown, but provides important non-consumptive economic diversity to the community's annual revenue.

3.9.7. Seabird Subsistence on the Pribilof Islands

Estimates of subsistence on the Pribilof Islands from the past 30 years focus almost entirely on marine mammals and groundfish, with little documentation of other forms of harvest (Orbach and Holmes 1983; Young 1987; ADFG 1997; Fall *et al.* 2013). More than 80% of the islands' subsistence harvest is comprised of fur seal, feral reindeer, and groundfish, along with a few other marine mammals, *e.g.*, walrus, seal, and sea lion. Sea ducks, seabirds (adults and eggs), and berries make up a much lower relative proportion of the wild food diet (Fall *et al.* 2013). However, evidence suggests that seabird harvests once played a larger role in traditional Aleutian subsistence (Veltre and Veltre 1981).

Young *et al.* (2014) characterized the relationship between the people of the Pribilof Islands and cliff-nesting seabird communities that nest on the sea cliffs. They conducted surveys and interviewed residents of both St. Paul and St. George, to assess opinions toward seabirds and harvest levels. Seabirds were generally regarded as important to both individuals and the wider community. However, current levels of subsistence harvest are low, and few people continue to actively harvest or visit seabird colonies. Young *et al.* (2014) indicated that both communities value the environment and seabirds both as subsistence and eco-tourism resources.

The interviews on each island related that both seabird observations and harvesting had once been an important part of family life and growing up. The strongest aspect of this importance was the way seabird usage had been a family experience and value. All memories of seabird harvesting were of family learning, coming of age, and ways in which children were taught to contribute to the community and identify being Aleut. The most commonly harvested birds were the Black- and Red-legged Kittiwakes, the Common and Thick-billed Murre (eggs and adults), and the Least Auklet. Hunting techniques varied by species.

According to interviewees, seabird subsistence has declined because it has been supplanted by the increased availability and ease of store-bought food. For subsistence harvest, seabirds appear to be less valued than the other species (Young *et al.* 2014). However, seabirds remain an important cultural resource on the Pribilof Islands.

3.9.8. Pacific Halibut Subsistence Fishery on the Pribilof Islands

Halibut is an important subsistence food species in Alaska and ranks among the top ten wild food species harvested in Alaskan coastal communities. Subsistence halibut is distributed among households through sharing, barter, and noncommercial customary trade (NMFS 2003). According to IPHC estimates, subsistence harvest of halibut in Alaska was 439,000 pounds in 2000; subsistence harvest of halibut was 0.47% of total halibut removals in 2000 (commercial and sport fisheries) (NMFS 2003).

The NPFMC adopted a subsistence halibut program recognizing the Alaska subsistence halibut fishery in October 2000. ''Subsistence halibut'' was proposed by NMFS to mean ''halibut caught by a rural resident of Alaska or by a member of an Alaska Native tribe for direct personal or family consumption as food, sharing for personal or family consumption as food, or customary trade.'' The NPFMC determined that subsistence halibut regulations were needed to authorize the long-term customary and traditional practices of fishing for halibut for food in a "non-commercial manner for noneconomic consumption" by families. The NPFMC then defined ''subsistence'' as ''non-commercial, long-term, customary and

traditional use of halibut.'' Non-commercial fishing means that halibut caught in the subsistence fishery cannot be sold or otherwise marketed for commercial purposes.

NMFS proposed regulations authorizing a subsistence fishery for halibut in waters off Alaska on August 26, 2002[46]. These regulations, designed to allow persons who have customarily and traditionally used halibut for food in the past to continue that practice, were finalized on July 9, 2004[47]. Regulations that manage the subsistence program have been repeatedly amended[48], once in 2005[49] and again on November 4, 2009, when NMFS published a final rule[50] modifying eligibility requirements for participation in the Alaska subsistence halibut fishery. Currently, the subsistence harvest of halibut in Alaska occurs primarily in July, August, and September, which overlaps in July and early August on St. Paul with the current northern fur seal subsistence harvest season.

Prior to fishing under subsistence halibut regulations, fishermen must obtain a Subsistence Halibut Registration Certificate (SHARC). Based on information obtained from a volunteer reporting system established under the SHARC regulations, approximately 10-15 fishermen have received a SHARC permit from NMFS for the Pribilof subarea since 2010 (Fall and Koster 2013, 2014) (approximately twice as many permits have been issued to St. Paul residents).

In 2010, ADFG estimated that approximately 10,139 pounds of halibut (a total of 485 fish) were harvested by St. Paul for subsistence (Fall and Koster 2010). The 7-year average for halibut subsistence harvest increased by 16.6% and indicates a possible increased dependency on the fish. Between 2009 and 2012, the average number of fishermen participating in the subsistence halibut fishery under a SHARC was 14, with a reported catch of approximately 4,985 pounds of halibut caught (about 250 fish). However, the estimated subsistence harvest of halibut in Area 4C (Pribilof Islands) dropped 29% in 2012, to 1,176 pounds from 1,648 pounds in 2011 (Fall and Koster 2014). The 2012 estimate was 88% below the previous 9-year average and the lowest since the SHARC program began in 2003 (Fall and Koster 2014). While the subsistence fishery in the Pribilof Islands is considered small by statewide standards, Unger *et al.* (2006) reports that halibut consumption in St. Paul is a major part of the traditional diet, and represents a significant source of sustenance to the St. Paul community on an annual basis.

3.9.9. Subsistence, Nutrition and Food Security in St. Paul, Alaska

Subsistence is defined at 50 CFR 216.3 as:

> *The use of marine mammals taken by Alaskan Natives for food, clothing, shelter, heating, transportation, and other uses necessary to maintain the life of the taker or those who depend upon the taker to provide them with such subsistence.*

Subsistence uses means:

[46] *Federal Register* 67 FR 5476

[47] *Federal Register* 68 FR 18141

[48] The regulations that govern the subsistence halibut fishery can be found at 50 CFR 300, Subpart E

[49] *Federal Register* 70 FR 16742, April 1, 2005

[50] *Federal Register* 74 FR 57105

The customary and traditional uses of fur seals taken by Pribilovians for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fur seals taken for personal or family consumption; and for barter, or sharing for personal or family consumption.

As used in this definition:

1. Family means all persons related by blood, marriage, or adoption, or any person living within a household on a permanent basis.
2. Barter means the exchange of fur seals or their parts, taken for subsistence uses:
   (i) For other wildlife or fish or their parts, or
   (ii) For other food or for nonedible items other than money if the exchange is of a limited and noncommercial nature

Subsistence and subsistence uses, is often described in terms of wild and local foods, however it means much more to the community than the simple gathering of food. Subsistence integrates nutritional and spiritual relationships to the land through the pursuit, collection, and sharing of natural resources. Subsistence connects hunters, families, and communities together for simple sharing and complex cultural celebrations. It is difficult to quantify the importance of the subsistence way of life and the value of co-management for purposes of a NEPA analysis. In some rural villages, subsistence accounts for roughly 80% or more of the annual diet (Wolfe 2000). Subsistence resources in Alaska contain significant nutrients, are energy dense, fresh and are often more cost effective (Meter and Goldberg 2014; Johnson *et al.* 2009; Unger 2014). The subsistence way of life in St. Paul has remained an important, consistent, and supporting factor in the personal, economic, and traditional character of the Pribilof Islands.

Subsistence is not simply the collection of food that can be replaced by a visit to a grocery store or the replacement of a pound of fresh fur seal meat for a pound of beef or pork or fish, or even other subsistence food (Gadamus 2013; Loring and Gerlach 2015). Subsistence connects community members and relatives through food sharing and cooperative hunting and harvesting efforts. Both cooked and uncooked subsistence foods are shared with the community (Meter and Goldberg 2014; Unger 2014). Subsistence harvests of marine mammals also provide raw materials for the creation of handicrafts, which connect community members to their environment beyond nutrition. The sale of raw marine mammal parts is prohibited between Alaska Natives and non-natives; a marine mammal handicraft is defined under federal law and can be sold commercially.

A continued subsistence harvest preserves the traditional skills, cultural values and knowledge, and enables the passing of cultural values on to younger hunters. Though not the sum total value of subsistence to Alaska Native communities and specifically St. Paul Island, the components of replacing a major subsistence resource have been broken down for this assessment. While this approach is informative, it is not complete in its valuation of fur seals as an essential element of the cultural character of St. Paul Island.

For the analysis of potential effects presented in Chapter 4, the issue of food delivery to St. Paul Island is discussed, then a quantitative estimate of food costs for purchase on St. Paul is reviewed, followed by an estimate of the nutritional value of subsistence foods if they were to be replaced. The concept of food security for remote rural communities is a key component of this qualitative evaluation.

3.9.9.1. Food Logistics in Alaska

The majority (95%) of food purchased by Alaskans is imported and transported by airplane, barge, or truck from outside the state. More importantly, this food is shipped through long supply chains which incur higher shipping costs, and forces the state as a whole to be more reliant on oil prices for grocery expenditures (Meter and Goldberg 2014). These costs are increased when food is shipped between Anchorage and rural communities off the road system that are exclusively reliant on air or ship transport. Most goods must arrive in rural communities by air; coastal communities like St. Paul also receive goods and fuel via barge from ports on the U.S. West Coast during the ice-free months.

Residents may order a year's worth of nonperishable groceries and other supplies via barge, but many cannot afford such expenditures and instead purchase in smaller quantities at a higher price per unit. Many rural residents will also stock up on supplies during trips to Anchorage or Fairbanks, and either mail them back to their communities, pay freight fees on air transportation ($1.00 per pound), or pay excess bag fees. Air transportation is the only means to receive fresh produce on the Pribilof Islands, and all meat is frozen for shipment to the islands. Complicating food logistics to the Pribilofs is the frequency of cancelled flights due to weather and loss of perishable items in transit and the frequent lack of basic items such as any fresh produce, milk, eggs, and butter. In response, the Tribal Government of St. Paul has invested in a hydroponic greenhouse to raise vegetables and herbs for sale in the store. The high price of transportation increases the cost of living in rural Alaska (Magdanz *et al.* 2007). As a result, subsistence and personal use gathering, which together account for food worth about $900 million per year throughout the state, is the main source of "local" food (Meter and Goldberg 2014).

3.9.9.2. Quantitative Evaluation of Monetary Value of Subsistence Foods

The Alaska Native residents of the Pribilof Islands rely on a traditional subsistence lifestyle, consuming fur seals, sea lions, sea birds, fish, wild celery and berries. NMFS reported (2014) that the residents of the Pribilof Islands on average consume more fur seal meat than any other subsistence resource. Wild food harvest is vital in sustaining rural residents where the cost of shipped in, commercially purchased food, is extremely high such as in the Pribilof Island communities. Meter and Goldberg (2014) suggested that the cost of food in rural western communities like St. Paul may be roughly $355.14 per week for a family of four, or roughly twice that of Anchorage. This trend is repeated throughout the state for other subsistence communities and for species other than fur seals.

The estimated cost of replacing wild food harvests by rural communities of western Alaska in 2000 (averaged as 664 pounds per person) was $64.6 million dollars annually at a replacement value of $5 per pound (Wolfe 2000). In 2008, a reassessment was made to account for the significant rise in prices of transportation and food, and a more realistic replacement value of $7 per pound adjusted the total to $90.4 million (Aslaksen *et al.* 2009). For St. Paul, this replacement value exceeds the amount spent on store-bought food by most households. In St. Paul using the most recent 10-year average of fur seals harvested

(449) times the average weight of a butchered seal at 27.5 pounds[51] results in about 12,000 pounds of fur seal (including bone) annually consumed.

Estimates of the subsistence use of halibut on St. Paul indicate about 5,000 pounds is reported annually via the subsistence monitoring programs. In the absence of the actual edible portion of meat from a butchered fur seal and under-reporting bias in self-reporting programs, we can estimate from these two subsistence sources alone approximately 10,000 to 17,000 pounds of subsistence meat is consumed annually on St. Paul. The minimum replacement cost at $7 per pound for these two subsistence collected meat sources indicates an annual economic value of $119,000. Contrasted with Wainwright, Alaska, the bowhead whale harvest is a wild food source that cannot be replaced by store-bought food; Vice-Chair and Commissioner Mr. John Hopson, Jr. of the Alaska Eskimo Whaling Commission (AEWC) noted that the AEWC-whaling villages have taken an average of 504 to 840 tons of food per year (average of 42 bowhead whales per year); a quantity of food that would not otherwise be available locally to feed these communities. It also would require expenditure on the order of US $20.2 million to $33.6 million to replace the annual whale harvest with beef at northern Alaskan prices (International Whaling Commission 2014). Therefore, the ability to maintain a subsistence life-style has significant economic consequences to all subsistence communities including St. Paul.

3.9.9.3. Food Security and Nutritional Value of Subsistence in St. Paul

Food security was defined at the 1996 World Food Summit as that situation when “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization [FAO] 1996). This definition has become refined over time, from a national measure to that of a household measure that includes cultural food preferences (FAO 2002). Therefore, household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

Native communities in Western Alaska, including the Pribilof Islands, have harvested marine mammals and seabirds, collected eggs, and fished for their foods for thousands of years (Veltre and Veltre 1981). Berries and various plants have also supplemented the diet of the Native peoples in this region. These foods are fresh, seasonally available, nutritional, economical and a core feature of culture. Poppel (2015) stated that for the Iñuit regions in general, the availability of subsistence resources and higher levels of subsistence activity both explain significant variations in overall well-being and quality of life. He further noted that by focusing on a series of aspects of subsistence activities (economic aspects, nutrition, socio-cultural and identity related aspects), it becomes clear that the meaning of these activities extend beyond what can be measured in dollars and cents. Thus, participation in subsistence activities, such as hunting and fishing (and activities closely related to these), seems to affect the individual's sense of identity, social relations, social cohesion and cultural continuity.

In 2009, the World Summit on food security reaffirmed that the "four pillars of food security are availability, access, utilization, and stability" (FAO 2009). These characteristics describe the traditional

[51] *Federal Register* 51 FR 17896

subsistence lifestyle and the availability and use of northern fur seals by the Island of St. Paul for subsistence purposes. Previous analysis for St. George (NMFS 2014a) indicated that subsistence resources are not exchangeable on an equivalent basis as each of these resources represents a significant seasonal contribution to the diet of local residents such that one cannot replace another. Further, they often have spiritual and cultural underpinnings regarding when and how resources are collected and used. Sea birds and their eggs are consumed in the spring when they arrive, followed by fish as weather allows, and then fur seals are available.

Fur seal availability on land declines to zero as the seals begin their winter migration (NMFS 2014a). Similarly, the tribal government of St. Paul Island has repeatedly indicated that subsistence needs are not interchangeable from one species to the next and that flexibility to meet that need is essential. Hunting of non-pup Steller sea lions has continued on St. Paul averaging 25 annually between 1999 and 2015 (Pamela Lestenkof, Pers. Comm. February 2016). Walrus Island is currently the only Steller sea lion rookery still active in the Pribilof Islands, but pup production has declined steadily from 2,866 in 1960 to approximately 334 in 1982, 50 in 1991, 39 in 2001, and only 29 in 2005 (NMFS 1992; NMFS unpublished data, Fritz and Stinchcomb 2005). Adult male sea lions are increasingly available for consumption in the autumn and winter after the breeding season, as they disperse widely from rookeries further south; however, they are not a selected age class in hunting effort. Sea lions remain dispersed until late spring when they return to breeding areas primarily on the Aleutian Islands (NMFS 2008). While sea lions may become more available for subsistence during the non-breeding periods, they are by no means resident to St. Paul during this time. Hunting this species is opportunistic and unpredictable. The availability and use of fur seals as a staple dietary requirement is critical for food security and nutritional requirements of the Pribilovians. Even if comparable quantities of beef could be substituted for fur seal subsistence meat, it “would be nutritionally inferior and would not satisfy the economic, social and cultural needs of the people for the participation in and sharing of the harvest” (U.S. Department of Agriculture [USDA] 2012). Subsistence foods are fresh, seasonally available, and have nutritional value that exceeds commercial prepared or store-purchased food (USDA 2012).

On St. Paul Island, fur seals provide a nutritionally superior source of meat (as compared to commercially prepared beef purchased at a store after being shipped from far away). Fazzino and Loring (2009) described the double-bind (lose-lose) scenarios forcing residents to make decisions about buying food or heating one’s home, or reallocating time towards employment rather than subsistence pursuits. The social and cultural needs of St. Paul coalesce around the availability of fur seals on an annual basis. Northern fur seals are the most available (*i.e.*, secure) and predictable traditional food source on St. Paul Island. Traditional culture has long utilized this available food source for sustenance. From the aspect of nutrition and food security, fur seals represent an available, accessible, fresh, and safe source of traditional food for the residents of St. Paul Island, providing a nutritionally superior source of food than commercially available alternatives (Loring *et al.* 2011).

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4. ENVIRONMENTAL CONSEQUENCES

This chapter describes the predicted consequences, or potential effects, on northern fur seals and the social, economic, and cultural environment on St. Paul Island from implementing the alternatives described in Chapter 2. The chapter begins by explaining how incomplete or unavailable information has influenced the analysis, and describes the steps used for determining the level of impact, including the resource-specific criteria used in the evaluation. Sections 4.3 through 4.4 present the results of the analyses for each of the alternatives.

CEQ regulations require NMFS to focus attention on important issues and to avoid extraneous material in this impact statement (40 CFR 1502.15). Several of the resources and characteristics described in Chapter 3 help to describe the physical, biological, and socioeconomic environment of St. Paul Island and surrounding region. Given the proposed action is to modify the current subsistence harvest regulations for northern fur seals, the other aspects of the environment described in Chapter 3 would not be affected measurably by any of the alternatives. Therefore, additional analysis of potential impacts on these resources would not be useful to the decision makers or public; this chapter instead focuses on fur seals and the St. Paul Island subsistence community.

4.1. Incomplete or Unavailable Information

The CEQ guidelines require that:

> *When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking (40 CFR 1502.22).*

In the event that there is relevant information, but "the overall costs of obtaining it are exorbitant or the means to obtain it are not known" (40 CFR 1502.22), the regulations instruct that the following should be included:

- A statement that such information is unavailable;
- A statement of the relevance of such information to evaluate reasonably foreseeable significant adverse impacts;
- A summary of existing information that is relevant to evaluating the adverse impacts; and
- The agency's evaluation of adverse impacts based on generally accepted scientific methods.

As described in Section 4.3.5, hunting[1] fur seals with firearms is currently prohibited, and therefore, there are no data on the rate of seals that may be struck and then lost (*e.g.*, assumed dead). To evaluate the potential impacts associated with animals struck and lost, our analysis has made assumptions based on Steller sea lion struck and lost rates on St. Paul. If Alternative 2 or 3 were implemented, rates of struck and lost would be recorded so as to inform future harvest management (see Chapter 2). In Sections 4.2.2

[1] Hunting is allowable only under Alternatives 2 and 3, as described in Chapter 2 and Section 4.3.5.

and 4.2.3, the assessment of sub-lethal effects (*i.e.*, decreased survival or reproduction rate) is based on observations and professional judgment of MML scientists who have worked directly with northern fur seals on the Pribilof Islands for several decades as documented in the 2007 PEIS on Steller Sea Lion and Northern Fur Seal Research (NMFS 2007b).

The evaluation of potential impacts on the social, economic, and cultural environment is primarily a qualitative assessment and is based on existing literature and reports, which are somewhat limited or several years old. NOAA's Guidance on Social Impact Assessment (NOAA 1997) states, "To predict what the probable impact of development will be, we seek to understand the past behavior of individuals and communities affected by agency actions, development, or policy changes". The "behavior" of the St. Paul community is best expressed in ACSPI's request to revise current harvest regulations to allow for an extended harvest season(s), which addresses the nutritional need for fresh meat throughout a greater portion of the year. As depicted in Figure 3.9-1, and described in Sections 1.5, 3.9.3 and 3.9.4, there is a long history of northern fur seal regulation and action related to commercial and subsistence harvest, and conservation of the species. Efforts have been made to incorporate publically available information on the subsistence foods historically used by Pribilovians and Aleuts from the broader region. The analyses of direct, indirect or cumulative effects on the St. Paul community have been qualitatively evaluated in light of this history and the ACSPI petition.

4.2. Methods for Impact Analysis

The CEQ regulations implementing NEPA state that an EIS should discuss the significance, or level of impact, of the direct, indirect, and cumulative effects of the proposed alternatives (40 CFR 1502.16).

- Significance is determined by considering both the context in which the action will occur and the intensity of the action (40 CFR 1508.27).
- Context can be referred to as the extent of the effect (*i.e.*, geographic extent or extent within a species, ecosystem, or region) and any special conditions, such as endangered species status or other legal status.
- Intensity of an impact is the result of its magnitude and duration.

Actions may have both adverse and beneficial effects on a particular resource. A component of both the context and the intensity of an effect is the likelihood of its occurrence.

Geographic extent of potential impacts to wildlife may be described using the following terms:

- Species level – change in species or population throughout its range that would likely affect its long-term survival.
- Subpopulation or local level – change in a species age- or size-classes in a limited area of its range.
- Individual level – change to a specific animal or small number of animals.

Duration or frequency provides the context of time and may use the following terms:

- Short-term – temporary effect that lasts from a few minutes to a few days, after which the affected animals or resource revert to a "normal" condition.
- Long-term – more permanent effects that may last for years or from which the affected animals or resource never revert to a "normal" condition.
- Intermittent or infrequent effects – effects that only occur a couple times a year or fewer.
- Frequent – effects that occur on a regular or repeated basis each year.

These terms are used in Table 4.2-4 of this assessment to describe the criteria against which potential effects of the alternatives are compared.

Other species-specific characteristics, such as whether the effects occur during a sensitive or critical part of the year (for example, breeding), are described in the analyses for each species or resource.

The combination of context and intensity is used to determine the level of impact on each type of resource. Analysts follow these steps to accomplish this analysis:

1. Examine the mechanisms by which the proposed action could affect the particular resource.
2. For each type of effect, develop a set of criteria to distinguish between major, moderate, minor, or negligible impacts.
3. Use these impact criteria to rank the expected magnitude, extent, duration, and likelihood of each type of effect under each alternative.

Determining the likelihood of an effect serves to assess whether it is plausible or just speculative. For the purposes of this analysis, “likely” effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%. This does not imply that the analysts will perform a formal probability calculation but, in their professional judgment, the probability of the effect occurring is more likely than not.

Tables 4.2-4 and 4.2-5 provide guidelines for the analysts to assess the context of a potential effect and serve as tools for comparing the alternatives based on the conclusions drawn from the analysis. Table 4.2-4 presents criteria for northern fur seals, while Table 4.2-5 presents criteria for social, cultural, and economic impacts. The impact criteria tables use terms and thresholds that are both quantitative and qualitative. Qualitative thresholds are used where resource-specific baseline data may be lacking or potential effects are difficult to predict quantitatively (*e.g.*, quality of life or cultural importance is difficult to measure in quantitative terms). For a qualitative assessment, analysts must use professional judgment about where a particular effect falls in the continuum from "negligible" to "major."

The criteria and definitions of levels of impact provided in Tables 4.3-1 through 4.3-8 are used only in reference to effects projected to occur within 10 years (see Section 1.3, Description of the Action Area and Scope for Analysis), which for purposes of this analysis, is considered the ‘foreseeable future.’ Predictions beyond 10 years are challenging due to uncertainty and the number of independent factors that may alter the environment. Thus, potential long-term effects are described using more qualitative terms.

4.2.1. Direct and Indirect Mortality

To measure the direct and indirect effects of the harvest alternatives, analysts compared the total number of harvested seals to the PBR of the northern fur seal population breeding on St. Paul Island. The calculation relative to PBR considers direct and indirect effects of the proposed action on the northern fur seal population, and allows the scaling of the effect to the estimated population size under consideration (in this case, the estimate of pup production for St. Paul Island). The rationale for using PBR as a metric for mortality effects on northern fur seals is based on the 1994 amendments to the MMPA, which defined PBR as "...the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population." PBR was intended to serve as an upper limit guideline for fishery-related mortality for each stock rather than population unit and is annually reported in the stock assessment report (Allen and Angliss 2015) and it is appropriate to use for other human-caused sources of mortality. NMFS used PBR as the threshold for evaluating the effects of Steller sea lion and northern fur seal research (NMFS 2007a), and for evaluating the effects of changing the northern fur seal subsistence regulations for St. George Island (NMFS 2014a). PBR is a precautionary or conservative measure of human-caused mortality that could be expected to affect a population's ability to recover from a depleted state or to remain at a sustainable level. The PBR calculation accounts for uncertainty in population estimates and protects half of annual productivity for the depleted Eastern Pacific stock of fur seals through the use of a recovery factor set at 0.5 rather than 1 (Wade 1998). Because the calculation of PBR contains a recovery factor for these stocks, mortality levels that exceeded PBR would not necessarily cause a population to decline.

Direct and indirect mortality is analyzed as a proportion of the most recent PBR estimate from the Alaska Marine Mammal Stock Assessment report, adjusted for just the St. Paul portion of the stock. For the 2014 Stock Assessment report (Allen and Angliss 2015), NMFS began using a 3-year average of the pup production estimates from the Pribilof Islands to derive PBR. For the 2015 Stock Assessment report (Muto *et al.*, 2016), NMFS estimated the Eastern Pacific stock of northern fur seals as 648,534 (N_{EST}). Thus, PBR for Eastern Pacific stock of northern fur seals = 11,802 animals (548,926 × 0.043 × 0.5) (Muto *et al.* 2016). The estimate of PBR for the analysis of direct harvest mortality effects when scaled to just the St. Paul Island component of the entire stock is 10,386 (88%).

To implement the MMPA, NMFS defined the insignificance threshold for fisheries related mortality as being 10% of PBR for the stock of marine mammals (69 FR 43338). To be consistent with this threshold, this analysis considers harvest-related mortality less than or equal to 10% of PBR "negligible". Following the logic of this threshold for fishery-related regulations, this analysis considers harvest-related mortality more than or equal to 50% of PBR "major". There are no comparable thresholds used in the fishery regulations to distinguish between "minor" and "moderate" levels of mortality. For the purposes of this analysis, these thresholds are evenly divided between the 10% (negligible) and 50% (major) thresholds. Thus, this analysis considers harvest-related mortality between 10% and 30% of PBR to be "minor" and mortality equal to or more than 30% and less than 50% of PBR to be "moderate" (Table 4.2-4).

PBR assumes random mortality across all age classes and both sexes in the population (Wade and Angliss 1997). However, the subsistence harvest is selective for male pups (<1 year) and juvenile males 2+ years old. This male-only harvest protects the female portion of the population and provides an additional

protection factor because non-breeding male harvests will not negatively affect pup production (DOC 1985). NMFS has juvenile male survival estimates from the 1970s (Lander 1981), but estimates of juvenile female survival from the same period are not available and Lander (1981) assumed juvenile females had higher survival. Therefore, applying estimates using juvenile female survival to the current population is highly variable and uncertain. For this reason, NMFS does not know the actual level of female harvests, which may affect the fur seal population. Evidence from studies of Russian fur seal harvests (from 1990 to 2007 on Tyuleniy Island and 1996 to 2006 on Bering Island) suggests that harvests of equal or nearly equal proportions of juvenile male and female fur seals have a high probability of negatively affecting the population. In addition to the selective harvest of males under all Alternatives considered, the St. Paul hunts and harvests are limited to the younger age classes in the population. All juvenile age classes have lower survival than adults. Lander (1981) estimated that only 1% to 3% of male pups born will survive to adulthood (≥9 years old). In other words, a very large proportion of the population of young males that can be harvested would die naturally whether or not they are harvested. Therefore, human-caused mortality on younger juvenile age-classes will have less effect on the population than the same mortality of older juvenile age-classes.

Supporting this concept, DeMaster (1981) modeled the "maximum yields" for Weddell seals and found that approximately twice as many pups could be harvested annually versus non-pups. While a comparable analysis of the maximum yield for northern fur seals has not been completed due to a lack of current age-class specific survival data, the similarities in life history suggest the harvest of young during their first year of life minimizes potential reproductive losses for the population compared to harvesting animals that survive into adulthood. Eberhardt (1990; 2002) describes the importance of high adult survival for long-lived species' ability to maintain or recover to an equilibrium population. Thus, any increase in human-caused mortality for age classes approaching sexual maturity is more likely to cause a detectable reduction in population abundance versus human-caused mortality during the first year of life. Therefore, the harvest of seal pups reduces the likelihood of population levels effects compared to the harvest of older animals.

4.2.1.1. Evaluating the Geographic Extent of Direct and Indirect Mortality

The geographic extent of direct and indirect mortality is evaluated based on the distribution of mortality effects across the population. Mortality that is distributed across multiple locations (*i.e.*, several rookeries or haulouts) would result in a minor effect because the effects would be effectively diluted across entire population, particularly due to the strong site fidelity exhibited by fur seals. A major effect in terms of geographic extent would result from concentrating mortality at a single rookery or haulout (Table 4.2-4).

Extensive research during the commercial harvest (Gentry 1998) showed that the high frequency of harvests of sub-adult males from the hauling grounds had no detectable effect on the population of fur seals. The primary concern regarding the frequency of harvests during the transition to the subsistence period after 1984 was related to whether there would be unlimited and unrestricted harvests and NMFS ability to monitor such harvests. Unlimited harvests are not being contemplated under any of the alternatives and practically it is not possible for volunteer harvesters to organize time off from wage-earning jobs, under the appropriate environmental conditions such that harvests could occur more frequently than once or twice a week as has been the case over the past decade.

4.2.2. Sub-lethal Effects Due to Harvesting

During the harvest, direct and indirect sub-lethal effects to seals may occur incidental to human presence on or near the breeding area while herding animals into groups, maintaining the groups, and the subsequent release of individuals from the groups. Disturbance that may decrease reproduction or population abundance is the primary concern for the analysis of sub-lethal effects due to implementation of the alternatives. As described in more detail in this section, this analysis uses a technique established previously which estimates potential mortality and converts the mortality estimate to a sub-lethal effect on fur seals.

This analysis followed the methods described in the Steller Sea Lion and Northern Fur Seal Research PEIS (Research PEIS) (NMFS 2007b) and subsequently used in 2009 to estimate effects of research activities requested in permit applications submitted for northern fur seals. The Research PEIS evaluated possible effects incidental to pup round-ups to estimate northern fur seal mortality due to researcher presence among animals (which includes incidental disturbance during animal captures). Potential effects evaluated in the Research PEIS included known lethal consequences (observed mortality rate) and unknown lethal effects (estimated mortality resulting from animals being alerted, entering the water, or being injured during the disturbance). Animals potentially exposed to the round-up activities included pups and non-pups that are disturbed but not rounded-up, as well as pups that are rounded-up and subsequently released.

The research category “pup round-ups” is the closest proxy for evaluating potential effects of the pup subsistence harvest round-up. The principal difference between the activities analyzed for the Research PEIS and the harvest activities analyzed here is that fewer animals (hundreds) are rounded up for subsistence harvests than those typically herded for research (approximately 3,000).

NMFS has not detected a reduction in reproductive rates due to sub-lethal effects associated with this type of incidental disturbance during research or the commercial harvest. However, as a precautionary measure, the observed rate of mortality has been used as an upper limit to evaluate such effects. Known (observed) mortalities incidental to pup round-ups have all corresponded to dense aggregations of pups involved in research, so it is likely that the observed mortality rate per affected animal (0.00001 for pups and 0.0 for non-pups) applied in the analyses of sub-lethal effects would be lower during the proposed subsistence harvest due to the lower number of pups in each harvest round-up. In other words, mortality expected from incidental disturbance (potential sub-lethal effects) from pup round-ups during subsistence harvest would be less than that estimated for scientific research, which was also quite low (total mortality = 0.4 total per year) (NMFS 2007b).

The recently authorized harvest of male pups on St. George Island has resulted in approximately 50 male pups being harvested in each of the first 3 years of the new harvest regime (Testa 2016; and NMFS unpublished). NMFS has initiated studies to examine the sub-lethal effects of these harvests in 2015 and 2016. The data from 2015 are currently being analyzed while 2016 data are still being collected. The St. George pup harvest has been restricted by regulation to no more than two harvests per week per location. The actual pup harvest frequency has been on average about less than one harvest per week for the harvest season (NMFS unpublished data).

The types of effects, estimated proportions of animals affected, and estimated mortality rates per animal affected described in the methods for the Research PEIS (NMFS 2007b) are used here to evaluate potential sub-lethal effects due to disturbance during subsistence harvest of pups and juveniles.

Possible disturbance under each of the five alternatives is based on the number of harvest events likely to occur (see Chapter 2 for a detailed description of alternatives). Based on the harvest seasons specified under each alternative, Table 4.2-1 shows the number of days that pups would likely be harvested. For the purposes of analysis, the number of harvest events was calculated by assuming that only one harvest would occur per day and that up to five harvests could occur during each week of the harvest season. Based on consultation with ACSPI and past subsistence harvest practices, NMFS believes this harvest frequency is both conservative (higher than will actually occur), and more importantly, a practical amount of harvest effort given the economic constraints of volunteer subsistence harvest practices, as previously discussed in Chapter 3. For example, the harvest season under Alternative 3 is 20 weeks and 4 days (August 9 – December 31) or a total of 104 estimated harvest days [*i.e.*, ((20x5)+4)].

Table 4.2-1 Number of Assumed[1] Harvest Events Under Each Alternative

	Alternative 1	Alternative 2[2]	Alternative 3	Alternative 4	Alternative 5
Harvest Season	Sub-Adult Harvest June 23 – Aug 8	Pup and Juvenile Harvest Jun 23 – Dec 31	Pup and Juvenile Harvest Aug 9 – Dec 31	Juvenile Harvest Jan 1 – May 31 Jun 23 – Aug 8 Pup Harvest Aug 9 – Dec 31	Juvenile Harvest Jun 23 – Aug 8 Pup Harvest Aug 9 – Dec 31
Number of Harvest Days (total per year)	33	137	104	244	137

[1] – It is assumed that for each week during the harvest season, approximately 5 of those days would be spent harvesting pups.

[2] – Under Alternative 2, pups and juveniles can be harvested during either of the two seasons; however, pups are not found on the St. Paul Island between January 1 and May 31. Therefore, the analysis assumes pups will be harvested between June 23 and December 31.

The numbers of animals potentially exposed to the disturbance for either the male sub-adult/juvenile or male pup harvests were estimated as follows:

1. Pups: two pups are disturbed for each pup harvested, 60 additional pups are disturbed for each harvest event. No pups are disturbed during the harvest of non-pups.
2. Non-pups: 1.15 non-pups are disturbed for each animal (either pups or older) harvested, 50 additional older animals (*i.e.*, non-pups) are disturbed for each harvest event.

Therefore, to calculate potential mortality due to disturbance, analysts multiplied the number of harvest events by the number of animals potentially exposed. This approach allows NMFS to estimate the range between the minimum and maximum level of disturbance that could result in sub-lethal effects under the proposed alternatives. The actual level of sub-lethal effects due to the proposed harvest of pups would likely fall in within this range.

4.2.3. Sub-lethal Effects Due to Hunting

To evaluate potential sub-lethal effects of hunting, it is important to understand the hunting method that is likely to be used on St. Paul. Shooting marine mammals from vessels on the water can be very unsteady, even in calm seas. The hunting season proposed under Alternatives 2 and 3 would occur during winter months (*i.e.*, January through March or May) when the ocean is frequently rough and stormy. Therefore, while hunting seals from local boats may occur, this method is unlikely due to hunter safety concerns. One contemporary method of hunting that is more likely to occur involves hiding in the rocks along shore and waiting for fur seals to pass by. Hunters shoot at the seal in shallow water before it notices the hunter's presence. After shooting the animal from shore, the hunter may use a kayŭx and a hand line thrown from shore to retrieve the kill. Hunters may also wait for the tide and current to wash the animal ashore. This method is currently used on St. Paul Island and in other coastal Alaska regions for hunting sea lions (Haynes and Mishler, 1991). According to Haynes and Mishler (1991), sea lion hunting locations on St. Paul depends on weather conditions, as well as available transportation to sites. For example, Northeast Point is accessible by road, but due to drifting, blowing snow the road is often closed during winter months. Other modes of transportation to hunting locations may include snow machines, all-terrain vehicles, or walking, but depend on weather conditions. Hunting sea lions on St. Paul is typically conducted by individuals or small groups (*i.e.*, two to three individuals).

Considering these methods of hunting, the potential for sub-lethal effects would likely result from:

- Presence of humans near haulouts or rookeries; or
- Noise associated with gunshots fired at targeted animals.

The potential impacts from the presence of humans during seal harvests are described under the previous section. While there may be some similar disturbance effects during hunting, there are distinct differences as follows:

- Hunters purposefully make an effort to be concealed so animals do not move away or startle. Therefore, walking around or through haulouts or rookeries would likely be limited;
- Seals are not herded into groups as they are during a harvest; and
- The proposed hunting seasons (Alternatives 2 and 3) are from January 1 through either May 31 (Alternative 2) or March 15 (Alternative 3) when fur seals are at sea and are not congregating or even regularly present on shore (Table 3.2-1). In addition, during the winter all potential subsistence species other than fur seals are found irregularly in the nearshore waters around the St. Paul (see Chapter 3), and those marine mammals pursued, such as Steller sea lions would be pursued under the exemptions found in the MMPA and ESA, independent of subsistence use of fur seals.

Table 4.2-2 provides the number of assumed hunting event under each of the five alternatives.

Table 4.2-2 Number of Assumed[1] Hunting Events Under Each Alternative

	Alternative 1[3]	Alternative 2	Alternative 3	Alternative 4[2]	Alternative 5[2]
	N/A	Jan 1 – May 31	Jan 1 – Mar 15	N/A	N/A
Number of Hunting Events for Juveniles (total per year)	N/A	109	54	N/A	N/A

[1] – It is assumed that for each week of the hunting season, approximately 5 of those days would be spent hunting and that only one animal would be killed per day.
[2] – Hunting is prohibited under Alternatives 1, 4 and 5.

4.2.4. Process Used to Assess Probability of Mortality Due to Sub-Lethal Effects Due to Harvest or Hunting

As indicated previously, NMFS has not detected a reduction in reproduction as a sub-lethal effect in fur seals exposed to research activities, harvest activities, and repeated human presence. In the absence of such evidence, NMFS has based the assessment of potential sub-lethal effects by using direct mortality observed during research as the maximum level of sub-lethal effects. This allows NMFS to estimate the number of animals exposed to sub-lethal effects and convert that exposure into the probability of mortality due to the proposed harvest or hunting activities in each alternative. We have no information about the sub-lethal effects on fur seals from the use of firearms during January through May when fur seals are pelagic, but would anticipate that any seals not struck would respond by swimming away at a rapid pace. Seals on land would respond similarly to gunfire as those that respond to human presence, and become alert, depart to the water, and some portion of those departing to the water may be injured during their escape to the water (see Step 1 below). We have used the exact same process to calculate the maximum sub-lethal effect of the alternatives based on the best available scientific methods established in the NMFS Steller Sea Lion and Northern Fur Seal Research PEIS (2007b) for research activities, and the NMFS Final Supplemental EIS for the Management of Subsistence Harvest of Northern Fur Seal on St. George Island (2014a). Estimating the probability of mortality from the different responses by pups and juveniles represents our best proxy for estimating the maximum sub-lethal effects based on the following steps:

- **Step 1.** Estimate the number of seals of each age group exposed to subsistence activities. We have used two age groups pups and non-pups because pups are at a greater risk of sub-lethal effects due to their more limited mobility and development. The number of seals exposed to harvest activities is based on the details provided previously in Sections 4.2.2 multiplied by the predicted number of harvest events. The number of seals exposed to sub-lethal effects of hunting is based on the number of seals provided in Table 3.2-1.
- **Step 2**. Categorize the potential responses to different types of harvest / hunt activities according to the intensity of an animal's response. Different responses can lead to mortality through a variety of known or suspected mechanisms for potential injury. This can be found in Tables 4.3-3 through 4.3-10 in the column titled "type of effect".
- **Step 3**. Estimate the proportion of animals that typically respond with a certain behavior based on observed responses in various locations and under different environmental conditions. This estimate represents a "typical" response and considers the range of responses observed at

different rookeries/haulouts over the years. This can be found in Tables 4.3-3 through 4.3-10 in the column titled "estimated proportion of animals affected".

- **Step 4**. Estimate the predicted number of animals affected as a result of exposure to all harvest / hunt activities. These estimates include sub-lethal injuries that require some time to heal, may involve some pain or discomfort, and may affect the ability of animals to move or behave normally for a period of time. It also includes estimates of individuals that may die as a result of infections, tissue damage, or impaired ability to forage successfully because of their injuries. These estimates do not include animals that would be injured and die due to natural causes. The predicted number of animals affected is a function of the number exposed to harvest / hunt activities (Step 1, above) and the proportion of those exposed which respond in different ways (Step 2, above).
- **Step 5**. We estimate the theoretical mortality as a proxy for the maximum possible sub-lethal effect for each subsistence activity by age class and disturbance response. The analysts multiply the estimated number of seals exposed, the "estimated proportion affected", and "estimated mortality rate per animal" responding to each type of effect. The "Theoretical number of mortalities" for each row are then summed to provide the maximum sub-lethal effect calculated as a "mortality equivalent."

As described in the beginning of Section 4.3.1, the duration or frequency of the activity provides the context of time of the effect. In this assessment, the intensity or magnitude of the effect is evaluated based on the northern fur seal population rather than individual animals. There are about 410,000 fur seals using habitat on St. Paul during the 7-month terrestrial portion of their annual cycle. A "short-term" effect is something that is temporary and lasts anywhere from a few minutes to a few days, then the affected animals revert back to a "normal" condition. A "long-term" effect refers to something that would last more than a few days or result in a permanent change to an animal's behavior or state. Long-term effects include serious injury or death and may include other effects on reproduction or fitness. Moderate duration is somewhere in between and may integrate intermittent or infrequent effects occurring a few times a year or less. Frequency refers to regularly or repeatedly occurring effects each year. Other elements of the temporal context of effects, such as whether the effects occur primarily during a sensitive or critical part of the year, are described in the analyses. For some aspects of this assessment, analysts will conduct a qualitative analysis of potential effects based on professional judgment and experience. In such cases, while a formal probability calculation will not be undertaken, potential effects will be described using the impact criteria defined in Table 4.2-4.

4.2.4.1. Analyzing the Geographic Extent of Sub-Lethal Effects

The geographic extent of sub-lethal effects is evaluated based on the distribution of disturbance effects across the population, with concentrated disturbance resulting in worse effects. In other words, the more disturbance is distributed across multiple locations (*i.e.*, several rookeries or haulouts), the less detrimental the sub-lethal effects may be. Therefore, if harvesting and hunting is distributed across multiple rookeries and haulouts, the potential sub-lethal effects would be minor while harvesting or hunting concentrated in one location would result in a major effect (see Table 4.2-4).

4.2.5. Process Used to Assess Potential Mortality Due to Struck and Lost

Alternatives 2 and 3 allow the use of firearms at specified periods during the year to hunt juvenile male seals. Alternative 2 is the only alternative that would allow the use of firearms from vessels in the water, but practically, ACSPI has indicated that most if not all hunting will be based on land, with hunters shooting at passing fur seals or those rare occurrences where they may be found hauled out on St. Paul Island. Alternative 3 would allow firearm use between January 1 and March 15, when hunting would only occur when seals are hauled out on St. Paul; therefore, the potential for a seal to be struck and lost on land is less likely and is qualitatively assessed for Alternative 3. Since Alternatives 2 and 3 would create hunting seasons prior to the harvest season, all hunting mortality would be accounted for prior to the start of harvest season managed by the Co-Management Council.

The fate of seals hunted from vessels using firearms that may be struck (*i.e.*, shot) and lost is not known. As a precautionary measure, this analysis assumes that seals struck result in mortality. This is a worst-case scenario required for the analysis, and not an assertion that all strikes from subsistence harvests result in mortalities. As firearms have never been permitted for northern fur seal subsistence harvests on St. Paul Island, data on struck and lost rates have been derived from data on pelagic killing of seals (pelagic sealing) when it was authorized for research and have been calculated at approximately 26.8% (R. Towell, Person Comm., December 17, 2015). As described in Section 3.9.3, while pelagic sealing occurred between 1875 and 1910, and then again between 1957 and 1974, data on struck and lost estimates are only available for three of those years (Japan 1983; Russia 1982; 1983; reported in North Pacific Fur Seal Commission 1984). Data from Steller sea lion subsistence harvests on St. Paul have also been reviewed and are summarized in Table 4.2-3 (NMFS, unpublished data). Over a 22-year period between 1992 and 2014, struck and lost rates for St. Paul Steller sea lion subsistence hunting using firearms ranged from 9.1% to 50%. It should be noted that struck and lost rates may be under-reported, and therefore, these data may be biased, but represent the best available data. Struck and lost rates for female fur seals are assumed to be zero because they are not present in the nearshore waters around the Pribilofs at this time of year (see Figure 3.2-3). MML analyzed satellite telemetry locations between 2003 and 2010 and found no females within 100 nautical miles (nm) of St. Paul between January and May (see Figure 3.2-3 in Section 3.2.4.1).

Alternative 2 would create a hunting season from January 1 through May 31 during which juvenile seals could be hunted using firearms. A second season would occur between June 23 and December 31 for the purpose of harvesting juvenile males (*i.e.*, up to 7 years old) and male pups and would not involve firearms. To evaluate the potential maximum contribution of seal mortality due to struck and lost under Alternative 2, and as a precautionary approach due to potential under-reporting of lost animals, analysts considered a minimum of 9% (based on Steller sea lions struck and lost from Table 4.2-3) and maximum of 100% struck and lost rate as a portion of the total allowable harvest limit of 2,000 seals. Additional detail on the impacts of Alternative 2 and total potential mortality is provided in Section 4.4. If the Preliminary Preferred/Petitioned Alternative (Alternative 2) is chosen, estimates of struck and lost will be estimated annually through the subsistence use monitoring program. Future harvest management decisions would be based on actual fur seal struck and lost rates collected under the direction of and reported to the Co-Management Council.

Table 4.2-3 Estimated Subsistence Takes of Steller Sea Lions by Alaska Natives, 1992 - 2014

Estimated Total				
Year	**Shot, Retrieved, and Used**	**Struck & Lost**	**Total Take**	**Source of Information**
1992	176.6 59.9%	120.2 40.1%	296.8 100.0%	ADFG St. George and St. Paul Combined
1993	165.4 67.4%	80 32.6%	245.4 100.0%	ADFG St. George and St. Paul Combined
1994	149.8 77.5%	43.5 22.5%	193.3 100.0%	ADFG Pribilofs Combined
1995	57.6 84.8%	10.3 15.2%	67.9 100.0%	ADFG Pribilofs Combined
1996	32.2 69.4%	14.2 30.6%	46.4 100.0%	ADFG Pribilofs Combined
1997	45.5 81.4%	10.4 18.6%	55.9 100.0%	ADFG Pribilofs Combined
1998	52.7 67.5%	25.4 32.5%	78.1 100.0%	ADFG Pribilofs Combined
2000	29.1 67%	14.2 33%	43.3 100%	ADFG Pribilofs Combined
2001	12 50%	12 50%	24 100.0%	Memo for Record St. Paul
2002	18 50%	18 50%	36 100.0%	Memo for Record St. Paul
2003	13 72.2%	5 27.8%	18 100.0%	Memo for Record St. Paul
2004	9 50%	9 50%	18 100.0%	Memo for Record St. Paul
2005	19 86.4%	3 13.6%	22 100.0%	Memo for Record St. Paul
2006	20 76.9%	6 23.1%	26 100.0%	Memo for Record St. Paul
2007	22 64.7%	12 35.3%	34 100.0%	Memo for Record St. Paul
2008	22 90.9%	2 9.1%	22 100.0%	Memo for Record St. Paul
2009	18 69.2%	8 30.8%	26 100.0%	Memo for Record St. Paul
2010	15 75%	5 25%	20 100%	Memo for Record St. Paul
2011	24 75%	8 25%	32 100%	Memo for Record St. Paul
2012	16 67%	8 33%	24 100.0%	Memo for Record St. Paul
2013	24 71%	10 29%	34 100.0%	Memo for Record St. Paul
2014	21 60%	14 40%	35 100%	Memo for Record St. Paul

The process used represents the best judgment of the analysts in identifying additional mortality due to struck and lost fur seals from hunting. Because the hunting occurs before the harvest season, NMFS and ACSPI will be able to count the number of fur seals retrieved and estimate the number of seals struck and lost during hunting to calculate the cumulative mortality and ensure the total fur seal take due to hunting of juveniles (*i.e.*, retrieved plus struck and lost) and the harvest of juveniles and pups does not exceed

2,000. The thresholds for mortality effects are described in Table 4.2-4. The results of applying this process are found in Section 4.4, which describes the anticipated effects for each alternative.

Table 4.2-4 Criteria for Determining Impact Level for the St. Paul Subsistence Harvest on Northern Fur Seals

Effect	Component of Effect	Major	Moderate	Minor	Negligible
Direct and indirect mortality on the St. Paul fur seal population	Magnitude or Intensity	Total mortality equal to or more than 50% of PBR	Total mortality equal to or more than 30% and less than 50% of PBR	Total mortality assessment between 30%-10% of PBR	Total mortality assessment less than or equal to 10%of PBR
	Geographic Extent	Effects concentrated at one rookery	Effects distributed among a few rookeries	Effects distributed across range of population	No measurable effects across a rookery
Direct and indirect sub-lethal effect on the St. Paul fur seal population	Magnitude or Intensity	Enough to cause a measurable change in reproductive success	Equivocal change in reproductive success	Mechanisms for effects, but productivity similar	No mechanisms for reproductive effects
	Geographic Extent	Effects concentrated at one rookery	Effects distributed among a few rookeries	Effects distributed across range of population	No measurable effects

4.2.6. Criteria for Evaluating Effects on the Social, Economic & Cultural Environment on St. Paul

The Pribilovians historically depended on foods from the sea; fur seals, sea lions, fish and tidal foods provided the majority of nutrients in the diet while birds, plants, and later reindeer, have also been important sources of food. All of these traditional foods continue to be utilized and are supplemented with store-bought foods though variety, freshness, and availability are unpredictable.

Traditional foods are not only necessary for survival on these remote islands, but are an essential part of the lives and culture of the communities. Many traditional values are expressed through the harvesting, hunting, and preparation of local / traditional food: sharing, respect for elders, care of others, and care of the land, air, and water.

Traditional foods provide nutritional, health, sociocultural, spiritual, and economic benefits to individuals and community of St. Paul. The harvesting, preservation and preparation of traditional foods are an integral part of Alaska Native cultural practices.

The native community of St. Paul is isolated and continues to face food security concerns. “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (World Food Summit 1996). The following dimensions can be used as criteria for determining effects of food security on St. Paul Island. Each can be defined using these brief definitions[2].

- **Food availability:** “The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports […]” (FAO 2006).

[2] The full definitions can be found here: www.fao.org/bioenergy/foodsecurity/befsci/definitions

- **Food access:** "Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet […]" (FAO 2006).
- **Food utilization:** "Utilization of food through adequate diet, clean water, sanitation, and health care to reach a state of nutritional well-being where all physiological needs are met […]" (FAO 2006).
- **Food stability:** "To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (*e.g.*, an economic or climatic crisis) or cyclical events (*e.g.*, seasonal food insecurity) […]" (FAO 2006).

From the aspect of nutrition and food security, fur seals represent an available, accessible, fresh, and safe source of traditional food for the residents of St. Paul Island providing a nutritionally superior source of food rather than commercially available alternatives (Loring *et al.* 2011). The following principles are intended to guide the evaluation of food security and the right to foods and resources. They are meant to complement food security considerations of human dignity, cultural acceptability, and empowerment by means of participation, non-discrimination, transparency, and accountability (FAO 2006). These principles along with the definitions on food security from FAO provide the basis for the impact criteria for evaluating impacts of the alternatives on the social, economic, and cultural environment of St. Paul Island (see Table 4.2-5). In general, FAO suggests that the action should be environmentally, socially, and economically sustainable. It should safeguard and, if possible, foster food security, cultural traditions, and economic surety.

Table 4.2-5 Socioeconomic and Cultural Impact Criteria

Principle (Criteria)	Definition
Food and Resource Availability	The action should, if possible, increase - or at least not reduce - the local availability of sufficient quantities of resource of appropriate quality that include: self-provisioning (including subsistence); sharing, barter and trade; and commercial markets.
Food and Resource Access	The action should, if possible, increase - or at least not reduce - access by the community to adequate resources for acquiring appropriate foods for a traditional diet, and materials for cultural crafts and art.
Food and Resource Utilization	The action should, if possible, improve - or at least not worsen - the utilization of food through proper storage and resources through proper care to achieve a state of nutritional and cultural well-being where all physiological and socioeconomic needs are met.
Food and Resource Stability	The action should, if possible, increase - or at least not reduce - access by the community to adequate food and resources at all times throughout the year by strengthening - or at least not weakening - their resilience to sudden resource failures, disasters or cyclical events. Examples include natural hazards: storms, weather, animal disease or injury; manmade hazards: fisheries conflict or at-sea incidents; percentage of the population under the national poverty line.
Cultural Practices and Emotional Wellbeing	If an action leads to a fundamental change in the way of life of people (*i.e.*, culture), continuation of a traditional cultural practice, the nature of relationships within a community or to livelihood patterns, it can result in changes to overall emotional wellbeing. These aspects are evaluated in terms of the likelihood that changes in northern fur seal subsistence relate to continuation of cultural practices and associated emotional wellbeing of the community.

4.2.7. Methods for Evaluating Cumulative Effects

The CEQ regulations for implementing NEPA define cumulative effects as:

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

The CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action on the universe, but to focus on those effects that are truly meaningful. Section 4.4.2 analyzes the potential direct and indirect effects of other factors that may in the aggregate, and in combination with the subsistence harvest of fur seals, result in greater effects on northern fur seals or their biological environment than those resulting solely from the subsistence harvest.

The intent of the cumulative effects analysis is to capture the total effects of several actions over time that would be missed by evaluating each action individually. Section 4.4.2 describes several factors external to the proposed actions that may be contributing to a cumulative effect on fur seals. The cumulative effects assessment follows CEQ guidance and consists of the following steps:

1. *Identify characteristics and trends within the affected environment that are relevant to assessing cumulative effects of the action alternatives (Sections 3.2 and 3.9);*
2. *Describe the potential direct and indirect effects (Sections 4.3 and 4.4);*
3. *Identify past, present and reasonably foreseeable external factors such as other fisheries, other types of human activities, and natural phenomena that could have additive or synergistic effects (Section 4.4.3);*
4. *Evaluate the significance of the potential cumulative effects and the relative contribution of the action alternatives to cumulative effects (Section 4.4.3); and*
5. *Discuss the reasoning that led to the evaluation of significance, or lack of significance, citing evidence from quantitative information, where available (Section 4.4.3).*

The advantages of this approach are that it: 1) closely follows CEQ guidance; 2) employs an orderly and explicit procedure; and 3) provides the reader with the information necessary to make an informed and independent judgment concerning the validity of the conclusions.

4.3. Direct, Indirect and Cumulative Effects on Northern Fur Seals

This section analyzes the effects of the St. Paul Island subsistence harvest alternatives on the Eastern Pacific stock of northern fur seals.

4.3.1. Elements Common to All Alternatives

None of the alternatives considered would authorize an unlimited or unrestricted subsistence harvest as was the main rationale for the emergency rulemaking in 1985. The differences among the alternatives are largely based on the use of federal regulations or the co-management council to limit and restrict the

ability of the Pribilovians to subsist on fur seals. The following regulatory elements are common to all alternatives:

- The taking of fur seals will be for subsistence uses by Pribilovians on St. Paul Island, Alaska;
- Subsistence use of fur seals 7 years old and greater is not authorized;
- Subsistence use will not be accomplished in a wasteful manner; and
- Harvests will be co-managed by the Tribal Government of St. Paul Island and NMFS under an existing Co-Management Agreement[3].

4.3.2. Elements Common to Alternatives 2, 3, and 4

The following regulatory elements are common to Alternatives 2, 3, and 4:

- The subsistence use of northern fur seal pups is authorized;
- The subsistence use of no more than 2,000 juvenile male northern fur seals is authorized; and
- Harvests will be co-managed by the Tribal Government of St. Paul Island and NMFS under an existing Co-Management Agreement.

The main distinctions under Alternatives 2, 3 and 4 relate to the level of co-management versus the use of federal regulations to describe when, where, and how the Pribilovians can subsist on juvenile male northern fur seals. Managing fur seal harvest through regulations requires a lengthy review and approval process. Alternatively, the Co-Management Council could more promptly modify harvest restrictions to balance the Pribilovians' need to subsist on fur seals when they are available on the Pribilof Islands while ensuring the northern fur seal population is not significantly impacted.

The alternatives use different threshold levels to suspend and terminate the subsistence use (see Table 2.2-6). Federal law enforcement officers enforce the existing regulations at 50 CFR 216.71-74, whereas the terms of the Co-Management Agreement identify that decisions of the Co-Management Council are made by consensus of NMFS and ACSPI. Thus management decisions made by the Co-Management Council about subsistence use would consider the latest information and circumstances to come to concensus. Alternative 2 Option A would delegate authority to the Co-Management Council to authorize the harvest to continue if females are killed during subsistence activities, and for implementing other harvest restrictions as determined necessary (see Table 2.2-2). Alternative 2, Option B would not delegate authority to the Co-Management Council, but instead would rely on federal regulations to authorize the harvest to continue until 20 females were killed. Alternative 2, Option B would delegate the authority to the Co-Management Council to implement all other harvest restrictions determined necessary. Compared to Alternative 2 Option B, Alternatives 3 and 4 NMFS would manage more aspects of subsistence use with federal regulations, including harvest range and season, conditions for harvest suspension and termination, and harvest practices rather than delegate those management decisions to the Co-Management Council. See Section 2.2 and Table 2.2-6 for additional detail on the alternatives.

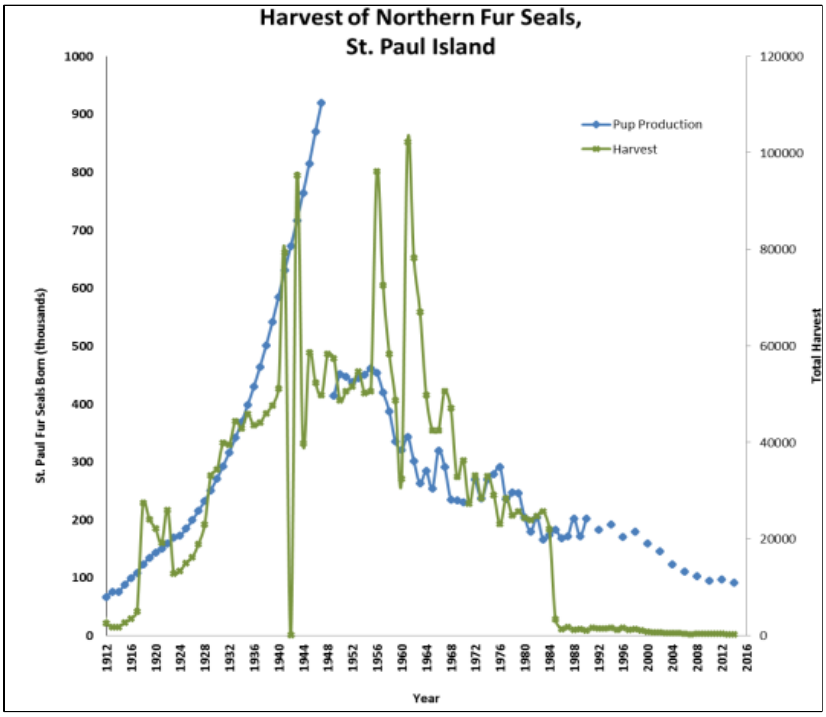
[3] Note that the level of responsibility for the Co-Management Council varies among alternatives, as described in Sections 2.2.2 and 4.4.2.

4.3.3. Context for Impact Analysis

Humans harvested northern fur seals commercially for their pelts for more than 200 years. A general discussion of the commercial harvest can be found in Section 3.9.3. The U.S. managed the commercial harvest intensively and conducted concurrent scientific investigations of the effects of the harvest from 1910 through 1984 (Scheffer *et al.* 1984; Roppel 1984; Gentry 1998). NMFS' best estimate of the U.S. commercial harvest and associated killing for research over this extensive period is more than 7 million seals killed, the vast majority on the Pribilof Islands. The U.S. commercial harvest and current northern fur research provides important context for understanding the likelihood of lethal and sub-lethal effects of the range of alternatives evaluated in this section.

Under the Fur Seal Treaty and subsequent Conventions, the U.S. harvested 2,525,709 sub-adult male fur seals from St. Paul Island. The average annual harvest of sub-adult males on St. Paul Island during the commercial period from 1911 to 1984 was 34,131. The commercial harvests occurred on about 35 days over a period of 6 to 8 weeks each year. Some days there were multiple sequential harvests at different sites with fewer numbers, while other hauling grounds were large enough that a single harvest took an entire day to complete. NMFS records indicate an average of 975 seals killed per commercial harvest-day per year from 1911 to 1984. By analyzing the absolute number of seals killed, data indicate that almost 100 times the number of sub-adult male seals were killed annually in the commercial harvest (1911 to 1984) compared to those taken for subsistence between 1985 and 2015 (29,246). Further, the Russians harvested approximately 34% to 93% of the estimated surviving sub-adult males on Tyuleniy Island from 1990 to 2003 (Kuzin 2010), this was a far higher harvest percentage of the male population than commercially harvested on the Pribilof Islands. Kuzin (2010) estimated during this same period, the pup production on Tyuleniy Island increased from about 15,000 to 42,000. This harvest information provides direct evidence of the sustainability of sub-adult male harvests (Figure 4.3-1), and the concurrent level of accidental female mortality described in the following section.

Figure 4.3-1 Harvest of Male Northern Fur Seals, St. Paul Island



4.3.3.1. Context of Female Mortality

The large-scale commercial harvest and the intense data collection to support the Convention provide an important source of information about the population implications of killing female northern fur seals at various population levels. In addition as discussed in Chapter 3, the female culling program instituted from 1956 to 1968 included the intentional killing of female fur seals from their breeding grounds. The commercial harvest of sub-adult males and female culling programs operated concurrently during that 13-year period. The contrast of these two programs is intended to highlight the differences in the level of incidental/accidental harvest of females during the sub-adult male harvest versus the direct and intentional killing of females during the culling program. After examining the accidental killing of female seals during the commercial sub-adult male harvest, on average 178 females were killed annually. The rate of accidental female mortality during the commercial was about 0.0045 females per male harvested. During the subsistence period (*i.e.*, from 1985 to 2016) 74 females have been killed accidentally, or about 2 females per year. The rate of accidental female mortality during the subsistence period is 0.0021, which is approximately half of the rate observed during the commercial period.

Towell and Williams (2016) modeled the possible impact of accidental female mortality under a variety of juvenile male harvest scenarios based on two different survival estimates (Lander 1981; Towell 2007). The model estimated population losses and reduction in reproduction due to annual accidental mortality of 20, 200, and 1,000 females for 25 years during the juvenile male harvest. Accidental female mortality levels of 20 individuals resulted in less than a 0.5% reduction in the female portion of the population. Accidental female mortality of 200 individuals resulted in less than a 2% loss of females in the

population; the mortality of 1,000 juvenile females resulted in a 4% to 6% loss of the females in the population. Statistically, a change in the total number of seals in the population as a result of the accidental mortality of 20 or 200 females cannot be detected. It is only after 25 years of accidental annual mortality of 1,000 females, that a 6% change in total population may be detectable.

The Russians instituted the first harvest restriction for the benefit of the Pribilof Island fur seal population by prohibiting the harvest of female seals. The Russians were able to maintain high harvests on the Pribilof Islands, primarily as a result of protecting females, and the population was robust when the U.S. purchased Alaska in 1867. This history is discussed in Chapter 3 and the most relevant context is that intentional killing of females has typically resulted in subsequent population declines. Further, the accidental killing of females during the subsistence harvest directed at males has not caused a detectable change in the population.

From 1956 to 1968, the U.S. killed a total of about 300,000 female fur seals on the Pribilof Islands as part of the herd reduction program in an attempt to increase population. However, the Pribilof Islands fur seal population did not react as expected likely due to the limited understanding of fur seal ecology or the actual implementation of the culling program in a manner inconsistent with the original plans. Kajimura (1980) reported that neither a substantial decrease in age at first pregnancy nor an increase in pregnancy rates occurred as the pup production declined (Figure 4.3-1). Additionally, scientists predicted an increase in adult survival, which was not observed (York and Hartley 1981). Direct losses of adult and juvenile female caused a significant and sustained decline beyond the initial predictions. York and Hartley (1981) were able to attribute the majority of the fur seal population decline through the 1970s to the killing of female fur seals. This experience established a further basis for controls on direct female mortality; none were instituted until the subsistence harvest regulations.

Harvests from the Russian Islands where fur seals breed provide another example for the importance of protecting females and the ability of the fur seal population to sustain high levels of male harvests. The commercial harvest on Bering Island was not managed similarly across the time period and additional analysis lends insight into the possible population effects. The Bering Island commercial harvest included only male fur seal pups from 1987 to 1992 and averaged more than 6,000 annually (14.6% of annual production) in addition to a harvest of 2- to 5-year-old males (Person Comm., Ream and Burkanof). Ten (10) years after the initiation of the male pup harvest, there were no observable effects on pup production at Bering Island; the trend in pup production during this time period was not statistically different from zero. These results indicate that a male pup harvest of about 14% of annual production may not have any detectable direct or indirect population level effects. The age composition of the Bering Island harvest 1987 to 1992 is similar to that considered in Alternatives 2 through 5, though the number of animals taken was a much higher percentage of the population. From 1993 to 1998, Russians harvested approximately *equal proportions* of male and female pups at about 10% of annual pup production in addition to harvests of 2- to 5-year-old males. During 1993 to 1998, beginning 4 years after females were first harvested, until 4 years after the harvest of females stopped, the population trend was negative (approximately −6% annual decline, Person Comm., Ream and Burkanov). NMFS analyzed the trend for females 4 years after the harvest because that is the age at which female fur seals first reach sexual maturity; therefore, any potential sub-lethal effects on reproduction would be evident. Kuzin (2010) reported that the harvest of

16,180 female pups from Bering Island over a 4-year period directly affected the reproductive capacity of the population.

In summary, current female mortality occurs at a very low rate (0.002 females per male harvested) during the subsistence harvest, which is about half of the rate observed during the commercial harvest. The current level of accidental female mortality has not been shown to detectably affect reproduction or abundance, and therefore, does not have an effect on overall population. Population modeling shows that, even at higher levels of accidental mortality of females, a 4% to 6% loss of females (20 to 200 females annually) does not result in a detectable change in overall fur seal population. The intentional directed killing of high numbers (thousands) of females can and has repeatedly caused a detectable and sustained decline in reproduction and subsequently overall abundance for the population.

4.3.4. Alternative 1 No Action

Alternative 1 would continue the current harvest take levels along with age and location restrictions. This alternative continues the harvest under the regulatory process used to establish harvest take levels every 3 years, and a set of restrictions that have been in place since 1993. Federal regulations at 50 CFR 216.72 currently restrict subsistence harvests to sub-adult male fur seals less than 124.5 cm in length during the period between June 23 and August 8 of each year. NMFS' current regulations governing the subsistence harvest of northern fur seals on the Pribilof Islands are more restrictive regarding sex, size, and age of harvested seals than those in effect during the approximately 80 years of the commercial harvest on the Pribilof Islands. St. Paul has a long history of harvesting male fur seals and the population implications are well understood. This size limit corresponds to the size of male fur seals aged 4 years old and younger. The length of seals killed cannot be determined until they have been killed, and about 1% to 3% of the seals harvested in the past few years have been longer than 124.5 cm. The length restriction generally limits the subsistence harvest to seals 4 years old and younger; eight males aged 5 years old and older have been harvested during the 31-year subsistence period. Towell and Williams (NMFS unpublished) modeled the population effect of a harvest of 2,000 sub-adult (*i.e.*, 2- to 4-year-olds) males and estimated a 4% to 6% reduction in the male portion of the population after 25 years of harvesting when compared to an unharvested population.

The actual number of seals taken for subsistence each year since 1986 has been less than the lower limit of the allowable range (average = 943). In addition, the subsistence harvesters (from 1985 to present) tend to select predominantly 3-year-old males on St. Paul. Under Alternative 1, taking of pups is prohibited by regulation. The regulations also prohibit the intentional taking of sub-adult female fur seals.

4.3.4.1. Key Aspects of Alternative 1

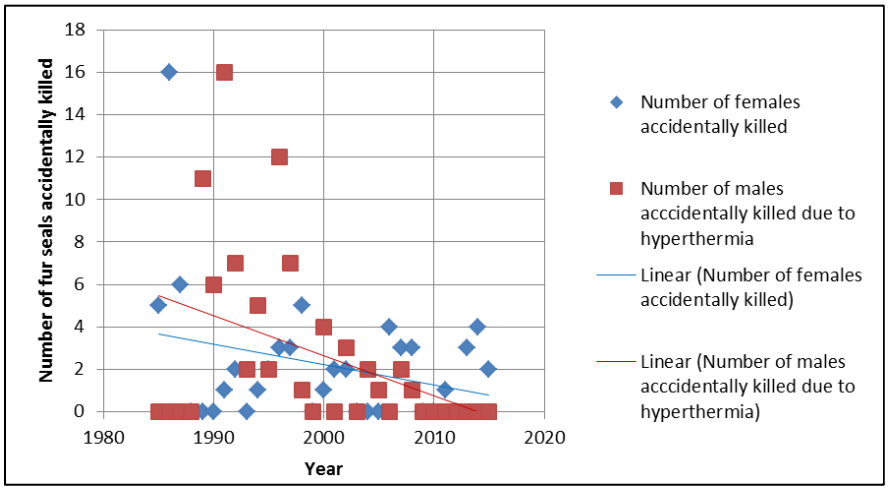
The following paragraphs provide a discussion of the aspects relevant to this Alternative.

- **What are the effects of the 124.5 cm size limit under Alternative 1?** The effect of the length restriction is that it generally limits the subsistence harvest to seals 4 years old and younger. Towell and Williams (NMFS unpublished) modeled the population effect of a harvest of 2,000 sub-adult (*i.e.*, 2- to 4-year-olds) males and 2,000 6-year-old males (*i.e.*, all greater than 124.5 cm). They estimated the harvest of exclusively 6-year-old males would result in a 1% to 2%

reduction in the male portion of the population after 25 years of harvesting when compared a harvest of 2,000 males less than 124.5 cm. This difference is undetectable based on our current methods of measuring abundance.

- **What are the effects of the requirement under Alternative 1 that sealers be experienced?** The intention of this requirement was to ensure the harvest was implemented consistently with commercial methods determined to be humane, not increase accidental take of females, and not increase disturbance to the rookery. While this conservation outcome was generally achieved in the late 1980s, the rate of female mortality and hyperthermia peaked in the 1990s. Today sealers have less experience than previously, yet hyperthermia and accidental female mortality are at their combined lowest rates of the entire subsistence period (Figure 4.3-2). Because the regulatory requirement is a prescriptive standard, "No fur seal may be taken except by experienced sealers" the intended conservation outcomes are not necessarily the result. However, it has significant negative effects on the cultural traditions because it makes it more difficult for younger generation sealers to gain experience. Overall, the regulatory requirement to be an "experienced sealer" creates an artificial standard that cannot be quantified (*i.e.*, how is one determined to be "experienced" at sealing). The prescriptive and regulatory requirements for subsistence harvesting of fur seals is considered contrary to the objectives of the co-management partnership. In addition, it results in a negative effect by discouraging participation by younger generations and limits the ability to pass on cultural practices within the community.

Figure 4.3-2 Number of Northern Fur Seals Accidentally Killed Under Alternative 1



- **What is the probability and effects of seals being struck and lost during traditional harvest under Alternative 1?** The current method of harvesting fur seals does not result in any seals being struck and lost. Sub-adult males are rounded-up and harvested and there is no evidence that seals have been struck and lost during the subsistence harvest. This has raised as a concern only in other alternatives that would allow hunting of fur seals with firearms.

- **How has NMFS determined the subsistence harvest is humane under Alternative 1?** NMFS determined during the commercial harvest that the methods employed during that time were humane. An independent veterinary panel determined the commercial method employed was humane, and that seals were killed consistent with standards established by commercial agriculture. To continue to ensure the harvest is humane, NMFS hired a veterinarian to be present during the harvests through 2014 to collect information on the percentage of seals that died due to hyperthermia (by measuring body temperature of killed seals) and the duration of the round-up and driving process. In recent years, after training with a NMFS veterinarian, these responsibilities have been transferred to the ACSPI. This is not an issue under Alternative 1.
- **What are the effects to the population when harvest is prohibited at breeding areas where pup production has been reduced to very low levels?** There is no regulatory mechanism under Alternative 1 to prohibit subsistence use from specific breeding locations if the population is below a specified level. Under Alternative 1 (Status Quo), there is nothing to indicate the need to protect breeding areas because harvest of sub-adults has occurred on haulouts and breeding areas have been unaffected. This is primarily due to the harvest of only sub-adult male fur seals which have a very high mortality rate during the first 3 years of life. Taking only male sub-adult seals has resulted in little effect on population trajectory or long-term trends of the population overall no matter which area is harvested.
- **What are the effects on the fur seal population when harvest is prohibited to a proportion of the available rookeries or haulouts under Alternative 1?** Prohibiting harvests from some locations concentrates the harvest at fewer locations thereby increasing the possibility of detectable effects to emerge. This outcome is largely related to the site fidelity and tenacity exhibited by northern fur seals. The lack of disturbance at a proportion of the breeding areas or haulouts might be considered a positive effect of limiting access and harvest to some areas, but those minor indirect benefits would be outweighed by the direct negative effects of higher frequency or concentration of harvest at a specified number of haulouts or breeding areas.
- **Under Alternative 1, what are the effects on the fur seal population where harvest of sub-adult males is prohibited after August 8?** The overall effect has been to limit the number of sub-adult female seals that are accidentally killed. Female fur seals become more abundant on the rookeries and hauling grounds after early August and they can easily be confused with sub-adult males during harvests. NMFS implemented the deadline to reduce the likelihood of female fur seals being rounded up during the harvest.
- **Under Alternative 1, what are the effects of requiring that only traditional methods are used?** Requiring only traditional methods does not promote innovative solutions to unforeseen problems or improvements to the harvest based on new experiences. The intention of this requirement was to ensure the harvest was implemented consistently with traditional commercial methods determined to be humane, maximize the detection of females, and attempt to minimize the effects of stress on those seals rounded up during the harvest. Because the regulatory requirement is a prescriptive standard “using the traditional harvesting methods”, the intended

conservation outcomes are not necessarily the result. However, it does result in little incentive to innovate or improve harvest methods as conditions change.

4.3.4.2. Male Mortality

4.3.4.2.1. Sub-Adult Male Mortality

The magnitude of direct and indirect mortality effects of the No Action Alternative are considered minor since the lower limit of 1,645 2- to 4-year-old male seals (17% of PBR) can be harvested prior to any controls being initiated by NMFS[4]. When the lower limit has been reached, the harvest is suspended pending a written request from the community identifying their subsistence need has not yet been met and asking that they be allowed to continue to harvest. If the community submits such a request, NMFS can decide to allow the harvest to continue to the upper limit of the harvest range (2,000 seals, 19% of PBR) at which point the harvest would be permanently suspended for the year.

Eighty-two sub-adult male seals have died during the history of subsistence harvest due to hyperthermia (*i.e.*, overheating). Seals that die due to overheating are often not consumed. These mortalities are recorded and reported by the humane observer and subsequently ACSPI. In 1991, a maximum of 16 seals died as a result of hyperthermia with only one seal in 2008; there have been no deaths since. As a proportion of hyperthermia deaths to the annual harvest over the entire 31-year period, the maximum rate (*i.e.*, 16 seals in 1991) was 0.01 of the total harvest. Another source of unintentional mortality due to the subsistence harvest occurred in 1999 when approximately 60 seals were killed after a group fell off a 50-foot cliff. The harvest was suspended for 2 days per the regulations pending an investigation. NMFS determined that the harvest round-up crew was not able to safely secure and move the group of seals to the killing field due to a lack of coordination and communication among the subsistence users (Spraker 1999). None of these seals were consumed and some were able to make their way to the ocean within a few hours after the harvest, suggesting the number observed was a minimum estimate. Regardless, seals that are killed accidentally or die due to hyperthermia still count against the annual mortality total.

As described in Section 3.2, NMFS is using PBR as a quantitative measure to analyze the effects of mortality of the subsistence harvest alternatives. PBR considers how random mortality might affect marine mammal populations and includes a "recovery factor" as a precautionary buffer to protect populations that are declining or listed under the ESA. In the case of fur seals, the recovery factor is 0.5. Therefore, NMFS is protecting 50% of the PBR, creating a buffer of more than 4,000 seals from St. Paul to die from other causes. In addition to the use of the recovery factor, subsistence harvesters select sub-adult males, and therefore reduce the impact to the population because this age class is less valuable in terms of reproduction (as compared to females of any age) (NMFS 2005c; Wade and Angliss 1998). Based on the impact criteria in Table 4.3-1, the potential effect of the harvest proposed under Alternative 1 (No Action) is considered minor because mortality would be 19% of PBR.

[4] 50 CFR 216.72 (e)(1)(iii)

4.3.4.2.2. Male Pup Mortality

There is no authorized harvest for pups under Alternative 1. Therefore, the Alternative 1 would include some unknown level of pup mortality. We can assume that any illicit pup harvests would likely result in the mortality of both male and female pups in equal proportions because there are equal proportions of male and female pups born each year. NMFS has no estimate of the level of illegal take of pups and therefore has no means to evaluate the significance of the effects on the population. When compared to Alternatives 2 through 5, the continued unauthorized harvest of pups under Alternative 1 would have a greater impact on the population because of the high probability of killing female pups. In addition, unauthorized harvests under Alternative 1 would also concentrate mortality at a few locations where subsistence users are least likely to be detected by enforcement.

4.3.4.3. Female Mortality

Since 1985, there have been 69 reported sub-adult females accidentally harvested on St. Paul Island (Figure 4.3-2) out of a total harvest of 29,246 seals (0.0021 accidental female harvest rate). This low rate of accidental female harvests is a result of several factors including: the prohibition on harvests after August 8 each year; efforts by harvesters to identify young females during the round-up; and restricting harvests to the hauling grounds at this time of the year. NMFS and ACSPI anticipate low female mortality to continue based on this history. If the accidental mortality of sub-adult females were to increase, there are no regulatory mechanisms in place under the No Action Alternative to reduce or prevent additional uninentional female mortalities. The very low rate of accidental female mortality on St. Paul under the No Action Alternative is currently the best indicator that measures to reduce female mortality are effective. If we evaluate the accidental harvest of 69 sub-adult females on St. Paul over a period of more than 30 years (since 1985), results indicate a negligible effect on the population because two females per year represents less than 0.001% of PBR. NMFS has examined the available harvest data, and found the majority of females are killed late in the harvest period when sub-adult females more commonly come ashore, such that prohibiting the extension of the 2- to 4-year-old male harvest season past August 8 is the most effective means of keeping accidental female mortality low.

The number of females accidentally killed since the adoption of co-management has remained below the threshold for suspension (five females) established in the agreement (7)(e)(i). In 2010, NMFS and ACSPI analyzed the proportion of females killed accidentally in the harvest in recent years and noted an increase in the proportion from less than 0.004 to 0.01. Through the co-management process, NMFS representatives, ECO staff, and the Humane Observer have worked collaboratively to train harvesters to identify females and circumstances likely to result in females occurring in the harvest. The 2015 proportion of females killed accidentally in the harvest was 0.006% of the total harvest. Under Alternative 1, if eight females were accidentally killed (the termination threshold in the Co-management Agreement), that would represent 0.0008% of PBR, and therefore, still result in a negligible impact on the population. NMFS anticipates continued co-management efforts will continue to improve the ability of harvesters to detect and avoid females accidentally herded from their hauling grounds to the killing fields.

4.3.4.4. Geographic Extent of Effects

Under Alternative 1, direct and indirect mortality would be concentrated at six haulouts, and during a 46-day period. Due to strong site fidelity, this results in a moderate adverse effect on the population because mortality is not distributed across the entire St. Paul population; rather, it would occur only at the six specified haulout sites within a short period of time.

4.3.5. Alternative 2 (Preliminary Preferred/Petitioned Alternative)

Alternative 2, the Preliminary Preferred/Petitioned Alternative, simplifies the subsistence harvest regulation based on the petition from ACSPI. Alternative 2 Option A addresses the petition from ACSPI, while Option B adds an additional regulatory restriction, which authorizes the taking of up to 20 female fur seals annually as a result of either subsistence hunting or harvesting activities. Alternative 2 Options A and B includes the following regulatory restrictions on the subsistence harvest of northern fur seals:

- Take of up to 2,000 male fur seals annually;
- Take with firearms, juvenile male fur seals from January 1 to May 31, annually;
- Take without firearms, pups and juvenile male fur seals from June 23 to December 31, annually; and
- Harvests will be co-managed by the Tribal Government of St. Paul and NMFS under an existing Co-Management Agreement.

Alternative 2 Option B would add the following additional regulation to be codified:

- Subsistence use would be terminated when 20 female seals are taken by lethal means incidental to hunting or harvesting of male seals.

4.3.5.1. Key Aspects of Alternative 2

The following paragraphs provide a discussion of the elements relevant to Alternative 2. Similar to Alternative 1 (No Action), Alternative 2 Options A and B would not change 50 CFR 216.71 in that St. Paul would continue to be regulated by the provisions that Pribilovians may take fur seals on the Pribilof Islands if such taking is: (a) for subsistence uses, and (b) in each case, not accomplished in a wasteful manner. In addition, as under Alternative 1, Alternative 2 would retain the provision at 50 CFR 216.72(a), which ensures: the harvests of seals on St. Paul and St. George Islands shall be treated independently for the purposes of this section. Any suspension, termination, or extension of the harvest is applicable only to the island for which it is issued.

Alternative 2 improves the regulations by removing the duplicative regulatory restrictions at 50 CFR 216.72 (e)(4) that are unnecessary because the FSA Section 105(b) prohibits all taking of fur seals unless authorized by regulation. Therefore, Alternative 2 (Options A and B) authorizes the harvest of up to 2,000 juvenile males (*i.e.*, fur seals up to 7 years old). Therefore, the taking of adult male fur seals (*i.e.*, 7 years old and older) is prohibited under Alternative 2 and the duplicative regulation under Alternative 1 is removed.

- **What are the effects of removing the 124.5 cm size limit under Alternative 2?** The ACSPI petition defines a harvestable seal as a non-breeding seal less than 7 years old (referred to as a juvenile). The direct mortality effects of the Preliminary Preferred/Petitioned Alternative are considered minor since the limit of 2,000 seals (19% of PBR) can be harvested, and are the same as the mortality effects of the No Action Alternative (Alternative 1). Towell and Williams (NMFS unpublished) modeled the population effect of a harvest of 2,000 sub-adult (*i.e.*, 2- to 4-year-old) males and 2,000 6-year-old males (*i.e.*, all greater than 124.5 cm). The harvest of exclusively 6-year-old males would result in a 1% to 2% reduction in the male portion of the population after 25 years of harvest when compared a harvest of 2,000 males less than 124.5 cm. This difference is undetectable based on the current methods of measuring abundance. The highest reduction of males under the No Action Alternative (Alternative 1) was 6% and the highest reduction of males under Alternative 2 was 8%, a difference of only 2%. A 2% difference in male abundance would be undetectable to the overall population.
- **What are the effects of removing the requirement under Alternative 2 that sealers be experienced?** Alternative 2 would instead use the St. Paul Co-Management Council to create a performance-based system to achieve the outcome that subsistence use of juvenile males and male pups would not result in increased disturbance to the rookery, the increased accidental take of female seals, or decreased safety of sealers. Alternative 2 would create a flexible system under the Co-Management Council where performance improvements, innovation, and creativity would be encouraged by participation of the users rather than restricted by regulations as under Alternative 1. Under Alternative 2, by shifting more responsibility to the Co-Management Council, there would be major positive benefits to the St. Paul community through improved food safety and security while still balancing conservation of seals and safe harvest operations (*i.e.*, through innovation and improved harvest performance).
- **What are effects of hunting rather than the use of traditional round-ups and harvesting of fur seals under Alternative 2?** The most significant effect of hunting with firearms is that the community would improve food security by having the opportunity to obtain fresh fur seal meat at other times of the year rather than rely on frozen or salted seal meat obtained months earlier or go without seal meat at all. Alternative 2 (Options A and B) would create the opportunity for subsistence users on St. Paul to hunt fur seals with firearms similar to the way Steller sea lions and other pinnipeds are hunted (currently prohibited under Alternative 1 No Action). Hunting fur seals with firearms would be managed and monitored by the Co-Management Council. The Co-Management Council may determine that establishing hunting performance measures may be an appropriate means to ensure rates of struck and lost are acceptable. As discussed in the sub-lethal effects analysis, the disturbance effects of using firearms would be limited to those few fur seals present nearshore in the winter. There is no evidence that other species would be disturbed by fur seal hunting.
- **What is the probability and effects of seals being struck and lost during traditional harvest under Alternative 2?** The current method of harvesting fur seals (Alternative 1) does not result in any seals being struck and lost and this would not change under Alternative 2. Under Alternative 2, take of juvenile male fur seals with firearms could occur from January 1 to May 31

annually. Public comments regarding firearms use to hunt fur seals expressed concern that hunting would be less 'humane' or considered "a wasteful manner" of take due to the potential for struck and lost animals. The Co-Management Council would ensure that subsistence practices such as hunting are implemented consistent with the requirements of the MMPA (see Chapter 2.2.2 for details on monitoring under the petitioned alternative). Hunting with firearms is considered an acceptable, humane method of subsistence for several other species including beluga whales, walrus, sea otters, polar bears, harbor seals, Steller sea lions, spotted seals, ringed seals, ribbon seals, and bearded seals. Struck and lost rates for females are assumed to be zero because females are not present in the nearshore waters around the Pribilof Islands during this time of year. Animals struck on land are less likely to be lost than those struck in the water. As described in detail in Section 4.4.5.1, the impact of an animal being struck and lost is negligible to minor given the low likelihood of occurrence.

- **How has NMFS determined the subsistence harvest is humane under Alternative 2?** NMFS determined during the commercial harvest that the methods employed during that time were humane. An independent veterinary panel determined the commercial method employed was humane, and that seals were killed consistent with standards established by commercial agriculture. To continue to ensure the harvest is humane, NMFS hired a veterinarian to be present during the harvests through 2014 to collect information on the percentage of seals that died due to hyperthermia (by measuring body temperature of killed seals) and the duration of the round-up and driving process. In recent years, after training with a NMFS veterinarian, these responsibilities have been transferred to the ACSPI. Under Alternative 2 the Co-Management Council would review current performance of subsistence users and determine whether and how to continue to ensure the hunt and harvest of northern fur seals is implemented consistent with the regulatory and statutory requirements.
- **What are effects from harvesting from areas of low pup production under Alternative 2?** Harvesting juvenile males from haulouts located within breeding areas with low and declining or unstable pup production has not been shown to affect future pup production. Subsistence use such as pup harvests from breeding areas with low and declining or unstable pup production may disproportionately affect those locations, but there is no recent data to evaluate this. In 2014, NMFS promulgated regulations (50 CFR 216.72(d)) to prohibit pup harvests from small breeding areas on St. George Island (2014a) and has subsequently initiated studies to attempt to evaluate the effects. Results from studies on the effects of pup harvest on St. George are not yet available. Alternative 2 would authorize the Co-Management Council to consider and implement any restrictions regarding where and how frequent subsistence use can occur based on the most recent data available. The Co-Management Council would be in the best position to consider such data and make decisions about specific co-management measures. Alternative 2 would replace the regulations at 50 CFR 216.72 (e) with the ability to harvest fur seals from all locations where fur seals are found. Alternative 1 authorizes the harvest at only six haulouts each week. Alternative 2 distributes the harvest among all sites and therefore has the potential to distribute the harvest more broadly across the entire population. By so doing, Alternative 2 reduces the potential adverse effects associated with concentrating the harvest at fewer locations under Alternative

1(No Action). The effects of the Petitioned/Preferred Alternative (Alternative 2) on the fur seal population is considered minor as juvenile male harvests would be distributed among all the accessible haulouts and male pup harvests would be distributed among all locations within and outside the rookeries (see Sections 4.3.5.2 and 4.3.5.3 below for more detail).

- **What are the effects of removing the three-year harvest range requirement?** Alternative 2 Options A and B would remove the regulatory provision at 50 CFR 216.72 (b) requiring the subsistence need be established as an upper and lower range every 3 years. Instead, the subsistence need on St. Paul would be established by regulation as taking up to 2,000 male fur seals annually. Removing this procedural aspect of the regulations would reduce the administrative burden for NMFS and the community. If the Pribilovians of St. Paul determine that their annual subsistence need is in excess of 2,000 male fur seals, they would need to request a revision to regulations.
- **What are the effects to the fur seal population where subsistence use is prohibited on a portion of the available rookeries or haulouts under Alternative 2?** Previous responses in this section indicate that distributing subsistence use proportionally to size of the population would help minimize potential population effects that may be associated with concentrating harvest at only a few locations (see Section 4.3.5.4 below for additional detail).
- **Under Alternative 2, what are the effects of pup and juvenile male harvest after August 8?** Allowing harvest of juvenile males after August 8 increases the likelihood of encountering and accidentally killing females. Towell and Williams (NMFS unpublished) modeled a range of increase female morality (*i.e.*, mortality of 20, 200, and 1,000 females). The results indicate that a population reduction is unlikely to be detected until at least 200 females were killed annually on St. Paul (see Section 4.3.3.1 above). Alternative 2 Option B authorizes by regulation the taking by lethal means of up to 20 female fur seals; harvest would be terminated when 20 females were killed. Alternative 2 Option A would delegate the authority to co-manage the lethal taking of females during subsistence use to the Co-Management Council. The Co-Management Council could also suspend the harvest to implement measures to reduce female mortality.

4.3.5.2. Male Mortality

Under Alternative 2, it would be possible that the harvest limit of 2,000 seals consisted of all male pups. While an exclusive pup harvest under Alternative 2 would remove male animals that otherwise may contribute to the breeding population, their removal would result in the lowest level of population effects when compared to a harvest of only sub-adult males under the No Action Alternative (Alternative 1). Removal of 2,000 pups would also result in less of an impact to the population than removal of all 6-year-old males which would also be possible (though unlikely) under Alternative 2. It would be more likely that Alternative 2 would vary subsistence use harvest across age classes (*i.e.*, some combination of pups and juveniles would be taken annually based on community input to the Co-Management Council) but not exceed 2,000 total mortalities. Therefore, effects to the population would be less than the No Action Alternative due to some proportion of the mortalities being pups (*e.g.*, there is a very high proportion of

pups that would already die due to natural mortality). The effect of mortality of 2,000 juveniles is described in more detail below.

4.3.5.2.1. Juvenile Male Mortality from Harvest or Hunting

Alternative 2 Options A and B would have the same effects due to juvenile harvesting as Alternative 1. Due to the removal of the prohibition to harvest after August 8 for Alternative 2, the likelihood that younger males would be harvested increases because most 2-year-old males arrive to the island in late August or September. As compared to Alternative 1, there would be the potential to harvest a greater proportion of younger males under Alternative 2. Therefore, the population effects would be relatively lower given the high natural mortality of younger seals.

Alternative 2 authorizes hunting with firearms as an option for taking fur seals from January 1 through May 31. Under Alternative 2 (Options A and B) hunting with firearms would result in seals being struck and lost representing an additional effect which does not occur under Alternative 1. In addition, under Alternative 2 a greater percentage of 5- and 6-year-old seals could be hunted and killed before the harvest season later in the year. Hunting would continue to be prohibited under Alternative 1.

As a precautionary measure, this analysis assumes that seals struck result in mortality. This is a worst-case scenario required for the analysis, and not an assertion that all strikes from subsistence harvests result in mortalities. Since firearms have never been permitted for northern fur seal subsistence harvests on St. Paul Island, data on struck and lost rates for Steller sea lions was reviewed as presented in Section 4.3.5. For Alternative 2, the effects of struck and lost mortality are based on the total number of seals killed that are targeted, plus the mortality risk due to sub-lethal effects associated with disturbance based on an individual animal's response. The sub-lethal effects risk factor is calculated by multiplying the number of animals exposed during hunting activities based on the number of hunting days under each alternative (see Table 4.3-2, Number of Assumed Hunting Events Under Each Alternative). This assumes that <1 seal is taken per hunting day (Person Comm., Pamela Lestenkof). Over a 22-year period, between 1992 and 2014, struck and lost rates for St. Paul Steller sea lion subsistence hunting using firearms ranged from 9.1% to 50%. It should be noted that struck and lost rates may be under-reported, and therefore, these data may be biased. Struck and lost rates for females are assumed to be zero because they are not present in the nearshore waters around the Pribilofs at this time of year. Overall, if a maximum of 2,000 juveniles (19% of PBR) were killed for subsistence, there would be a minor effect on the population.

4.3.5.2.2. Male Pup Mortality

Under Alternative 2, up to 2,000 male pups can be harvested each year from June 23 through December 31, firearms would only be authorized from January 1 through May 31. Alternative 1 (No Action) prohibits the harvest of pups. Despite this, Alternative 2 has a lesser effect on the population than Alternative 1 because of the high natural mortality of pups. Towell and Williams (NMFS unpublished) modeled the effects of the mortality of 2,000 male pups to mortality of 2,000 seals less than 124.5 cm (Alternative 1), and mortality of 2,000 6-year-old males. The mortality of 2,000 pups has the smallest possible effect on the St. Paul fur seal population of all the alternative considered, while the mortality of 2,000 6-year-old males resulted in as much as a 4% greater reduction in the male population than the mortality of 2,000 male pups. Under Alternative 1, if 2,000 males less than 124.5 cm in length were

harvested, it only reduced male mortality by 2%. In other words, Alternative 1 would have a greater effect on male mortality than Alternative 2 harvest of all pups. Because Alternative 2 could theoretically result in the mortality of 2,000 6-year-old males, which has a 2% greater population effect than Alternative 1, the likely actual effect of Alternative 2 is similar to or less than Alternative 1. While the modeling by Towell and Williams is a more specific quantitative analysis of the population effects of the Alternatives, the use of PBR is an effective tool for determining in evaluating human-cause mortality (*i.e.*, the use of a recovery factor to protect the population). Thus, the specific modeling by Towell and Williams (NMFS unpublished) is intended to provide an independent confirmation that the choice of using PBR as a threshold for determining significance under NEPA is appropriate.

4.3.5.3. Female Mortality

Alternative 2 Option A delegates to the St. Paul Co-Management Council the authority to co-manage female mortality that may occur during the subsistence use of male fur seals. The Co-Management Council would suspend subsistence use at any level up to 20 female mortalities depending on the circumstances of those mortalities. If under Alternative 2 Option A, 20 females are killed the Co-Management Council would terminate subsistence use for the year. Alternative 2 Option B, creates a regulation that would authorize up to 20 female mortalities. Once that threshold of 20 female seals is reached, subsistence use would be terminated by NMFS under the regulatory provision. Female fur seals may be killed during three different periods of subsistence use: 1) juvenile male hunting; 2) juvenile male harvesting; and 3) male pup harvesting. During each of these periods, the probability of female mortality is different.

Based on the ecology of female behavior during the winter (*i.e.*, January through May; Figure 3.2-3), the probability of hunters encountering female fur seals is highly unlikely. For this reason, it is reasonable to assume that no females would be shot during hunting of fur seals under Alternative 2 Option A or B. Under Option A, if multiple female fur seals were killed during hunting, the Co-Management Council would make decisions about restricting hunting to ensure that female mortality is minimized to allow for harvest of juvenile males and pups later in the year. Alternative 2 Option B, up to 20 female mortalities would be authorized such that the Co-Management Council could take action prior to reaching that limit of 20. However, under Option B, if 20 females were killed additional harvest would be terminated.

Female mortality during the juvenile male harvest through August 8 is likely to occur at very low levels. After that date, the probability of encountering females during the harvest is higher given more females would be on the island after August 8. When compared to Alternative 1, Alternative 2 (Option A or B) has a higher probability of killing females during the juvenile male harvest after August 8. Under Option A, female mortality would be co-managed by the Co-Management Council. Accordingly, circumstances regarding female mortality would be evaluated over the course of the harvest/hunt and restrictions or adjustments to juvenile harvest methods would be implemented as needed to ensure that the pup harvest could occur later in the year without the possibility of killing up to 20 females.

Under Option B, female mortality up to 20 females could be co-managed by the Co-Management Council, but if 20 females were killed, additional female mortalities would be prohibited under regulation. The pup harvest under Option A or B would encounter equal numbers of male and female pups during the

round-up process, but because pups can be handled and sexed safely prior to harvest the probability of killing females is very low. After 3 years of harvesting pups on St. George Island, there have been no occurrences of accidental female mortality. St. George pup harvesters have determined that the most effective way to avoid killing female pups is to release all pups that cannot be definitively determined to be male. That is, if the sealer handling the pup either cannot determine the sex or if the pup is determined to be a female it is released to escape to the water. In addition, at times during the harvest of pups on St. George the subsistence users have used two different people to confirm a pup is a male before it is harvested. NMFS anticipates similar pup harvest methods would be implemented by ACSPI through the St. Paul Co-Management Council to ensure that female mortality remains as low as practicable.

NMFS also ran specific population modeling of the effects of different levels of female mortality (Towell and Williams unpublished) to ensure that an independent and alternative analysis supported the use of PBR to discriminate among the Alternatives. Towell and Williams (NMFS unpublished) found that up to 20 female mortalities would result in less than a 1% reduction in the female portion of the population. This small percentage loss of females could not be detected through modeling as a change in population abundance. The additional modeling supports the determination that 20 female mortalities (0.002% of PBR) would not result in a greater adverse effect on the population under Alternative 2. Therefore, Alternative 2 could result in slightly increased effects on the population when compared to the No Action Alternative (Alternative 1, which has a limit of eight accidental female mortalities) in addition to the mortality of 2,000 males. However, the overall effects would still be considered minor because the overall mortality threshold for both Alternative 1 and Alternative 2 (Option A or B) is 2,000 fur seals.

4.3.5.4. Geographic Extent of Effects

The geographic extent of the direct and indirect mortality effects of the Preliminary Preferred/Petitioned Alternative (Alternative 2) on the fur seal population is minor as juvenile male harvests would be distributed among all the accessible haulouts. Male pup harvests would be distributed among all locations within and outside the rookeries (see Chapter 2 for a detailed description of alternatives) and would, therefore, also have a minor effect. Mortality is obviously a long-term, permanent effect; however, because it would be spread across the entire population of fur seals on St. Paul Island the geographic extent of effects is minimized.

4.3.6. Alternative 3

Alternative 3 modifies the federal regulations to create a 219-day subsistence period (analyzed as 158 subsistence days), split into two fixed regulatory seasons: the first to hunt juvenile male fur seals with firearms from January 1 to March 15, and the second to harvest male pups only from August 9 to December 31 without firearms. Alternative 3 removes the regulations authorizing the subsistence harvest of juvenile males from June 23 through August 8. The regulations would be modified to create restrictions on the times and areas where subsistence activities can occur as well as ages of fur seal used for subsistence. Alternative 3 would designate the St. Paul Co-Management Council to provide advice to the AA to make determinations regarding suspensions and terminations of the harvest as well as planning and improvements to the harvest process. The process to define and provide an opportunity for public

comment on the lower and upper range of the Pribilovians' subsistence need every 3 years would remain a regulatory requirement.

Specifically, the regulations would:

1. Authorize the Pribilovians on St. Paul to take up to 2,000 male fur seals annually for subsistence use;
2. Create two subsistence seasons totaling 219 days: the first to hunt juvenile male fur seals with firearms from January 1 to March 15, and the second to harvest male pups only from August 9 to December 31;
3. Retain the prohibition on harvesting adult fur seals;
4. Retain the provision to limit harvests any site occupied by fur seals to occur once per week;
5. Limit the harvest of male pups from August 9 to December 31 to 1,500 animals.
6. Limit the hunt of juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups, killed with firearms) to 500 animals from January 1 to March 15;
7. Restrict the use of firearms to hunt juvenile males hauled out on land at the Vostochni and Morjovi hauling and breeding grounds;
8. Terminate the subsistence use for that year if and when five females have been killed (*i.e.*, 0.25% of the authorized total male kill);
9. Create a provision that suspends subsistence use for up to 2 days if and when three females have been killed, and during the suspension period prescribe measures to be taken by the Pribilovians to minimize the future female mortality after the circumstances of the three accidental mortalities have been reviewed;
10. Retain the suspension and termination provisions regarding a determination that the harvest is being conducted in a wasteful manner (same as Alternative 1);
11. Create a provision that Pribilovians' method of harvest must include at a minimum that all pups be captured, handled and their sex determined prior to harvesting male pups.

Alternative 3 also establishes the co-management roles and responsibilities of NMFS and ACSPI in the regulations to:

- Establish the Co-Management Council between NMFS and ACSPI as the advisory body to cooperatively manage the non-regulatory provisions of the subsistence harvest of northern fur seals and scientific research, which may have an adverse impact on the availability of northern fur seals for taking for subsistence uses.
- Determine which breeding areas have adequate abundance to sustain a pup harvest each year.
- Advise the AA regarding any suspensions to the subsistence harvest and whether or not to resume the harvest;
- Advise the AA regarding the subsistence needs of the Pribilovians; and

- Develop measures intended to characterize and reduce, when practical, the direct and indirect sub-lethal effects of subsistence activities.

4.3.6.1. Key Aspects of Alternative 3

The following paragraphs provide a discussion of the aspects relevant to Alternative 3. Primary differences between Alternative 3 and Alternative 2 are the removal of the juvenile male harvest season from June 23 through August 8, and the use of codified federal regulatory restrictions to define seasons, locations, methods of killing, and harvest and hunt allocation by age and season. This alternative incorporates co-management in more of an advisory capacity than for primary decision-making as under Alternative 2.

- **What are the effects of removing the 124.5 cm size limit under Alternative 3?** Alternative 3 defines a harvestable seal as a non-breeding seal less than 7 years old (referred to as a juvenile) and pups. The direct mortality effects of the Alternative 3 would be minor since the limit of 2,000 seals (19% of PBR) could be harvested, and would be the same as the mortality effects of the No Action Alternative (Alternative 1) and Alternative 2. In order to model the maximum possible population effect for Alternative 3, Towell and Williams (NMFS unpublished) modeled the mortality of 1,500 male pups and 500 6-year-old males (*i.e.*, all greater than 124.5 cm). It is unlikely that subsistence users would kill all 6-year-old seals, the more likely result would be some combination of ages less than 7, thus the model results represent a conservative analysis. The model results from Alternative 3 indicate the use of these two age groups would result in a 4% to 5% reduction in the male portion of the population after 25 years of harvest. When compared to the modeling results of Alternative 1, Alternative 3 would have lesser effects on the male portion of the population by 1% to 2%. This difference would be undetectable based on the current methods of measuring abundance. Based on the model, the effects of Alternative 3 on the population would fall between the two most extreme subsistence use patterns of Alternative 2 (taking 2,000 male pups or 2,000 6-year-old juvenile males). The direct mortality effects of this alternative as it relates to the size of animals being harvested would be similar to Alternative 2.
- **What are the effects of removing the requirement under Alternative 3 that sealers be experienced?** Alternative 3 would instead use the St. Paul Co-Management Council to create a performance-based system to achieve the outcome that subsistence use of juvenile males and male pups would not result in increased disturbance to the rookery, the increased accidental take of female seals, or decreased safety of sealers. Alternative 3 would create a flexible system under the Co-Management Council where performance improvements, innovation, and creativity would be encouraged by participation of the users rather than restricted by regulations as under Alternative 1. Alternative 3 would shift more responsibility to the Co-Management Council, than Alternative 1 but less than Alternative 2. Alternative 3 would create positive benefits to the St. Paul community through improved food safety and security while still balancing conservation of seals and safe harvest operations (*i.e.*, through innovation and improved harvest performance).
- **What are effects of hunting under Alternative 3 rather than the use of traditional round-ups and harvesting of fur seals?** The most significant effect of hunting with firearms is that the

community would improve food security by having the opportunity to obtain fresh fur seal meat throughout the year rather than rely on frozen or salted seal meat obtained during a shorter season as under Alternative 1. Alternative 3 removes the juvenile male harvest season (under Alternatives 1 and 2) and replaces it with a 79-day hunting season for juvenile males. Alternative 3 would create the opportunity for subsistence users on St. Paul to hunt fur seals (same as Alternative 2), but under additional restrictions regarding the location of hunting (at Northeast Point), for a shorter time period (January 1 through March 15), and only when fur seals are hauled out on land, not when they are found in the water. Hunting under Alternative 3 would minimize the probability of struck and lost seals because it restricts hunting to only seals hauled out on land.

- **What is the probability and effects of seals being struck and lost during traditional harvest under Alternative 3?** Alternative 3 would add regulations to authorize and restrict the use of firearms to hunt up to 500 juvenile fur seals from January 1 to March 15 annually. Public comments regarding firearms use to hunt fur seals expressed concern that hunting would be less "humane" or considered "a wasteful manner" of take due to the potential for struck and lost animals. The Co-Management Council would ensure that subsistence practices such as hunting are implemented consistent with the requirements of the MMPA (see Chapter 2 for details on monitoring). Hunting with firearms is considered an acceptable, humane method of subsistence for several other species including beluga whales, walrus, sea otters, polar bears, harbor seals, Steller sea lions, spotted seals, ringed seals, ribbon seals, and bearded seals. As described in more detail in Section 4.2.5 and Section 4.3.6.2.1, struck and lost rates for females are assumed to be zero because females are not present in the nearshore waters around the Pribilof Islands during this time of year. Animals struck on land are less likely to be lost than those struck in the water. The impact of an animal being struck and lost is negligible to minor given the low likelihood of occurrence.
- **How has NMFS determined the subsistence pup harvest is humane under Alternative 3?** As described for Alternatives 1 and 2, NMFS determined during the commercial harvest that the methods employed during that time were humane (see Sections 4.3.4 and 4.3.5). Under Alternative 3, the Co-Management Council would review performance of subsistence users and determine whether and how to continue to ensure the hunt and harvest of northern fur seals is implemented consistent with the regulatory and statutory requirements. However, Alternative 3 includes regulatory restrictions to suspend hunting or harvests if three female fur seals are killed (whether they are juvenile or pups), and terminates the harvest when five females are killed. Therefore, there is a very restrictive threshold for female mortality under Alternative 3, when compared to Alternatives 1 or 2. Under Alternative 3, the circumstances surrounding the female mortalities would be examined by the St. Paul Co-Management Council and then provide advice to the AA regarding the decision to remove the 2-day suspension of subsistence use.
- **What are effects from preventing harvesting from areas of low pup production under Alternative 3?** Subsistence use, such as pup harvests from breeding areas with low, declining or unstable pup production, may disproportionately affect those locations, but there is no recent data to evaluate this. As described in Section 4.3.5, in 2014 NMFS promulgated regulations (50 CFR §

216.72(d)) to prohibit pup harvests from small breeding areas on St. George Island (2014a) and has subsequently initiated studies to attempt to evaluate the effects. Results from studies on the effects of pup harvest on St. George are not yet available. Alternative 3 would authorize the Co-Management Council to directly consider and implement this provision to prohibit pup harvests at breeding areas determined not capable of sustaining a harvest. Neither Alternative 1 nor Alternative 2 directly addresses the implementation of this provision. By so doing, Alternative 3 reduces the potential increased risk of extinction of small and declining breeding areas by authorizing the Co-Management Council to review data and implement prohibitions as needed without regulations. While the use of this provision is not directly contemplated in the ACSPI petition (Alternative 2 Option A) or Alternative 2 Option B, it is possible that the Co-Management Council could consider implementing this provision like Alternative 3. The effects of Alternative 3 on the fur seal population would be minor as pup harvests would be distributed among all breeding areas capable of supporting a harvest without an increased risk of extinction (see Sections 4.3.5.2 and 4.3.5.3 for more detail).

- **What are effects of harvesting primarily pups under this alternative?** Alternative 3 would result in fewer effects to the population than Alternative 1 (No Action) because the natural mortality of pups after weaning is high. Population modeling by Towell and Williams (NMFS unpublished) show that the greater percentage of subsistence use that relies on male pups results in lower loss of future males than similar level of harvests of older juvenile males. Therefore, the effect to the fur seal population of Alternative 3 less than Alternative 1 and similar to Alternative 2. While Alternative 3 creates new opportunities to improve food security relative to Alternative 1, it will likely decrease food security relative to Alternatives 1 and 2 due to the prohibition on the summer juvenile male harvest and additional regulatory restrictions on hunting.
- **What are the effects of removing the 3-year harvest range requirement under Alternative 3?** Alternative 3 would remove the regulatory provision at 50 CFR 216.72 (b) requiring the subsistence need be established as an upper and lower range every three years. Instead, the subsistence need on St. Paul would be established by regulation as taking up to 2,000 male fur seals annually. Removing this procedural aspect of the regulations would reduce the administrative burden for NMFS and the community. If the Pribilovians of St. Paul determine that their annual subsistence need is in excess of 2,000 male fur seals, they would need to request a revision to regulations.
- **What are the effects to the fur seal population where subsistence use is prohibited on a portion of the available rookeries or haulouts under Alternative 3?** Alternative 3 only prohibits subsistence use through the Co-Management Council at locations determined to be at a high risk of extinction. Otherwise Alternative 3 could distribute subsistence use proportionally to the size of the available population and have similar population effects to Alternative 2 and reduced population effects compared to Alternative 1, which concentrates harvest at only a few locations.
- **What are the effects on the fur seal population under Alternative 3 allowing a harvest of pups after August 8?** The effects of harvesting pups after August 8 include increased safety for

sealers and seals because adult males begin to abandon their territories. Due to the regulatory restriction that all pups be handled and sexed prior to harvest the probability of misidentifying and killing female pups is very small (see Section 4.3.5). The August 8 deadline applies to the juvenile male harvest and would result in significantly low rates of female mortality, same as under Alternative 1.

4.3.6.2. Male Mortality

The Pribilovians may harvest up to the established lower end of the harvest range (2,000 juvenile male northern fur seals). Alternative 3 could result in the direct mortality of up to 2,000 juvenile males, and therefore, the effects would be considered minor (19% of PBR). Alternative 3 apportions the total harvest level through federal regulations of not more than 1,500 male pups (14% of PBR) and 500 juvenile males (5% of PBR).

4.3.6.2.1. Juvenile Male Mortality

Alternative 3 authorizes the hunting of up to 500 juvenile males. Although Alternative 1 prohibits the harvest of males greater than 124.5 cm in length, up to 2,000 sub-adult males could be harvested. Towell and Williams (NMFS unpublished) modeled the specific population loss of 500 6-year-old males for 25 years and found that the harvests of 2,000 sub-adult males for 25 years under Alternative 1 would have a greater population loss (see Section 4.3.4). Alternative 2 does not have regulatory thresholds for any age class of males to be killed such that the effects of Alternative 3 would be similar if there are similar numbers of juveniles killed. The rate of illicit hunting and harvesting is unknown, but it is reasonable to assume that it would be similar to Alternative 1 and could result in marginally greater impacts to seals than Alternative 2, which we would assume to have the lowest rate of illicit hunting and harvesting compared to the other alternatives.

As a precautionary measure, the analysis of Alternative 3 assumes that seals struck result in mortality. This represents a worst-case scenario and is not an assertion that all strikes from subsistence hunting result in mortalities. Since firearms have never been permitted for northern fur seal subsistence use on St. Paul Island, data on struck and lost rates for Steller sea lions was reviewed as presented in Section 4.2.5. For Alternative 3, the effects of struck and lost mortality are based on the total number of seals killed that are targeted, plus the mortality risk due to sub-lethal effects associated with disturbance based on an individual animal's response. The sub-lethal effects risk factor is calculated by multiplying the number of animals exposed during hunting activities based on the number of hunting days under each alternative (see Table 4.3-2, Number of Assumed Hunting Events Under Each Alternative). This assumes that <1 seal is taken per hunting day (Person Comm., Pamela Lestenkof). Over a 22-year period, between 1992 and 2014, struck and lost rates for St. Paul Steller sea lion subsistence hunting using firearms ranged from 9.1 - 50%. It should be noted that struck and lost rates may be under-reported, and therefore, these data may be biased. Struck and lost rates for females are assumed to be zero because they are not present in the nearshore waters around the Pribilofs at this time of year. Animals struck on land (a regulatory requirement under Alternative 3) are less likely to be lost than those struck in the water under Alternative 2. The animal must move from its location on land while injured to reach the water and be lost by diving and swimming away. Hunters will move swiftly to prevent the loss of a struck animal on land, adding to a

lower loss rate under Alternative 3. Considering this information, and assuming that a total of 500 fur seals struck result in mortality (5% of PBR), there would likely be a negligible effect on the population even if those seals were all age 6.

Hunting fur seals with firearms would be managed and monitored by the Co-Management Council. The Co-Management Council under Alternative 3 may determine that establishing hunting performance measures may be an appropriate means to ensure rates of struck and lost are acceptable. As discussed in the sub-lethal effects analysis, the disturbance effects of using firearms would be limited to those few fur seals present on land in the winter. While Alternative 3 authorizes hunting, which increases food security relative to Alternative 1, the number of regulatory restrictions would result in lower use of fur seals during this period than Alternative 2 due to the rare occurrence of fur seals hauling out on land. Alternative 3 would likely result in higher rates of illicit hunting and under-reporting when compared to Alternative 2 due to the predominance of fur seals in the water (but not authorized to be hunted) compared to their infrequent or rare occurrence on land. There is no evidence that other species co-occur with fur seals in the winter and would be disturbed by fur seal hunting.

4.3.6.2.2. Male Pup Mortality

Under Alternative 3, up to 1,500 male pups can be harvested each year from August 9 through December 31. Alternative 3 has a lesser effect on the population than Alternative 1 (No Action) because of the high natural mortality of pups after weaning. Alternative 3 would have similar effects to Alternative 2 given that the actual juvenile male harvest has been about 350 for the most recent decade, resulting in similar level of a pup harvests between the two alternatives. Under Alternative 3, the male pup harvest would account for about 14% of PBR, and would result in a minor effect on the seal population. If 1,500 of those 91,737 pups were harvested, it would represent about 1.6% of annual production, which would result in a negligible effect.

4.3.6.3. Female Mortality

Alternative 3 would suspend subsistence use by regulation if three female fur seals were killed during the subsistence activities. The probability of encountering females during hunting on St. Paul from January 1 through March 15 is very low under Alternative 3 (see Chapter 3 and discussion about the probability of occurrence of females in section 4.3.5). Thus female mortality would only be likely to occur during the pup harvest. Regulations would require that seals are handled and sexed during the pup harvest thereby reducing the likelihood of female mortality. Therefore, Alternative 3 would have the lowest probability of female mortality of any alternative considered. If it is determined ACSPI can implement measures to improve the detection and avoidance of females during the pup harvest, then NMFS can authorize the harvest to resume under conditions described by NMFS and agreed to by ACSPI in writing. If the harvest resumes and a total of five females are taken, then the harvest is permanently terminated for the year. Therefore, the effects of Alternative 3 would be negligible (0.0003% of PBR). Alternative 3 has reduced effects on the population when compared to Alternative 1 (No Action), which prohibits *intentional* taking of sub-adult females in the regulations, but can result in the *unintentional* or *accidental* mortality of up to 8 females as co-managed under the current Co-Management Agreement. Alternative 3 also would have reduced effects compared to Alternative 2, which has a 20-female mortality limit. Alternatives 2 and 3

would simplify and clarify protections of females by removing the prohibition on *intentional* taking of sub-adult females. NMFS would be unable to detect the population change (less than 1% reduction in production or female population size) (see Towell and Williams 2016) of the female mortality limits among Alternatives 1, 2, or 3 due to the precision of the population estimates (Towell *et al.* 2016).

4.3.6.4. Geographic Extent of Effects

The geographic extent of the direct and indirect mortality effects of Alternative 3 on the fur seal population would be moderate for the juvenile male hunting because it would be authorized only at the northern fur seal rookeries at Northeast Point. During the hunting season fur seals are rarely present on land at these locations, and other species are not known to occupy these locations either. In other words, hunting would be distributed over fewer sites, but because fur seals are not known to haul out with any regularity at this time of year there would be a marginally greater effect than Alternative 2, but the difference would be unlikely to be detected. Male pup harvests would be distributed among all locations within and outside the rookeries once per week, which would distribute the potential direct and indirect mortality across the St. Paul population. Distributing harvests across all rookeries and haulouts, any potential female mortality would also be more broadly dispersed.

In addition, Alternative 3 includes an additional co-management restriction where harvests would be prohibited at any breeding ground where the annual estimate of pup production is deemed to be at a level unable to sustain a harvest. The minimum number of seals required for the population to maintain the social structure and reproductive ecology of a breeding area is not known, but the methods used to prohibit harvests on St. George at similar breeding areas would be used for Alternative 3. Alternative 1 No Action does not include any such restriction. Alternative 3 protects relatively smaller breeding areas from harvest and provides an additional means to conserve the population when compared to Alternative 1 or Alternative 2.

While the geographic extent of effects would be broader than Alternative 1, the effects of harvest would be distributed across more locations and a longer period of time. This would mean that fewer seals would be harvested at each location. Additionally, potentially longer intervals between subsequent harvests would occur at a site previously harvested.

4.3.7. Alternative 4

Alternative 4 modifies the federal regulations to create a 342-day subsistence period (analyzed as 244 subsistence days), split into three fixed regulatory seasons: the first to harvest juvenile male fur seals (*i.e.*, less than 7 years old) from January 1 to May 31; the second to harvest juvenile male fur seals (*i.e.*, 2- to 4-year-olds) from June 23 to August 8; and the third to harvest male pups from August 9 to December 31. Alternative 4 would limit the harvest of up to 1,500 male pups from August 9 to December 31 and limit the harvest of up to 500 juvenile males (*i.e.*, fur seals up to 7 years old, excluding pups) during January 1 to May 31, and June 23 to August 8. Alternative 4 would modify the regulations to create restrictions on the times and areas where subsistence activities could occur and prohibit mortality of female fur seals, with the exception of allowing no more than 20 accidental female mortalities (*i.e.*, 1% of the authorized total male kill or 0.002% of PBR). Alternative 4 would designate the NMFS-ACSPI Co-Management Council to provide advice to the AA to make determinations regarding suspensions and terminations of

the harvest as well as planning and improvements to the harvest process. The process to set the subsistence harvest range every 3 years would remain a regulatory requirement.

Specifically, the regulations would create:

- An administrative requirement to define and provide an opportunity for public comment on the lower and upper range of the Pribilovians' subsistence need every 3 years (same as Alternative 1).
- A prohibition on the use of firearms to hunt or harvest fur seals.
- Two fur seal harvest seasons from January 1 to May 31 and from June 24:
    - Authorizing the harvest of up to 500 juvenile male fur seals (*i.e.*, fur seals up to 7 years old);
    - Authorizing harvest at any resting areas (*i.e.*, hauling grounds) on St. Paul Island;
    - Prohibiting the harvest from occurring more frequently than once per week per site;
    - Prohibiting the harvest of pups;
    - Prohibiting the mortality of adult male fur seals; and
    - Prohibiting the mortality of female fur seals.
- A male pup harvest season from August 9 to December 31:
    - Authorizing the harvest of up to 1,500 male pup fur seals;
    - Authorizing harvesting from any resting areas on St. Paul Island;
    - Prohibiting the harvest from occurring more frequently than once per week per site;
    - Prohibiting the hunting or harvesting of any juvenile male fur seals; and
    - Prohibiting the hunting or harvesting of any female fur seals.

Alternative 4 creates additional regulatory restrictions intended to control the implementation of the subsistence harvest by prohibiting the taking from any breeding areas where annual pup production estimates reach levels determined to be unable to sustain a harvest (see Section 4.3.4.1 under Alternative 1; Johnson *et al.* 2013).

Alternative 4 also establishes the co-management roles and responsibilities of NMFS and ACSPI in the regulations to establish the Co-Management Council between NMFS and ACSPI as the advisory body to cooperatively manage the non-regulatory provisions of the subsistence harvest of northern fur seals and scientific research, which may have an adverse impact on the availability of northern fur seals for taking for subsistence uses.

Alternative 4 also creates non-regulatory harvest co-management roles and responsibilities of NMFS and ACSPI Co-Management Council to:

- Monitor and report on the status of the harvest to include the dates, locations, number of juvenile male fur seals killed, number of female fur seals killed.

- Suspend the harvest if five females have been killed during either season, and authorizing the Co-Management Council to resume the harvest only after an assessment of the circumstances of the deaths and measures implemented to detect and avoid accidental taking of females are agreed upon; and again suspend and review the harvest each time an additional five females have been killed during the subsistence activities.
- Terminating the harvest for the year if 20 females have been killed on St. Paul Island.
- Advise the AA regarding any suspensions to the subsistence harvest and whether or not to resume the harvest.
- Advise the AA regarding the subsistence needs of the Pribilovians.
- Develop measures intended to characterize and reduce, when practical, the direct and indirect sub-lethal effects of subsistence activities.

4.3.7.1. Key Aspects of Alternative 4

The following paragraphs provide a discussion of the elements relevant to Alternative 4.

- W**hat are the effects of removing the 124.5 cm size limit under Alternative 4?** Alternative 4 would authorize harvest of pups and seals less than 7 years old (referred to as a juvenile). The direct mortality effects of the Alternative 4 are considered minor since the limit of 2,000 seals (19% of PBR) can be harvested, and are the same as the mortality effects of the No Action Alternative (Alternative 1) and Alternatives 2 and 3. The more significant issue is the difference between Alternatives 3 and 4 in the number of pups taken under this alternative as compared to other alternatives. This is discussed in following sections.
- **What are the effects of removing the requirement under Alternative 4 that sealers be experienced?** Similar to Alternative 3, Alternative 4 would use the St. Paul Co-Management Council to create a performance-based system to ensure subsistence use harvest would not result in increased disturbance to the rookery, the increased accidental take of female seals, or decreased safety of sealers. Overall, the regulatory requirement to be an "experienced sealer" creates an artificial standard that cannot be quantified (*i.e.,* how is one determined to be "experienced" at sealing). The prescriptive and regulatory requirements for subsistence harvesting of fur seals is considered contrary to the objectives of the co-management partnership. In addition, it results in a negative effect by discouraging participation by younger generations and limits the ability to pass on cultural practices within the community.
- **What is the probability and effects of seals being struck and lost during traditional harvest?** Under Alternative 4, the use of firearms to hunt or harvest fur seals is prohibited. Therefore, struck and lost would not be an issue.
- **How has NMFS determined the subsistence pup harvest is humane under Alternative 4?** As described under Alternative 1, a NMFS veterinarian has trained ACPSI staff to be present during the harvests to collect information on the percentage of seals that die due to hyperthermia (by measuring body temperature of killed seals) and the duration of the round-up and driving process.

This monitoring effort would continue under Alternative 4 to ensure the harvest continues to be humane. Similar to Alternative 3, the amount of time to kill a seal during pup harvests might increase due to the need to sex each fur seal pup prior to harvesting an animal. This could result in disturbance to other seals in the area although the effects of this are expected to be minor as described in Section 4.2.4, Process Used to Assess Probability of Mortality Due to Sub-Lethal Effects During Harvest or Hunting.

- **What are effects from preventing harvesting from areas of low pup production under Alternative 4?** Alternative 4 retains the limit to harvest once per week per site (same as Alternative 3). As described in detail for Alternative 3, the effects of harvesting once per week from any haulout or breeding area is considered minor because juvenile male harvests would be distributed across more locations rather than limited to a few, specific locations. As with Alternative 3, Alternative 4 reduces the potential increased risk of extinction of small and declining breeding areas by authorizing the Co-Management Council to review data and implement prohibitions as needed without regulations.
- **What are effects of harvesting primarily pups under this alternative?** Alternative 4 allows for the harvest of up to 1,500 pups annually from August 9 to December 31 (same as Alternative 3). Under Alternative 4 a pup harvest would result in less biological adverse effects to the population than Alternative 1 No Action because the natural mortality of pups after weaning is high. Under Alternative 4, fewer reproductive males would be lost than under Alternative 1 (No Action) because 1,500 male pups could be harvested as opposed to 2,000 sub-adult males under Alternative 1. Therefore, the effect to the fur seal population is negligible because it would not result in changes to the overall population. It would have a beneficial effect on the ability of Pribilovians to obtain fur seal meat late into the season which is currently prohibited under Alternative 1. The ability to obtain fresh meat more times throughout the year would improve food and provide security for the community of St. Paul Island.
- **What are the effects on the fur seal population of allowing a harvest of pups after August 8 under Alternative 4?** As described under Alternative 2, allowing harvest of juvenile males after August 8 increases the likelihood of encountering and accidentally killing females. However, Alternative 4 would include suspension and termination provision within the regulations. Under the regulations, the harvest would be suspended if five female fur seals are killed during the harvest of male seals and the AA would retain authority to terminate subsistence use harvest annually 20 females were killed, 2,000 seals have been harvested, or if the conditions that led to harvests or hunts being conducted in a wasteful manner have not been remedied. Therefore, monitoring the accidental taking of females would help minimize effects such that they would be negligible similar to all other alternatives with suspension and termination provisions.

4.3.7.2 Male Mortality

Up to 2,000 (19% of PBR) male fur seals may be killed as a result of Alternative 4. The mortality would be distributed among 500 juvenile male seals (up to 7 years old) and 1,500 male pups. No fur seals would be struck and lost because the use of firearms to harvest fur seals is prohibited under Alternative 4. The

harvest of adult (7 years old or greater) male fur seals is prohibited under Alternative 4 as in all other alternatives. The Pribilovians would be prohibited from using firearms to obtain fur seals for subsistence use, and must only organize and round up seals for harvesting during the three seasons defined. The direct mortality effects of Alternative 4 are slightly less than those in Alternative 3, as described in the following sections.

4.3.7.2.1 Juvenile Male Mortality

Up to 500 juvenile males would be harvested during two regulatory seasons from 1 January to May 31 and another from June 23 to August 8. This would represent 5% of PBR and a negligible effect on the population. There is no documentation that fur seals have been rounded up and harvested either commercially or for subsistence purposes during the new proposed timeframe from January 1 through May 31. Adult male fur seals do not begin to haulout on land on the Pribilofs until late April or early May (Gentry 1998; Williams *et al.* 2010). The earliest seals arriving on land do not exhibit strong site tenacity and do not begin to occupy inland areas until they are displaced by territorial adult males (Williams pers. comm. 2016). Male fur seal response during May is typically an immediate departure to the water (Williams *et al.* 2010). Whether the seals can be prevented from escaping to the water and herded inland as occurs in the summer is unknown. From June 23 to August 8 the traditional harvest method would be used to harvest up to 500 juvenile males. Overall, if a maximum of 500 juveniles (5% of PBR) were killed for subsistence, there would be a minor effect on the population. Because Alternative 4 prohibits the use of firearms there would be no additional or unaccounted mortality due to animals struck and lost.

4.3.7.2.2 Male Pup Mortality

Similar to Alternative 3, under Alternative 4 up to 1,500 male pups can be harvested each year from August 9 through December 31. As with Alternatives 2 and 3, Alternative 4 has a reduced effect on the population when compared to Alternative 1 No Action because of the high natural mortality of pups (60-70%) as reported by Lander (1981), and Trites and Larken (1989) (see also the discussion under Alternative 2). Based on the high natural mortality rate of pups, approximately 1,050 of the 1,500 pups potentially harvested under Alternative 4 would have died prior to returning to the island as a 2-year-old seal. For comparative purposes, if under the No Action Alternative 1,500 2- and 3-year-old males were harvested, 375 would have died naturally before returning the following year. Therefore, the effects of Alternative 4 on male pup mortality would be less than Alternative 1.

Under the Preliminary Preferred/Petitioned Alternative 2, the Pribilovians could theoretically kill 2,000 6-year-old males during the spring hunting season, Alternative 4 would have less of an effect on the population because of the limited harvest of older seals that would otherwise have a higher potential contribution to future reproduction. However, Under Alternative 2, the likelihood of killing 2,000 6-year-olds killed would be highly unlikely due to the limited availability of seals from January 1 to May 31.

In summary, federal regulations would dictate that male mortality for Alternative 4 is limited to 2,000 seals divided between pups (1,500) and juvenile males (500). As described under Alternatives 2 and 3, older juveniles would be considered more important to the population due to their higher survivorship and potential future contribution to reproduction as compared to pups. Therefore, any harvest alternative that harvests fewer pups could result in greater population effects. Alternative 4 does not allow the use of

firearms. Therefore, there would be no mortality associated with animals struck and lost when compared to Alternatives 2 or 3. The impact of Alternative 4 is considered negligible to minor because overall the harvest of 2,000 fur seals (*i.e.*, 1,500 pups and 500 juveniles) would represent no more than 19% of PBR.

4.3.7.3 Female Mortality

Alternative 4 would suspend subsistence use harvest by regulation if five female fur seals are killed. The pup harvest would be required by regulation to handle and sex all pups prior to harvest the likelihood of female mortality is very low as well. Under this alternative, the circumstances surrounding the female mortalities would be examined by the Co-Management Council of NMFS and ACSPI. If measures to improve the detection and avoidance of females during future harvests can be implemented, then NMFS and ACSPI could agree to resume the harvest under conditions agreed to by the Co-Management Council in writing. If the harvest resumed and a total of 20 females were accidentally killed, then by regulation under the authority of the AA, the harvest would be permanently terminated for the year.

If 20 females were killed, it would represent approximately 0.002% of PBR. Therefore, Alternative 4 would have greater effects on the population when compared to the Alternative 3, which includes a limit of five accidental female mortalities. Alternative 4 has similar effects on the population to Alternative 2, which also has a 20-female limit. Alternative 1 (No Action) has a regulatory prohibition on the taking of adult females and the *intentional* taking of sub-adult females; however, there is no limit or prohibition on the *accidental* taking of sub-adult females as there would be with Alternatives 2 through 4. Alternatives 2, 3, and 4 would simplify and clarify protections of females by removing the Alternative 1 prohibition on *intentional* taking of sub-adult females. While Alternative 4 would result in a greater effect than the No Action Alternative 1 on the population due to the higher female mortality limit (20), the harvest suspension provisions would the same (*i.e.*, suspended if five females were killed). Overall, the potential effect of killing 20 females (0.002% PBR) would be considered negligible under Alternative 4.

4.3.7.4 Geographic Extent of Effects

The geographic extent of the direct and indirect mortality effects of Alternative 4 on the fur seal population is minor as juvenile male harvests would be distributed among all the accessible haulouts and male pups harvests would be distributed among all locations within and outside the rookeries as practical. Similar to Alternatives 2 and 3, harvest would be allowed at all sites but could only occur once per week at each site which would help minimize the potential effects of frequent disturbance.

Alternative 4 includes an extended harvest season through the autumn and into winter, such that harvests would occur over a longer period of time than under Alternative 1 No Action. Shorter harvest periods for age classes (pups, juveniles) separate this alternative from the Preliminary Preferred/Petitioned Alternative (Alternative 2). Similar to Alternatives 2 and 3, this Alternative includes an additional restriction where harvests are prohibited at any breeding ground where the annual estimate of pup production is deemed to be at a level unable to sustain a harvest. The minimum number of seals required to maintain the social structure and reproductive ecology of a breeding area is not known. Alternative 1 (No Action) does not include any such restriction, and as such, has no mechanism to prevent harvests at declining or relatively small breeding areas. This alternative would protect relatively smaller breeding areas from harvest and improve the ability of NMFS and ACSPI to conserve the population. As described

under Alternative 2, northern fur seals return to a site after human-caused disturbance within a few hours (*i.e.*, do not show long-term displacement as a result of harassment). As with Alternatives 2 and 3, the geographic extent of effects would be distributed over the entire St. Paul population while under Alternative 1, harvests are only authorized at seven locations.

4.3.8. Alternative 5

Alternative 5 would amend federal regulations to create a 188-day subsistence harvest period (137 subsistence days), split into two seasons: June 23 to August 8, and August 9 to December 31; limit the harvest during June 23 to August 8 to juveniles (*i.e.*, fur seals up to 7 years old, excluding pups) males; limit the harvest during August 9 to December 31 to male pups. Use of firearms would be prohibited. From 2017 to 2019, subsistence harvest of male pups and juveniles (*i.e.*, up to 7 years old) would be authorized up to 50% of PBR for the St. Paul Island population. PBR for St. Paul Island is 9,805 seals (NMFS 2014a); therefore, the upper limit of the subsistence harvest range would be 4,902 seals. Beginning in 2020, the lower end of the 3-year harvest range (*i.e.*, 2020 to 2022) would be set based on the average number of reported seals harvested over the 2017 to 2019 period. The upper end of the harvest range would be set based on the actual harvest for entire subsistence period (*i.e.*, 1985 to 2019). The lower end of the harvest range would continue to be established under the regulations every 3 years based on the reported harvest levels from the previous 3-year period and the upper end of the range on the entire subsistence period. Under Alternative 5, the future harvest range setting process would be based on the actual harvest from the 3 previous years rather than an estimate of the subsistence need of the Pribilovians on St. Paul. Thus, Alternative 5 bases the subsistence need on actual subsistence use rather than other methods to estimate subsistence need. Public comments expressed concern about the estimated number of animals required to meet the subsistence needs of the Pribilovians and requested supporting rationale for the levels estimated. This alternative is similar to Alternatives 2, 3 and 4 in creating conservation controls and delineating NMFS and ACSPI responsibilities. Under regulations, this alternative would limit incidental take and mortality of female fur seals, allowing no more than 200 female mortalities (*i.e.*, 10% of the authorized total male harvest or 2% of PBR).

Specifically, Alternative 5 would create the following regulatory provisions:

- A regulatory process to establish the harvest range from a 3-year average based on subsistence need; the harvest of up to 4,902 seals (male pups or juveniles up to 7 years old) until 2020 after, which the 3-year average harvest would be used to set the lower end of the range and the average of the entire subsistence period would be used to set the upper end of the range;
- A prohibition on the use of firearms to hunt or harvest fur seals;
- Creates a restriction prohibiting the taking for subsistence purposes from any breeding areas where annual pup production estimates reach levels determined to be unable to sustain a harvest (see Section 4.3.4.1 under Alternative 1; Johnson *et al.* 2013).
- A juvenile male fur seal harvest season from June 23 to August 8 and a male pup harvest season from August 9 to December 31:
    - Authorizing harvest at any resting or breeding areas on St. Paul Island once per week;

- Prohibiting the mortality of adult male fur seals;
- Authorizing the mortality of up to 200 female fur seals;
- Suspending the harvest if 150 female fur seals are killed; and
- Terminating the harvest if more than 200 female seals are killed.

- Harvest by only experienced sealers using traditional, humane methods[5] including sexing pups prior to harvest.

Alternative 5 also creates non-regulatory harvest co-management roles and responsibilities of NMFS and ACSPI Co-Management Council to:

- Establish the Co-Management Council between NMFS and ACSPI as the advisory body to cooperatively manage the non-regulatory provisions of the subsistence harvest of northern fur seals and scientific research, which may have an adverse impact on the availability of northern fur seals for taking for subsistence uses;

4.3.8.1. Key Aspects of Alternative 5

The following paragraphs provide a discussion of aspects relevant to Alternative 5. Alternative 5 continues to rely on regulations to establish the subsistence but recommends a process to estimate the lower and upper limit of the subsistence need using the most recent 3-year average of actual harvest levels beginning in 2017 to set the lower limit and PBR to set the upper limit for the initial 3-year period of the new regulation, rather than a household survey of the subsistence need as in Alternative 1.

- **What are the effects of increased harvest limits under Alternative 5?** Initially, there would be a moderate to significant impact compared to the other alternatives due to the potentially higher level of harvest. From 2017 to 2019, the upper harvest limit of male pups (less than 1 year old) and juvenile males (up to 7 years old, excluding pups) would be 50% of PBR, or (4,902 seals[6]). However, beginning in 2020, the upper limit of the harvest would be set based on the average harvest from 1985 to the present (the average for this period for St. Paul is 924 seals); harvest range would continue to be established every 3 years based on the reported harvest levels from the previous years. The lower limit of the harvest would be based on the most recent 3-year average of the subsistence harvest (the average for St. Paul 2014-2016 is 294). Therefore, the effect of the change in setting the range limits would eventually reduce the harvest based on use rather than need.
- **What are the effects of requiring experienced sealers under this alternative?** Alternative 5 retains the provision that harvest may be conducted only by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (same as Alternatives 1 and 4). The effects would be consistent with Alternatives 1 and 4.

[5] round-up, stunning and immediate exsanguination.

[6] Based on the 2012 Stock Assessment Report and used as the basis for the St. George Subsistence Harvest SEIS (Allen and Angliss 2013).

- **What is the probability and effects of seals being struck and lost during traditional harvest?** Under Alternative 5, the use of firearms to hunt or harvest fur seals is prohibited. Therefore, struck and lost is not a concern (same as Alternative 1).
- **How has NMFS determined the subsistence pup harvest is humane under Alternative 5?** As described under Alternative 1, a NMFS veterinarian has trained ACPSI staff to be present during the harvests to collect information on the percentage of seals that die due to hyperthermia (by measuring body temperature of killed seals) and the duration of the round-up and driving process. This monitoring effort would continue under Alternative 5 to ensure the harvest continues to be humane. Similar to Alternatives 3 and 4, the amount of time to kill a seal during pup harvests might increase due to the need to sex each fur seal pup prior to harvesting an animal. This could result in disturbance to other seals in the area although the effects of this are expected to be minor as described in Section 4.2.4, Process Used to Assess Probability of Mortality Due to Sub-Lethal Effects During Harvest or Hunting.
- **What are effects of being able to harvest from all areas under this alternative?** Alternative 5 retains the limit to harvest once per week per site (same as Alternatives 1, 3, and 4), juvenile male harvests would be distributed among all the accessible haulouts and male pups harvests would be distributed among all locations within and outside the rookeries as practical. By distributing potential disturbance across more sites, potential effects would be minimized compared to Alternative 1 No Action which concentrates disturbance at only seven locations.
- **What are effects of allowing an increased number of females to be accidentally killed?** Alternative 5 would not suspend the harvest until 150 accidental juvenile (*i.e.*, up to 7 years old) female mortalities. Alternative 5 would terminate the harvest by regulation if 200 females were accidentally harvested. Towell and Williams (NMFS unpublished) modeled the effect of the mortality of 200 juvenile females and the results indicate that there was about a 1% reduction in the female portion of the population versus a less than 1% reduction for Alternatives 1 through 4. Therefore, Alternative 5 would potentially have a greater effect on the population than all other alternatives because of the accidental harvest of up to 200 female fur seals. The overall female mortality would account toward the total mortality limit.
- **What are effects of harvesting pups under this alternative?** Alternative 5 removes the prohibition on the harvest of male pups (same as Alternatives 2, 3, and 4). The number of pups that could be taken would depend on the limits established under the new 3-year process. Generally, taking pups as opposed to sub-adults or juveniles, results in less biological adverse effects to the population (same as Alternative 4). Therefore, the effect to the fur seal population is positive compared to the No Action Alternative (Alternative 1) or alternatives which limit the pup harvest. It also has a beneficial effect on the ability of Pribilovians to obtain fresh fur seal meat throughout more of the year. The ability to obtain fresh meat at that time of the year would improve food security to the community of St. Paul.
- **Under Alternative 5 what are the effects of establishing a new 3-year harvesting setting requirement?** Alternative 5 retains the provision to establish the lower and upper range of the subsistence need every 3 years (same as Alternative 1), but also creates a new way to establish the

limits. The lower end of the range would be set at the most recent 3-year average (2014 to 2016 = 294) of subsistence harvest. Beginning in 2020, the lower end of the 3-year harvest range (*i.e.*, 2020 to 2022) would be set based on the average number of reported seals harvested over the 2017 to 2019 period, and the upper end of the range to be based on the average from the entire subsistence period (*i.e.*, 1985 to the present year). This would allow the harvest to be based on the most recent average number of seals taken based on subsistence needs of the community. Alternative 5 is intended to determine a more accurate representation of subsistence use that would become evident over time.

- **What are the effects on the fur seal population under Alternative 5 allowing a harvest of pups after August 8?** Alternative 5 would allow a harvest of male pups from August 9 to December 31. Each pup needs to be sexed prior to harvest to determine if it is male or female. However, the threshold for suspending the harvest under this alternative is higher than the other alternatives (200 female seals), and therefore could result in greater impacts. However, there would still be a regulatory requirement to handle and sex all pups prior to harvest which would likely result in avoidance of female pups as has been the experience on St. George from 2014-2016 (NMFS unpublished). Even if 200 female seals were accidentally killed during harvest, the potential effects on the population would be negligible at 0.02% of PBR.
- **What are effects from preventing harvesting from areas of low pup production under Alternative 5?** As with Alternatives 3 and 4, Alternative 5 reduces the potential increased risk of extinction of small and declining breeding areas by promulgating a regulation to review data and implement prohibitions based on those established for St. George Island at 50 CFR 216.71 (d)(10). The effects of Alternative 5 on the fur seal population would be minor as pup harvests would be distributed among all breeding areas capable of supporting a harvest without an increased risk of extinction (see also the discussion under Alternative 2, Sections 4.3.5.1).

4.3.8.2. Male Mortality

Up to 4,902 fur seals could be harvested during the first 3 years under Alternative 5, which would have the highest impact of all the alternatives. After the first 3-year period of the regulations, the harvest level would be reset based on the actual subsistence use for the previous 3 years (lower end of the range) and entire subsistence period (upper end of the range). The number of pups versus juveniles able to be harvested during either season would be allocated by the Co-Management Council not to exceed the annual harvest quota established every 3 years under the regulations. The impact to the population would be moderate since the limit of 4,902 seals that could be harvested represents 50% of PBR. Because the overall harvest level can be allocated by season among pups and juveniles, a specific analysis of the harvest of these two age groups is provided.

Under Alternative 5, the annual harvest range could be reduced after the first 3 years based on the community's subsistence use as evident from the actual average harvest. Therefore, there is potential for impacts to be reduced in future years because the harvest would be based on actual use.

4.3.8.2.1. Juvenile Male Mortality

Alternative 5 has the highest harvest limit of all the alternatives for the first 3 years. Alternative 5 does not authorize a harvest of 4,902 (50% of PBR) 6-year-old males for more than the first 3 years; rather, this is the initial harvest limit until the Co-Management Council establishes a new limit based on the new 3-year average as the lower end of the range. To identify the actual subsistence need without the influence of the regulatory limitation, the upper end of harvest level would be set higher than what ACSPI requested is on the community's subsistence requirements to allow for the subsistence need to become evident through actual use. There is some indication that the subsistence harvest prohibition from 1972 to 1975 for St. George Island (see NMFS 2014a) and subsequent subsistence harvest limits set below the community's subsistence needs may have resulted in reduced use among younger generations due to the inability to legally harvest what was needed (Gentry 1988). This likely resulted in a more limited availability of seal meat (Zimmerman and Letcher 1986). Further, because the intent of changing the subsistence harvest regulations is to provide access to fresh meat throughout more of the year (rather than over a 6-week season under Alternative1), there is no indication that Pribilovians would harvest the entire allotment during one season or of one particular age group. Pribilovians on St. Paul have identified a subsistence need for pups and juvenile male fur seals, each of which are available at different times of year.

4.3.8.2.2. Male Pup Mortality

Harvesting 4,902 pups (5% of annual pup production) would be less of an impact on the population than if the harvest was all juvenile male fur seals due to their greater reproductive value as discussed in Alternatives 2 through 4. For this analysis, it was assumed that of those 4,902 male pups selected for harvest, 3,431 would have died from natural causes prior to returning to the island as a 2-year-old seal. For comparative purposes, out of 4,902 2- and 3-year-old males, 1,226 would die naturally before returning the following year.

An exclusive pup harvest under Alternative 5 would result in reduced population effects when compared to a harvest of 2,000 sub-adult/juvenile seals under Alternatives 1 through 4. Regardless, NMFS does not anticipate that the Pribilovians would choose to harvest one age group of seals over another. During the initial 3 years, Alternative 5 could result in the subsistence harvest of 4,902 6-year-old males. Therefore, the impacts to the fur seal population would likely be greater than Alternatives 1 through 4. However, after that initial period, the harvest limit would be set on the actual harvest level and would likely be less than 4,902 seals (juveniles or pups). Therefore, the effects of Alternative 5 in the future would likely be minor to moderate based on the percentage of PBR (less than 10% to 50%) that would be killed.

4.3.8.3. Female Mortality

Alternative 5 terminates harvests if 200 female fur seals were accidentally killed during the subsistence harvest. Alternative 5 would have a greater effect on the population than all other alternatives because of the accidental harvest of up to 200 female fur seals. Towell and Williams (NMFS unpublished) modeled the mortality of 200 juvenile females and found that direct mortality of females would result in a 1% loss of the female portion (0.02% of PBR) of the population when compared to a loss of less than 1%

(0.0008% to 0.002%) for Alternatives 1 through 4. While this loss is greater than the other alternatives, it still represents an increase in the effects on the population that would not be detectable.

When considering the effects of removing female seals that otherwise may someday contribute to the breeding population, Alternative 5 accidental female pup harvest would result in a minor adverse effect because of the high level of natural pup mortality. The accidental lethal take of juvenile females would have more of an impact on productivity and coupled with cumulative environmental factors, may be more of a moderate impact to productivity and the northern fur seal population as a whole.

Impacts of Alternative 5 initially would be greater than all other alternatives, and are considered moderate because the harvest of 4,902 fur seals would be 50% PBR. The higher level of accidental female mortality in Alternative 5 would result in greater effects on the fur seal population than the other alternatives, while allowing greater access to fur seals for subsistence use. In addition, there is no intermediate level for female mortality that would temporarily suspend the harvest to determine if measures can be taken to improve detection and avoidance of future female mortality. However, these impacts would decline once a new harvest range is established based on the most recent 3 years of St. Paul harvests.

4.3.8.4. Geographic Extent of Effects

The geographic extent of the direct and indirect mortality effects of Alternative 5 on the fur seal population would be minor as juvenile male harvests would be distributed among all the accessible haulouts and male pup harvests would be distributed among all locations within and outside the rookeries as practical. Alternative 5 would allow harvest at all sites, but would use the Co-Management Council to evaluate whether harvests should occur at small breeding areas. Mortality would be distributed across more haulouts and rookeries and as a result would be an improvement over Alternative 1 No Action, under which only seven specific locations can be harvested.

Alternative 5 has an extended harvest season through the autumn and into early winter, such that harvests would occur at more times than under the No Action Alternative. Shorter harvests for age class (pups or juveniles) separate Alternative 5 from the Preliminary Preferred/Petitioned Alternative (Alternative 2). Alternative 5 includes an additional restriction where harvests would be prohibited at any breeding ground where the annual estimate of pup production is deemed to be at a level unable to sustain a harvest. The Co-Management Council would review recent pup production estimates by breeding area and model output estimating the trajectory of the population trend 5 years into the future. The Co-Management Council would determine whether a harvest is sustainable at the sites with lowest pup production. Once the determination is made for a particular breeding area the Co-Management Council would annually suspend harvesting at those sites and ACSPI would enforce that suspension among its Tribal members. The minimum number of seals required to maintain the social structure and reproductive ecology of a breeding area is not known. Alternative 1 No Action does not include any such restriction. Alternative 5 would protect relatively smaller breeding areas from harvest and would be an improvement towards conserving the population.

Alternatives 3 through 5 would all prohibit any subsistence harvest or hunting at breeding locations determined to be at risk of reaching unsustainable population levels. The range of alternatives incorporates measures designed such that proposed harvest would not significantly impact northern fur

seals at the population level or result in localized reductions in productivity within individual rookery sites. These conservation measures would ensure that the subsistence harvest does not undermine the ability for the northern fur seal population to recover from the unknown factors causing the population to decline on the Pribilof Islands and not at their other breeding locations.

4.3.9. Summary of Direct and Indirect Mortality Relative to Potential Biological Removal

In summary, impacts associated with lethal take (mortality) under Alternatives 1 through 4 would all be negligible to minor with regard to PBR (Table 4.3-1). Alternative 5 total lethal take would be considered moderate for the first 3-year period. However, it is unlikely that harvest would be maintained at the proposed level under Alternative 5 (4,902), once the harvest level is set based on the 3-year average subsistence need. Because the harvest range would likely decrease under Alternative 5 after the first 3-year period, future impacts associated with mortality under that Alternative would also be negligible or minor.

Table 4.3-1 Impacts of Lethal Take Relative to Potential Biological Removal

Alternative	Lethal Take (maximum)	% PBR	Impact
1 (No Action)	2,000	19	Minor
2, 3, and 4	2,000	19	Minor
5	4,902 (first 3 years)	50	Moderate (initial 3-year period)

4.3.10. Sub-lethal Effects of Harvesting Northern Fur Seals

During the harvest, direct and indirect sub-lethal effects to seals may occur incidental to human presence on or near the breeding area while herding animals into groups, maintaining the groups, and the subsequent release of individuals from the groups. Disturbance that may result in excessive time and energy expenditures above the normal range may reduce reproductive rates or survival and is the primary concern for the analysis of sub-lethal effects due to implementation of the alternatives. As described in more detail in this section, this analysis estimates the potential mortality associated with sub-lethal effects on fur seals.

To estimate the duration of the harvests and the short-term harassment one must consider three aspects of the process: the round-up, the drive, and the stunning and exsanguination.

Data on the duration of the sub-adult male harvest has been collected since 1987 on St. Paul Island. The round-up includes sending the crew discreetly towards the beach to prevent the hauled out seals from escaping to the water. The round-up takes only a few minutes and largely depends on the terrain and wind direction relative to the water and seals. Once the crew prevents the seals from escaping they are slowly moved inland at a pace to minimize potential overheating. Harvest drives range from 2 to 75 minutes, but average about 12 minutes, followed by an average of 11 minutes of resting prior to the actual harvest. The average stunning and exsanguination (*i.e.*, harvest) lasts about 72 minutes but can range from 7 to 200 minutes depending on the number of sub-adult males harvested in any particular harvest.

Since 1987, the average rate of stunning seals is about one seal per minute. Based on data from St. Paul, the longest duration of a harvest would occur when more than 100 seals are harvested on a single day. On average there have been eight sub-adult male harvests per year on St. Paul since 2002; St. Paul has taken an average of 48 seals per harvest between 2002 and 2015.

Disturbance and associated sub-lethal impact analysis followed the methods described in the Research PEIS (NMFS 2007b) and subsequent research permit applications submitted for northern fur seals, and for the 2014 St. George EIS. The types of effects, estimated proportions of animals affected, and estimated mortality rates per animal affected described in the methods for the Research PEIS (NMFS 2007b) were used to evaluate potential sub-lethal effects due to disturbance during subsistence harvest of juveniles and pups. Based on those assessments, mortality expected from incidental disturbance (potential sub-lethal effects) from pup round-ups during subsistence harvest would be less than that estimated for scientific research, which was also quite low (total mortality = 0.4 total per year) (NMFS 2007b).

Possible disturbance under each of the five alternatives is based on the number of harvest events likely to occur (see Chapter 2 for a detailed description of alternatives). Based on the harvest seasons specified

under each Alternative, Table 4.3-2 shows the number of days that pups would likely be harvested. For the purposes of analysis, the number of harvest events was calculated by assuming that only one harvest would occur per day and that up to five harvests could occur during each week of the harvest season. For example, the harvest season under Alternative 3 is 20 weeks and four days (August 9 – December 31) or a total of 104 estimated harvest days [*i.e.*, ((20x5) + 4)]. This is based on the empirical evidence of the subsistence harvest from the past 30 years, rather than the speculation that multiple harvests might occur per day or repeated harvests might occur per location from the 1985 and 1986 emergency rulemaking (50 FR 57914 and 51 FR 24828).

Subsistence harvesters are both wage earning and non-wage earning members of the community (Veltre and Veltre 1981, 1987). Wage earning members of the subsistence community include those in the commercial halibut fishery. To comply with the "traditional harvest method" and "experienced" restriction in the fur seal regulations, wage earning subsistence harvesters often have to balance time off from employment to pursue subsistence during the work week. Employment in commercial halibut fishing is not favorable to a flexible schedule and limits opportunities to pursue fur seals for subsistence; both seasons overlap directly.

Table 4.3-2 Number of Assumed[1] Harvest Events Under Each Alternative

	Alternative 1	Alternative 2[2]	Alternative 3	Alternative 4	Alternative 5
Harvest Season	Sub-Adult Harvest June 23 – Aug 8	Pup and Juvenile Harvest Jun 23 – Dec 31	Pup and Juvenile Harvest Aug 9 – Dec 31	Juvenile Harvest Jan 1 – May 31 Jun 23 – Aug 8 Pup Harvest Aug 9 – Dec 3	Juvenile Harvest Jun 23 – Aug 8 Pup Harvest Aug 9 – Dec 31
Number of Harvest Days (total per year)	33	137	104	244	137

[1] – It is assumed that for each week during the harvest season, approximately 5 of those days would be spent harvesting pups.
[2] – Under Alternative 2, pups and juveniles can be harvested during either of the two seasons however; pups are not found on St. Paul Island between January 1 and May 31. Therefore, the analysis assumes pups will be harvested between June 23 and December 31.

The numbers of animals potentially exposed to the disturbance for either the male juvenile or male pup harvests were estimated as follows:

- Pups: 2 pups are disturbed for each pup harvested, 60 additional pups are disturbed for each harvest event. No pups are disturbed during the harvest of non-pups.
- Non-pups: 1.15 non-pups are disturbed for each animal (either pups or older) harvested, 50 additional older animals (*i.e.*, non-pups) are disturbed for each harvest event.

Therefore, to calculate potential mortality due to disturbance, analysts multiplied the number of harvest events by the number of animals potentially exposed. This approach allows NMFS to estimate the range between the minimum and maximum level of disturbance that could result in sub-lethal effects under the proposed alternatives. The actual level of sub-lethal effects due to the proposed harvest of pups and juveniles would likely fall in within this range.

Following the approach used to evaluate potential sub-lethal effects of fur seal research (NMFS 2007b), NMFS has quantified the likelihood of sub-lethal effects of the subsistence harvest by estimating the

probability of mortality due to harassment. The analysis considered possible sub-lethal effects that could incur incidental to: human presence on or near the breeding area, the herding of animals into groups, maintaining the groups, and the subsequent release of individuals from the groups. Tables 4.3-3 to 4.3-13 present the result of each calculation for a particular activity and age class of animal (*i.e.*, an estimated average mortality rate that could occur over time as a result of many different animals being exposed to a type of activity or disturbance).

To calculate these numbers, NMFS estimates a proportion of animals that might exhibit a response to harassment (*i.e.*, alert response, enter water, etc.) during the harvest. This number is multiplied by the number of animals exposed to come up with how many animals could be affected. The number of animals that might exhibit a certain response is then multiplied by the estimated mortality rate to predict the number of mortalities that could occur from that sub-lethal effect. The estimated number of mortalities for each age class and type of effect are totaled to get an overall estimate of the lethal risks to seals that could result from the range of pup harvest scenarios that could occur if there were greatest number of harvest events, which would represent the greatest amount of disturbance.

It is not always possible to detect animal responses to disturbance. Some responses go unnoticed for various reasons including animal behaviors that may be hidden or limitations in methods used to observe or measure responses. For those species or circumstances where responses may be detected, the type and intensity of response can vary greatly. For example, researchers have observed a variety of behaviors and measured various physiological indicators of stress in response to certain research activities as described in detail in the Research PEIS (NMFS 2007b).

In response to harvest activities, some animals exhibit no obvious behavioral response although they may have physiological responses associated with stress. Other animals are alerted and show a noticeable increase in awareness of the presence of harvesters (*e.g.*, head up, vocalization, etc.). Others may move away from the harvester or toward the water without actually entering the water. Others may enter the water without trampling seals around them or they may cause a stampede. Some mechanisms for sub-lethal effects, including injury and mortality, during a stampede or flight into the water include:

- Increased corticosteroid levels or other physiological stress responses, especially from prolonged or repeated exposure to disturbance.
- Increased energy expenditure with the potential for hyperthermia (excessively high body temperature, which could lead to muscle rigidity, brain damage, or death) for those animals involved in strenuous or prolonged activity.
- Hypothermia (characterized by abnormally low body temperature and associated with rapid, progressive mental and physical collapse, which could be life-threatening) for those animals forced into the water, particularly animals undernourished or in poor health.
- Stress reactions that produce psychological and physiological responses, especially if disturbance is chronic or frequent.

The assessments of sub-lethal effects resulting from disturbance during pup harvests for each alternative are not conveniently separated by age group or gender. Therefore the assessments of sub-lethal effects related to disturbance during pup harvests are combined within the same section in each alternative.

4.3.10.1. Sub-lethal Effects under Alternative 1 (No Action)

4.3.10.1.1. Male Sub-lethal Effects

Neither pups nor females would experience sub-lethal effects under the No Action Alternative because they are not typically found in the hauling grounds at the time of year when the sub-adult male harvest occurs. Therefore, there is no assessment for sub-lethal effects to pups and females for Alternative 1.

4.3.10.1.2. Sub-Adults

The number of sub-adult male fur seals exposed to sub-lethal effects such as harassment or displacement is about 3,950 sub-adult males under Alternative 1 No Action (Table 4.3-3). The duration of sub-lethal effects is short-term because each harvest would last less than two hours and would be relatively infrequent (on average 9 harvests per year over the last decade). The magnitude and intensity of direct and indirect sub-lethal effects of the No Action Alternative are also minor. During any particular harvest approximately 25 to 30% of the sub-adult male fur seal population is onshore at any one time during the breeding season (Gentry 1981), but only one hauling ground of the nine where seals are present is harvested on any particular day.

Sub-adult males do not participate in reproduction. Assuming they may have been harassed for a very short period (less than two hours) at some point between ages 2 and 5, it is not likely they would experience some reduction in reproduction after being exposed to a few round-ups. Gentry (1998; 1981) was not able to detect any changes in the population after the cessation of the commercial harvest on St. George Island, when on average there were 10 times as many round-ups each year and 10 times as many fur seals rounded-up during each harvest when compared to the subsistence harvests.

There is direct evidence of short-term changes in behavior of sub-adult male fur seals as a result of the subsistence harvest, they escape into the water and return to the same or another location within a few hours or depart for a foraging trip. Other potential sub-lethal effects may occur, but NMFS has no evidence to describe the extent of such effects. Therefore, some assumptions must be made based on professional judgment and experience regarding the magnitude, extent, and likelihood of other possible sub-lethal effects. Sub-adult male fur seals are disturbed from their resting place and subsequently enter the water for a few hours while there are harvesters present nearby. Once the harvest is complete (average duration about one hour) or harvesters are no longer present on the hauling ground (average duration about 15 minutes), seals would begin to reoccupy their habitat. This type of response by fur seals occurs commonly (Gentry 1998; 1981), and within a few minutes to hours the fur seals return to their previously occupied sites and resume their normal behaviors. Considering the maximum mortality estimate for Alternative 1 would be the equivalent of an estimates 0.67 mortalities due to sub-lethal effects, the lack of historical evidence of sub-lethal effects from the commercial harvest, and low numbers of sub-adult males exposed to disturbance from the subsistence harvest, NMFS determined that the magnitude of sub-lethal effects is minor according to the criteria in Table 4.3-3.

Table 4.3-3 Sub-lethal Effects for Alternative 1

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 1 harvest 2000 Sub-adult males harvested during 33 harvests	Pups	0	Observed mortality during activity			0.00001	0	0
			Alert response	1	0	0	0	
			Enter water	0.01	0	0.001	0	
			Injured during disturbance	0.001	0	0.05	0	
	Non-pups	3,950	Observed mortality during activity	n/a	n/a	0.00008	0.316	0.6715
			Alert response	1	3950	0	0	
			Enter water	0.8	3160	0.0001	0.316	
			Injured during disturbance	0.0005	1.975	0.02	0.0395	

4.3.10.1.3. Geographic Extent of Sub-Lethal Effects

Under Alternative 1, direct and indirect sub-lethal effects of the No Action Alternative would be concentrated at seven rookeries, and during a 33-day period. Due to strong site fidelity, this results in a moderate effect on the population because disturbance is not distributed across the entire St. Paul population; rather, it would occur only at the seven specified rookeries within a short period of time.

Alternative 1 would continue to distribute the sub-adult male harvests across seven hauling grounds on St. Paul Island resulting in approximately 3,950 sub-adult seals exposed to sub-lethal effects. The duration of potential sub-lethal effects would include short-term and temporary changes in behavior for those sub-adult males not harvested and as such are considered minor. While these effects are temporary and short-term, they do perpetuate disturbance at the same hauling grounds each year.

Under Alternative 1 No Action, the frequency at which the subsistence harvests are to occur is annually and not more than twice per week per location during the season from June 23 until August 8. At this frequency over this timeframe, the effects would be considered negligible across the population. The potential that sub-lethal effects under Alternative 1 would result in a detectable change in reproduction is highly unlikely. No changes in reproduction were detected as a result of the commercial harvest, which was conducted with higher frequency and higher magnitude than under the No Action Alternative. Gentry (1995) described various aspects of male behavior studied during the commercial harvest, which provide the biological basis to consider the likelihood of sub-lethal effects of the subsistence harvest to be highly unlikely and therefore negligible. First, at least 80% of adult males never have contact with adult females in estrus at both high and low harvest rates and population sizes. Second, the male social system is marked by a high turnover rate. Gentry (1995) reported 65% of all adult males on the breeding grounds fail to return to a breeding site the next year, but adult females are seldom observed unattended by adult males during the breeding season for long. Third, Gentry (1995) describes the male territorial and reproductive system as, "…neither fragile nor susceptible to human disturbance, as once believed." Fourth, adult male fur seals show great fidelity to their territorial sites over years, irrespective of the availability of females at those sites.

4.3.10.2. Sub-Lethal Effects Under Alternative 2 (Preliminary Preferred/Petitioned Alternative)

4.3.10.2.1. Juvenile Harvest

Neither pups nor adult females would experience sub-lethal effects under the harvest of juveniles because they are not typically found in the hauling grounds at the time of year when the juvenile male harvest

occurs. Therefore there is no assessment for sub-lethal effects to pups and adult females for Alternative 2. Sub-lethal effects to juvenile females that may inadvertently haul out in these harvest areas may exist, however the level of disturbance and resultant equivalent mortality is unknown. The number of females accidently taken during the subsistence harvest since 1985 is 69; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are negligible.

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last less than two hours and would be relatively infrequent (on average 9 harvests per year over the last decade). During any particular harvest approximately 25 to 30% of the juvenile male fur seal population is onshore at any one time during the breeding season (Gentry 1981), but only one hauling ground of the 20+ where seals are present is harvested on any particular day. Fur seals incidentally harassed during the harvest are most likely to experience a small change in their annual energy budget, which we categorize as a sub-lethal effect.

As described previously, northern fur seals displaced from their preferred habitats by humans return to those habitats after the humans have departed or are no longer detected by those returning seals. The sub-lethal effects of the juvenile male harvest are well understood because of the long history of commercial harvests and research. The magnitude of the sub-lethal effects on non-pups due to disturbance during harvest round-ups under the Preliminary Preferred/Petitioned Alternative if all 2,000 were juvenile males is estimated as the equivalent of 1.56 additional mortalities, Table 4.3-4.

Table 4.3-4 Sub-lethal Effects of Alternative 2

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 2 harvest 2000 male juveniles harvested during 137 harvests	Pups	0	Observed mortality during activity			0.00001	0	0
			Alert response	1	0	0	0	
			Enter water	0.01	0	0.001	0	
			Injured during disturbance	0.001	0	0.05	0	
	Non-pups	9,150	Observed mortality during activity			0.00008	0.732	1.5555
			Alert response	1	9150	0	0	
			Enter water	0.8	7320	0.0001	0.732	
			Injured during disturbance	0.0005	4.575	0.02	0.0915	

4.3.10.2.2. Pup Harvest

The upper number of pups disturbed during a harvest of 2,000 pups would be: (2*2,000) + (60*137) = 4,000 + 8,220 = 12,220. Disturbance to juveniles would be attributed to either the harvest of 2,000 pups or 2,000 juveniles (2,000 animals) and would be: (1.15*2,000) + (50*137) = 2,300 + 6,850 = 9,150.

The sub-lethal effects of the pup male harvest of the Preliminary Preferred/Petitioned Alternative, if all 2,000 were pups, are estimated as the equivalent of 0.86 additional pup mortalities. Pup harvests would impact older animals, and the resultant sub-lethal effects on the non-pup population are 1.56, for a total of 2.46 probable mortalities. The magnitude and intensity of direct and indirect sub-lethal effects of the Petitioned Alternative are also minor.

Gentry (1998) summarized the results of the short and long-term disturbance investigations: “Brief, infrequent human disturbances are not likely to affect fur seals through breakage of the maternal bond within a season.” He continues, “The activity pattern on shore was also little affected by these occasional

disturbances" (Gentry 1998). The reported examples suggest that harassments during the non-breeding season under the Preliminary Preferred/Petitioned Alternative would not result in the permanent abandonment of habitat, but would cause additional energy expenditures by the fur seals temporarily disturbed during the harvest.

Under Alternative 2, NMFS and ACSPI would work together to identify, describe, and implement best harvest practices, which would minimize repeated harassment of previously harvested sites by scheduling repeated harvests at the same site only after consideration of non-harvested sites. This approach would allow those females displaced from their young by the harvest to reunite and suckle their young without being disturbed before they depart on their subsequent foraging trip.

Some additional mechanisms for sub-lethal effects of pup harvests, including injury and mortality, during a stampede or flight into the water include:

- Injury to pups from being trampled by adults or other pups.
- Injury to adults and pups from landing on sharp rocks when jumping or falling off cliffs or rocks.
- Injury to pups from aspirating water.
- Death of pups by drowning.
- Increased risk of predation for those animals forced into water, especially pups and juveniles with limited mobility.
- Increased conspecific aggression (*e.g.*, biting and pushing) among adults and from adults toward pups as animals try to reestablish or access territories on the rookery or reunite with their pups.
- Delay in return of nursing females to the rookery/haulout, leading to a malnourished or weakened pup, or slower pup growth.
- Failure of pups and mothers to reunite after separation resulting in pup death by starvation or exposure.

Since pup harvests require capture and restraint of pups to identify their sex prior to harvest, there are risks of injury in addition to those listed above. Mechanisms by which northern fur seals can be injured during capture or incidental to capture include:

- Efforts to avoid or escape capture can lead to contusions, lacerations, hematomas, nerve injuries, concussions, and fractures, as well as hyperthermia and myopathy from increased muscle activity.
- Pups herded into large groups for processing or that pile up in response to disturbance on rookeries may be injured or suffocated under the weight of other pups.
- Pups attempting to reunite with their mothers after harvesters leave may encounter lactating females who may aggressively displace and injure them.

A change in reproduction due to sub-lethal effects as a result of the Preliminary Preferred/Petitioned Alternative is unlikely to be detected (Table 4.3-5). Adult females and males are not breeding during the pup harvest season, so sub-lethal effects on their reproduction would not be likely to occur until the

following year. The juvenile male harvest occurs on non-breeding habitat where no breeding seals are present; therefore, sub-lethal effects on their reproduction also would be not likely to occur.

Table 4.3-5 Sub-lethal Effects of Alternative 2

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 2 harvest 2000 male pups harvested during 137 harvests	Pups	12,220	Observed mortality during activity			0.00001	0.1222	0.8554
			Alert response	1	12220	0	0	
			Enter water	0.01	122.2	0.001	0.1222	
			Injured during disturbance	0.001	12.22	0.05	0.611	
	Non-pups	9,150	Observed mortality during activity			0.00008	0.732	1.5555
			Alert response	1	9150	0	0	
			Enter water	0.8	7320	0.0001	0.732	
			Injured during disturbance	0.0005	4.575	0.02	0.0915	

4.3.10.2.3. Geographic Extent of Sub-Lethal Effects

Under the Preliminary Preferred/Petitioned Alternative 2, the duration of the direct and indirect sub-lethal effects would include short-term harassment and displacement for those juvenile males not harvested during the summer harvest season and as such would be minor.

If a portion of pup harvest occurs in the suckling areas, short-term harassment of adult females, pups, and any non-breeding males resting onshore could result. There are no data to evaluate the duration of pup round-ups, drives, and harvests and the possible sub-lethal direct and indirect effects. Boltnev *et al.* (1997) describes the perinatal period (birth to 10 days old) as the most sensitive based on survival and growth, followed by the molting period from 40-80 days of age based on growth. Most pups die prior to 40 days of age, and their survival from 40 days to weaning is quite high (Boltnev *et al.* 1997). The pup harvests are not anticipated to last longer than the average juvenile male harvest on St. Paul, but may be more frequent as there may be unsuccessful attempts to harvest in unfamiliar locations. If we assume the number of pups harvested during each event is similar to the number of juveniles harvested, then we can estimate the duration of the pup harvest to range from at least 1 hour to probably not more than 3 hours depending on the terrain and weather, which determines the number of young that can be collected during any one event. Whether an unsuccessful pup harvest attempt would be followed by another attempt is unknown.

NMFS considered whether the sub-lethal effects of the pup harvest on female fur seals might cause detectable effects on the population. There have been no directed studies on the sub-lethal effects on female fur seals, but the female culling program from 1956-1968 (York and Hartley, 1981) and pup tagging programs during this period can be considered proxies for the possible sub-lethal effects of the pup harvest. Under the female culling program the U.S. Government rounded-up adult female fur seals from the breeding areas, moved them to upland harvest areas and killed an average of about 24,000 adult female seals per year, resulting in the deaths of their dependent offspring. In addition, on average 36,996 pups were tagged each year by rounding them up, moving them inland, and handling them for tag application, sex identification, and weighing before releasing them back to their suckling areas.

If one were to predict that sub-lethal effects might occur and be detected we might expect it would have occurred during this period of intensive breeding area disruption on the Pribilof Islands. In 1964, there were at least 12,034 adult females rounded up and killed from the breeding grounds on St. Paul (resulting

in the subsequent deaths of their dependent pups on land) by the U.S. Government under the Convention (York and Hartley 1981; Roppel 1984; MML unpublished data). In 1964, the U.S. Government rounded up at least 24,000 pups on St. Paul Island and tagged them for research. Using the same rationale to evaluate sub-lethal effects as presented in Table 4.3-5, approximately 1.15 non-pups could be exposed to sub-lethal effects for every 150 male pups killed and an additional 50 non-pups exposed per event. Therefore, in 1964 approximately 30,000 pups and 44,000 non-pups (mostly adult females since they were the object of the female culling program) would have been exposed to sub-lethal effects from the round-up, handling and tagging. In 1965, the pup production was estimated to be 253,768; whereas, in 1963, the pup production was 262,498 (MML unpublished data). In order to properly estimate the sub-lethal effect, we must first remove the direct effect of mortality in 1964 from the 1963 pup production estimate by subtracting 10,830 (pregnancy rate of about 90% for those 12,034 harvested females; Trites and York 1993). Using these assumptions, we would have expected the 1965 pup production estimate to be 262,498-10,830=251,668, but the actual production was higher at 253,768.

Thus, we might expect that if sub-lethal effects were to occur because of the 1964 female culling, among those 44,000 females left alive but exposed to disturbance from harvesters entering the breeding areas to kill 12,304 females, pup production would have been reduced the year after the harvest (1965). However, the pup production estimate in 1965 (after removing the direct effect of mortality) was actually higher by about 2,000 pups, rather than lower. Sub-lethal effects on females as a result of harvesting male pups are not anticipated. In addition researchers entered the breeding and suckling areas to tag 24,000 pups during 15 to 20 different tagging events in 1964, exposing those females to additional sub-lethal effects. If sub-lethal effects were not detectable under these circumstances (about 20-30% of pup production exposed to sub-lethal effects), the harvest of 2,000 male pups would likely result in negligible (no detectable change in reproduction).

The risk of seals overheating (*i.e.*, hyperthermia) during the subsistence harvest of sub-adult male harvest has also been evaluated. NMFS does not anticipate death of pups during round-ups or handling due to hyperthermia for two reasons. First, average ambient temperature in July when the sub-adult male harvest occurs on St. Paul Island is about 48ºF. Second, the small number of pups to be rounded up reduces the risk of hyperthermia. The large number of sub-adult seals rounded-up during the commercial harvest was the predominant factor behind the concerns for overheating seals when the subsistence harvest regulations were first developed (May 15, 1986; 51 FR 24840). With a proposed subsistence harvest that is one-tenth the number of seals harvested commercially in the past, sub-lethal effects from hyperthermia would be negligible. Likewise, sub-lethal effects related to hyperthermia observed and described in the Research PEIS (NMFS 2007b) are related to hundreds or thousands of pups between 30 and 40 days old being rounded-up and held for marking.

NMFS also considered the possibility that pups rounded-up but not harvested could become cold and not be able to return to their resting grounds from the harvest areas. NMFS estimated this effect was highly unlikely due to the daily pup activity cycle and behavior. Baker and Donahue (2000) reported that pups during the autumn spend an increasing amount of time in the water (up to 35% of their time). Mean sea surface temperature in the Bering Sea in October is about 44ºF and heat loss is 20 times faster in water than in air. Upon weaning, pups spend 100% of their time in the water for the next 10-24 months. In addition, Gentry (1998) reported that experimentally transported pups walked overland a few kilometers

to return to their preferred location of suckling on numerous occasions. The animals from these experiments were all less than 40 days old, the age described by Boltnev *et al.* (1998) where the highest on land mortality occurs. The combination of these two studies suggests the energy expenditures associated with natural movement of distances far greater than that anticipated for the pup harvest are well within the normal tolerance of northern fur seals and would not cause stress due to cold. In addition, there are no records or evidence from the Russian pup harvests indicating some percentage of those pups not harvested have been unable or delayed in their natural return to their suckling areas. NMFS tagged female pups at four different rookeries on St. George in October 2015, the mean distances that pups traveled at sea on a daily basis ranged from 0.97 km to 2.07 km from their natal rookery, with maximum distances as far as 43 km, and the average maximum daily at sea movement was 20.86 km (NMFS unpublished data). So, pups at the time when the harvest is occurring are at sea travelling significant distances. Our results build on those of Baker and Donahue (2000), which report that pups were spending on average 35% of their time at sea in October and had at-sea trips lasting up to 16 hours. Those longer trips observed by Baker and Donahue (2000) likely represent trip distances around 20 km or more. Therefore, it is highly unlikely that harvestable-aged pups would become cold or not have the energy after a harvest round-up and drive to return a few hundred meters or even further to their resting habitat, and if sub-lethal effects were to occur at most they would be negligible.

Sub-lethal effects under Alternative 2 would be considered moderate due to the fact that disturbance could be distributed across more rookeries and haulouts. However, Alternative 2 includes an extended harvest season through the autumn and into winter, such that harvests would occur over a greater period of time than Alternative 1 (No Action), which would mitigate the effects of disturbance because it would be spread over a greater period of time. Pups also exhibit the behavioral tendency to return to a site within a few hours (*i.e.*, do not show long-term displacement as a result of harassment) as exhibited by the ability of researchers to capture hundreds of fur seal pups from the same location by waiting unobtrusively after the initial captures. Researchers regularly re-capture pups that escaped to the water after tagging or marking and return to land within a few minutes to an hour (NMFS unpublished data). In addition, after August pups begin to make progressively longer and farther daily trips away from their rookery of birth while their mothers are away on foraging trips (Baker and Donahue 2000). Although the effects of harvest would be distributed across more locations, because it would occur over a longer period of time, there would be longer intervals before a subsequent harvest would occur at the same site. For these reasons, the overall geographic extent of sub-lethal effects would be minor.

4.3.10.3. Sub-lethal Effects Under Alternative 3

Up to 1,500 male pup fur seals would be harvested under Alternative 3, the remainder (500 juvenile males would be hunted). The upper number of pups disturbed during the harvest would be: (2*1,500) + (60*104) = 3,000 + 6,240 = 9,240. Disturbance to juveniles attributed to the harvest of 1,500 pups would be: (1.15*1,500) + (50*104) = 1,725 + 5,200 = 6,925. Juvenile males under this alternative would be hunted and not harvested. Therefore, there is no estimate of potentially disturbed animals resulting from juvenile harvest under Alternative 3.

4.3.10.3.1. Pup Harvest

The mechanisms for sub-lethal effects under Alternative 3 are identical to those described for Alternatives 1 and 2 including injury from round-up, capture and restraint associated with identifying the sex of pups prior to the harvest of males.

Fur seals incidentally harassed during the harvest are most likely to experience a small change in their annual energy budget, which we categorize as a sub-lethal effect. As described previously, northern fur seals displaced from their preferred habitats by humans return to those habitats after the humans have departed or are no longer detected. The estimated maximum additional mortality equivalent for quantifying the sub-lethal effects of pup round-ups and handling assuming 1 male pup is harvested every attempt until 1,500 are harvested (Table 4.3-6) is about 1.83 additional fur seal mortalities (0.65 male pups and 1.18 non-pups) and would be greater than those of Alternative 1 No Action (*i.e.*, 0.67 probable mortalities). The impacts are greater primarily due to the greater number of harvest days for Alternative 3.

Alternative 3 sub-lethal effects (1.83) would be less than that for Alternative 2 (2.46 probable mortalities) because of the harvest of 2,000 pups. However, if more juveniles were taken during the Alternative 2 harvest, the estimated maximum additional mortality equivalent for quantifying the sub-lethal effects of Alternative 2 would be less than that of Alternative 3.

It is highly unlikely that sub-lethal effects on adult females and males of the Alternative 3 would be detectable as a change in reproduction as would be the case for Alternative 2.

Table 4.3-6 Sub-lethal Effects of Pup Harvests in Alternatives 3 and 4

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 3 and 4 harvest 1500 male pups harvested during 104 harvests	Pups	9,240	Observed mortality during activity			0.00001	0.0924	0.6468
			Alert response	1	9240	0	0	
			Enter water	0.01	92.4	0.001	0.0924	
			Injured during disturbance	0.001	9.24	0.05	0.462	
	Non-pups	6,925	Observed mortality during activity			0.00008	0.554	1.17725
			Alert response	1	6925	0	0	
			Enter water	0.8	5540	0.0001	0.554	
			Injured during disturbance	0.0005	3.4625	0.02	0.06925	

4.3.10.3.2. Geographic Extent of Sub-Lethal Effects

Sub-lethal effects under Alternative 3 include an extended harvest season through the autumn and into winter, such that harvests would occur for a longer period than under Alternative 1 (33 harvest events). Alternative 3 has a shorter subsistence harvest period (104 harvest events) overall than Alternative 2 (137). Sub-lethal effects under Alternative 3 would be considered moderate due to the fact that disturbance could be distributed across more rookeries and haulouts. Similar to Alternative 2, Alternative 3 includes an extended harvest season through the autumn and into winter, such that harvests would occur over a greater period of time than Alternative 1 (No Action), which would mitigate the effects of disturbance because it would be spread over a greater period of time. Pups also exhibit the behavioral tendency to return to a site within a few hours (*i.e.*, do not show long-term displacement as a result of harassment) as exhibited by the ability of researchers to capture hundreds of fur seal pups from the same location by waiting unobtrusively after the initial captures. Researchers regularly re-capture pups that

escaped to the water after tagging or marking and return to land within a few minutes to an hour (NMFS unpublished data). In addition, after August pups begin to make progressively longer and farther daily trips away from their rookery of birth while their mothers are away on foraging trips (Baker and Donahue 2000). Although the effects of harvest would be distributed across more locations, because it would occur over a longer period of time, there would be longer intervals before a subsequent harvest would occur at the same site.

Alternative 3 would prohibit any subsistence harvest or hunting at breeding locations determined to be at risk of reaching unsustainable population levels; incorporating measures designed such that proposed harvest would not significantly impact northern fur seals at the population level or result in localized reductions in productivity within individual rookery sites. These conservation measures would ensure that the subsistence harvest does not undermine the ability for the northern fur seal population to recover from the unknown factors causing the population to decline on the Pribilof Islands and not at their other breeding locations. Therefore overall, the geographic extent for Alternative 3 is estimated to be minor.

4.3.10.4. Sub-lethal Effects Under Alternative 4

NMFS has used the identical approach for evaluating the sub-lethal effects of Alternative 4 as that used for Alternatives 2 - 3. The approach is probabilistic and should be considered in terms of an estimated average mortality rate equivalent that could occur over time and as a result of many different animals being exposed to the same type of activity or disturbance. The estimated number of mortality equivalents for each activity and age class are totaled to get an overall estimate of the lethal risks to animals for the scope and type of sub-lethal effect as a result of the harvest of 1,500 male pups and 500 juveniles.

Both pups and juvenile fur seals would be harvested under Alternative 4; up to 1,500 male pup fur seals would be harvested over 104 days, the remainder (500 juveniles) would be harvested over 140 days. The upper number of pups disturbed during the harvest would be: (2*1,500) + (60*104) = 3,000 + 6,240 = 9,240. Disturbance to juveniles attributed to the harvest of 1,500 pups: (1.15*1,500) + (50*104) = 1,725 + 5,200 = 6,925. No pups would be disturbed during the juvenile harvest. The upper number of non-pups potentially disturbed under Alternative 4 would be: (1.15*500) + (50*140) = 575 + 7,000 = 7,575.

The mechanisms for sub-lethal effects under Alternative 4 would be identical to those analyzed and described for Alternatives 2 - 3 including the mechanisms of injury from capture and restraint to identify the sex of pups prior to the harvest of males.

4.3.10.4.1. Juvenile Harvest

Neither pups nor adult females would experience sub-lethal effects under the harvest of juveniles because they are not typically found in the hauling grounds at the time of year when the juvenile male harvest occurs. Therefore there is no assessment for sub-lethal effects to pups and adult females for Alternative 4. Sub-lethal effects to juvenile females that may inadvertently haul out in these harvest areas may exist, however the level of disturbance and resultant equivalent mortality is unknown. The number of females accidently taken during the subsistence harvest since 1985 is 69; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are negligible.

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last less than two hours and would be relatively infrequent (on average 9 harvests per year over the last decade). During any particular harvest approximately 25 to 30% of the juvenile male fur seal population is onshore at any one time during the breeding season (Gentry 1981), but only one hauling ground of the 20+ where seals are present is harvested on any particular day. Fur seals incidentally harassed during the harvest are most likely to experience a small change in their annual energy budget, which we categorize as a sub-lethal effect.

As described previously, northern fur seals displaced from their preferred habitats by humans return to those habitats after the humans have departed or are no longer detected by those returning seals. The sub-lethal effects of the juvenile male harvest are well understood because of the long history of commercial harvests and research. The magnitude of the sub-lethal effects on non-pups not harvested during the harvest round-ups under Alternative 4 if all 500 juvenile males were harvested is estimated as the equivalent of 1.29 additional mortalities, Table 4.3-7.

Table 4.3-7 Sub-lethal Effects of Alternative 4

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 4 harvest 500 Juvenile males harvested during 140 harvests	Pups	0	Observed mortality during activity			0.00001	0	0
			Alert response	1	0	0	0	
			Enter water	0.01	0	0.001	0	
			Injured during disturbance	0.001	0	0.05	0	
	Non-pups	7,575	Observed mortality during activity			0.00008	0.606	1.28775
			Alert response	1	7575	0	0	
			Enter water	0.8	6060	0.0001	0.606	
			Injured during disturbance	0.0005	3.7875	0.02	0.07575	

4.3.10.4.2. Pup Harvest

Sub-lethal effects from pup harvests under Alternative 4 would be identical to those described for Alternatives 2 - 3. Under Alternative 4, NMFS and ACSPI would work together to identify, describe, and implement best harvest practices, which would minimize repeated harassment of previously harvested sites by scheduling repeated harvests at the same site only after consideration of non-harvested sites. This approach would allow those females displaced from their young by the harvest to reunite and suckle their young without being disturbed before they depart on their subsequent foraging trip.

The estimated maximum additional mortality for quantifying the sub-lethal effects of pup round-ups and handling assuming 1 male pup is harvested every attempt until 1,500 are harvested (Table 4.3-8) is about 1.83 additional fur seal mortalities (0.65 male pups and 1.18 non-pups). The sub-lethal effects of the harvest of 1,500 male pup harvest would be less than 1 additional mortality. The sub-lethal effects on adult females and males of the Alternative 4 would not result in a detectable change in reproduction.

Alternative 4 overall sub-lethal effects are greater than those of Alternative 3 based on the additional juvenile harvest. Alternative 4 sub-lethal effects are also greater than those of Alternative 1, based on the disturbance caused by pup harvests. Differences in sub-lethal impacts between Alternative 2 and 4 are dependent on the number of pups and juveniles harvest in Alternative 2.

4.3.10.4.3. Geographic Extent of Sub-lethal Effects

As described for Alternative 2, and 3, pups also exhibit the behavioral tendency to return to a site within a few hours (*i.e.*, do not show long-term displacement as a result of harassment) as exhibited by the ability of researchers to capture hundreds of fur seal pups from the same location by waiting unobtrusively after the initial captures. The initial geographic extent of effects would be similar to Alternatives 2 and 3; the effects of harvest would be distributed across more locations and a longer period of time. This would mean that fewer seals would be harvested at each location and there would likely be longer intervals between harvests at specific locations.

As with Alternative 3, Alternative 4 would prohibit any subsistence harvest or hunting at breeding locations determined to be at risk of reaching unsustainable population levels; incorporating measures designed such that proposed harvest would not significantly impact northern fur seals at the population level or result in localized reductions in productivity within individual rookery sites. The geographic extent of the effects of Alternative 4 is the same as Alternative 3 and would be minor.

4.3.10.5. Sub-lethal Effects of Harvest Under Alternative 5

NMFS has used the identical approach for evaluating the sub-lethal effects of Alternative 5 as that used for Alternatives 2 - 4. The approach is probabilistic and should be considered in terms of an estimated average mortality rate equivalent that could occur over time and as a result of many different animals being exposed to the same type of activity or disturbance. The estimated number of mortality equivalents for each activity and age class are totaled to get an overall estimate of the lethal risks to animals for the scope and type of sub-lethal effect as a result of the harvest of up to 4,902 male pups and juveniles.

Both pups and juvenile fur seals would be harvested under Alternative 5. This assessment considers the two extremes: up to 4,902 male pup fur seals would be harvested over 104 days, or up to 4,902 juvenile males would be harvested over 33 days. The upper number of pups disturbed under a harvest of 4,902 pups: (2*4,902) + (60*104) = 9,804 + 6,240 = 16,044. If 4,902 pups are harvested, disturbance to juveniles attributed to the harvest of 4,902 pups under Alternative 5 would be: (1.15*4,902) + (50*104) = 5,637 + 5,200 = 10,837. No pups would be disturbed during the juvenile harvest. The upper number of non-pups potentially disturbed under Alternative 5 would be: (1.15*4,902) + (50*33) = 5,637 + 1,650 = 7,287.

The mechanisms for sub-lethal effects under Alternative 4 would be identical to those analyzed and described for Alternatives 2 through 4 including the mechanisms of injury from capture and restraint to identify the sex of pups prior to the harvest of males.

4.3.10.5.1. Juvenile Harvest

Neither pups nor adult females would experience sub-lethal effects under the harvest of juveniles because they are not typically found in the hauling grounds at the time of year when the juvenile male harvest occurs. Therefore, there is no assessment for sub-lethal effects to pups and adult females for Alternative 5. Sub-lethal effects to juvenile females that may inadvertently haul out in these harvest areas may exist, however the level of disturbance and resultant equivalent mortality is unknown. The number of females

accidently taken during the subsistence harvest since 1985 is 69; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are negligible.

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last less than two hours and would be relatively infrequent (on average 9 harvests per year over the last decade). During any particular harvest approximately 25 to 30% of the juvenile male fur seal population is onshore at any one time during the breeding season (Gentry 1981), but only one hauling ground of the 20+ where seals are present is harvested on any particular day. Fur seals incidentally harassed during the harvest are most likely to experience a small change in their annual energy budget, which we categorize as a sub-lethal effect.

As described previously, northern fur seals displaced from their preferred habitats by humans return to those habitats after the humans have departed or are no longer detected by those returning seals. The sub-lethal effects of the juvenile male harvest are well understood because of the long history of commercial harvests and research. The magnitude of the sub-lethal effects on non-pups not harvested during the harvest round-ups under Alternative 5 if all 4,902 juvenile males were harvested is estimated as the equivalent of 1.24 additional mortality equivalents, Table 4.3-8.

Table 4.3-8 Sub-lethal Effects of Alternative 5 (Harvest of 4,902 Juveniles)

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 5 harvest 4902 male Juveniles harvested during 33 harvests	Pups	0	Observed mortality during activity			0.00001	0	0
			Alert response	1	0	0	0	
			Enter water	0.01	0	0.001	0	
			Injured during disturbance	0.001	0	0.05	0	
	Non-pups	7,287	Observed mortality during activity			0.00008	0.58296	1.23879
			Alert response	1	7287	0	0	
			Enter water	0.8	5829.6	0.0001	0.58296	
			Injured during disturbance	0.0005	3.6435	0.02	0.07287	

4.3.10.5.2. Pup Harvest

NMFS and ACSPI would continue to conserve the northern fur seal population by protecting female fur seals from harvest, minimizing their exposure to incidental sub-lethal effects from harvesting, and balancing the ability of the Alaska Native residents to meet their subsistence needs for northern fur seals.

Sub-lethal effects under Alternative 5 are identical to those described for Alternatives 2 - 4. Under Alternative 5, NMFS and ACSPI would work together to identify, describe, and implement best harvest practices, which would minimize repeated harassment of previously harvested sites by scheduling repeated harvests at the same site only after consideration of non-harvested sites. This approach would allow those females displaced by the harvest to reunite with and suckle their young without being disturbed before they depart on their subsequent foraging trip.

The estimated maximum additional mortality for quantifying the sub-lethal effects of harvesting 4,902 pups would be about 3.07 additional fur seal mortalities (1.23 male pups and 1.84 non-pups) (Table 4.3-9). The sub-lethal effects on adult females and males of the Alternative 5 would not result in a detectable change in reproduction.

Alternative 5 overall sub-lethal effects are greater than all other alternatives based on the greater harvest numbers (4,902; 50% PBR) and the short harvest period for the juvenile harvest (33 days).

Table 4.3-9 Sub-lethal Effects of Alternative 5 (Harvest of 4,902 Pups)

Activity	Age class	Animals potentially exposed	Type of effect	Estimated proportion of animals affected	Predicted number of animals affected	Estimated mortality rate per affected animal	Predicted mortalities (number of animals)	Mortality subtotal for activity by age class
Activities involved in the conduct of Alt. 5 harvest 4902 male pups harvested during 104 harvests	Pups	16,044	Observed mortality during activity			0.00001	0.16044	1.12308
			Alert response	1	16044	0	0	
			Enter water	0.01	160.44	0.001	0.16044	
			Injured during disturbance	0.001	16.044	0.05	0.8022	
	Non-pups	10,837	Observed mortality during activity			0.00008	0.86696	1.84229
			Alert response	1	10837	0	0	
			Enter water	0.8	8669.6	0.0001	0.86696	
			Injured during disturbance	0.0005	5.4185	0.02	0.10837	

4.3.10.5.3. Geographic Extent of Sub-Lethal Effects

As described for Alternative 2 - 4, pups also exhibit the behavioral tendency to return to a site within a few hours (*i.e.*, do not show long-term displacement as a result of harassment) as exhibited by the ability of researchers to capture hundreds of fur seal pups from the same location by waiting unobtrusively after the initial captures. The initial geographic extent of effects would be greater than Alternatives 2 - 4 because of the greater harvest allotment; however, the effects of harvest would be distributed across more locations and a longer period of time for pup harvest (104 events). This would mean that fewer seals would be harvested at each location and there would likely be longer intervals between harvests at specific locations.

The condensed time period for juvenile harvest (33 events) would have moderate effects on the juvenile population if all 4,902 juveniles were harvested. This would mean that greater seals would be harvested at each location and there would likely be shorter intervals between harvests at specific locations.

As with Alternatives 3 and 4, Alternative 5 would prohibit any subsistence harvest or hunting at breeding locations determined to be at risk of reaching unsustainable population levels; incorporating measures designed such that proposed harvest would not significantly impact northern fur seals at the population level or result in localized reductions in productivity within individual rookery sites. The geographic extent of the effects of Alternative 5 is greater than all other alternatives and would be moderate.

4.3.11. Sub-lethal Effects of Hunting

In order to evaluate potential sub-lethal effects of hunting, it is important to understand the hunting method that is likely to be used on St. Paul. Shooting marine mammals from vessels on the water can be very unsteady, even in calm seas. The hunting season proposed under Alternatives 2 and 3 would occur during winter months (*i.e.*, January through March or May) when the ocean is frequently rough and stormy (Table 4.3-10). Therefore, hunting seals from skiffs or boats is not likely to occur. One contemporary method of hunting that is more likely involves hiding in the rocks along shore and waiting for fur seals to pass by. Hunters then surprise the seal by shooting it in shallow water before it notices the hunter's presence. After shooting the animal from shore, the hunter may use a kayŭx on a hand line thrown from shore to retrieve the kill. Hunters may also wait for the tide to wash the animal ashore. This method is currently used on St. Paul and in other coastal Alaska regions for hunting sea lions (Haynes and

Mishler, 1991). According to Haynes and Mishler (1991), sea lion hunting locations on St. Paul id both weather dependent, as well as reliant on available transportation to sites. For example, although Northeast Point is accessible by road, the road is often closed during winter months because of drifting blowing snow. Other modes of transportation to hunting locations may include snow machines, all-terrain vehicles or walking but as with trucks or skiffs depend on weather conditions. Hunting sea lions on St. Paul is typically conducted by individuals or small groups (*i.e.*, 2 to 3 men).

Considering these methods of hunting, the potential for sub-lethal effects would likely result from:

- Presence of humans near haulouts or rookeries;
- Transportation noise such as from trucks, snow machines or skiffs; and
- Gunshots fired at targeted animals.

The potential impacts from the presence of humans during seal harvests is described under the previous section. While there may be some similar disturbance effects during hunting, there are distinct differences as follows:

- Hunters purposefully aim to be concealed so animals do not move away or startle. Therefore, walking around or through haulouts or rookeries would likely be limited;
- Seals are not herded into groups as they are during a harvest; and
- The majority of the proposed hunting seasons (Alternatives 2 and 3) would occur during winter months (*i.e.*, before June) when most animals are at sea and are not congregating on shore.

Table 4.3-10 Number of Assumed[1] Hunting Events Under Each Alternative

	Alternative 1	Alternative 2[2]	Alternative 3	Alternative 4	Alternative 5
Sub-Adult / Juvenile Harvest Season	Jun 23 – Aug 8	Jan 1 – May 31	Jan 1 – Mar 15	Jan 1 – May 31 & Jun 23 – Aug 8	Jun 23 – Aug 8
Number of Hunting Events for Sub-Adults / Juvenile (total per year)	0	109	54	0	0

[1] – It is assumed that for each week of the hunting season, approximately 5 of those days would be spent hunting and that only one animal would be killed per day.
[2] – Hunting would likely occur during the winter season only because of the desire to harvest pups June 23 – December 31. Therefore, the analysis assumes hunting would occur between January 1 and May 31.
[3] – Hunting prohibited under Alternatives 1, 4 and 5.

Disturbance from hunting activities could cause physical and physiological effects in northern fur seals that could range from temporary alterations of behavior, abandonment of haulout sites, injuries or subsequent mortality after being injured (stuck and lost), inability to forage normally, or reproductive failure. The intensity of response to disturbance can vary according to numerous physical factors and individual condition of the animals. Alternatives 1, 4 and 5 do not have a hunting component, and would not contribute to any hunting-related disturbance and, therefore, there would be no sub-lethal effects associated with hunting. Alternatives 2 and 3 represent an increasing scope and intensity of contributed disturbance or injury from hunting. However, because the population-level effect of disturbance from these alternatives is unknown, their contribution to the sub-lethal effects is also unknown.

Data from a 15-year observational database for northern fur seals between January and May are provided in Table 4.3-11. The data are broken down by probability of sighting at each location by winter month (Table 4.3-12).

Table 4.3-11 15-Year Account of Northern Fur Seals between the Months of January and May

Location	January	February	March	April	May	Total Observed
Northeast Point	15		1	--	235	251
Reef	55	45	13	262	154	529
Tolstoi/Zapadni	220	4	--	14	212	450
Polovinas	--	--	1	2	17	20
Southwest Point	--	--	2	--	3	5
Village Cove	--	--	--	1	5	6
Lukanin/Kitovi	--	--	--	--	18	18
Total Observed	**290**	**49**	**17**	**279**	**644**	**1279**

Source: P. Lestenkof.

Table 4.3-12 Probability of Sighting a Single Fur Seal Each Day Between January and May

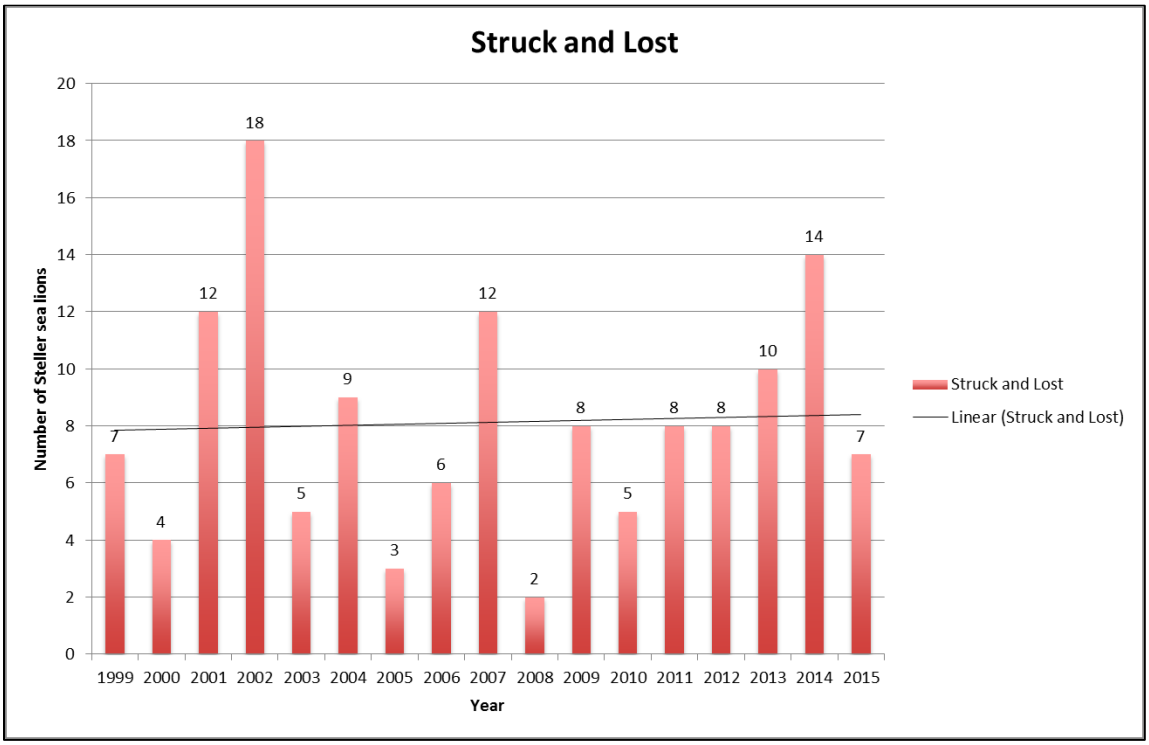
Location	January	February	March	April	May
Northeast Point	3%	--	<1%	--	51%
Reef	12%	11%	--	58%	33%
Tolstoi/Zapadni	47%	1%	--	3%	46%
Polovinas	--	--	<1%	<1%	4%
Southwest Point	--	--	--	--	1%
Village Cove	--	--	--	<1%	1%
Lukanin/Kitovi	--	--	--	--	4%

As a precautionary measure, this analysis assumes that seals struck result in mortality. This is a worst-case scenario required for the analysis, and not an assertion that all strikes from subsistence harvests result in mortalities. As firearms have never been permitted for northern fur seal subsistence harvests on St. Paul Island, data on struck and lost rates have been derived from data on pelagic killing of seals (pelagic sealing) during the commercial harvests and have been calculated at approximately 26.8% (R. Towell, Person Comm., December 17, 2015). As described in Section 3.9.3, while pelagic sealing occurred between 1875 and 1910 and then again between 1957 and 1974, data on struck and lost estimates are only available for 3 of those years (Japan 1983; Russia 1982; 1983; reported in NPFSC 1984). Data from Steller sea lion subsistence harvests on St. Paul have also been reviewed and are summarized in Table 4.3-13 (P. Lestenkof Person Comm., February 2, 2016), struck / lost rates are provided in Figure 4.3-3 (P. Lestenkof Person Comm., February 2, 2016). Over a 16-year period between 1999 and 2015, hunt struck and lost rates for St. Paul Steller sea lion subsistence hunting using firearms averaged 32%, with an average loss of 8 animals per year. It should be noted that struck and lost rates may be under-reported and therefore these data may be biased. Struck and lost rates for females are assumed to be zero based on tagging data between 2003 and 2010, which shows that no females were found within 100 nm of St. Paul Island between January and May (see Figure 3.2-2 in Section 3.2).

Table 4.3-13 Estimated Subsistence Takes of Sea Lions by St. Paul Hunters, 1999 - 2015

Year	Retrieved	Struck and Lost	Total Takes
1999	12	7	19
2000	12	4	16
2001	12	12	24
2002	18	18	36
2003	13	5	18
2004	9	9	18
2005	19	3	22
2006	20	6	26
2007	22	12	34
2008	20	2	22
2009	18	8	26
2010	15	5	20
2011	24	8	32
2012	16	8	24
2013	24	10	34
2014	21	14	35
2015	17	7	24
Total	292	138	430
	68%	32%	25

Figure 4.3-3 St. Paul Steller Sea Lion Struck / Lost Estimates 1999 - 2015



4.3.11.1. Sub-lethal Effects Due to Hunting Under Alternative 2 (Preliminary Preferred/Petitioned Alternative)

The proposed season for Alternative 2 is January 1 – May 31 for a total of 109 days. During this period, up to 2000 juvenile northern fur seals can be taken by hunting. The reader may ascertain from Table 4.3-13 that 2,000 animals have not been observed during the Jan 1 – May 31 timeline in the cumulative 15-year observation period on St. Paul. Therefore, the likelihood of 2,000 juveniles being lethally taken by hunting in a single year is very small. Based on available data, a rough estimate of the maximum number of animals present and available for hunting over a 109-day hunting season, provided that hunters are able to reach every location every time every day, would be 85 animals. Based on the St. Paul Steller sea lion subsistence hunting data (see Table 4.2-3 above), a total of 32% seals struck would result in 27 animals lost. Sub-lethal effects from disturbance related to hunting would impact at most, the 85 animals likely to be available during the hunting period if all animals were disturbed and none taken by lethal means.

4.3.11.2. Sub-lethal Effects Due to Hunting Under Alternative 3

The proposed season for Alternative 3 is January 1 – March 15 (54 days) and only at Vostochni and Morjovi, during which up to 500 juvenile northern fur seals could be taken by lethal hunting. These two rookeries are located at Northeast Point. Based on data presented in Table 4.2-3, the number of animals observed at Northeast Point between January 1 and May 31 over the 15-year observation period does not even approach 500 animals. Therefore, the likelihood of 500 juvenile being lethally taken by hunting in a single year is very small. Based on the observation data, if seals were hunted over a 54-day hunting season and assuming hunters were able to reach every location every time every day, only one animal would be struck and lost. Based on St. Paul Steller sea lion subsistence hunting data, if 32% of seals hunted were struck, it would result in a maximum of 1one animal lost. Sub-lethal effects from disturbance related to hunting would impact at most the one animal available during the hunting period if the animal was disturbed and not taken by lethal means.

4.3.12. Consideration of Whether the Subsistence Harvest is Humane and Not Wasteful as Described in the MMPA

NMFS determined that Section 105(a) of the FSA is applicable to the subsistence harvest regulations of northern fur seals and uses the MMPA definition of *subsistence use* by Pribilovians in the resulting regulations only permitting handicraft articles to be made if the marine mammals were initially taken for consumption (50 FR 27914, July 8, 1985). The subsequent depleted listing of the Pribilof stock of northern fur seals in 1988 did not change the applicability of 105(a) of the FSA and definition of subsistence uses in the harvest regulations of northern fur seals (53 FR 17888, May 18, 1988). Alternatively, Alaska Natives are exempted from the "take" prohibition in the MMPA under Section 101(b) if the taking of marine mammals is: (1) by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or Arctic Ocean for subsistence, or (2) for the purposes of creating and selling authentic native articles of handicraft and clothing, and (3) in each case, not accomplished in a wasteful manner.

Public comments continue to question whether the proposed new subsistence use method(s) are humane and not accomplished in a wasteful manner. Whether the northern fur seal harvest is being accomplished

in a wasteful manner has been a divisive and complicated topic to resolve. In addition, whether the method used to meet the subsistence needs of the Pribilovians is humane is also relevant to this analysis since a new method (hunting with firearms) is being proposed for use in Alternatives 2 and 3. The method of conducting the subsistence harvest of fur seals on the Pribilof Islands was developed during the commercial harvest period and is referenced in the regulations as the traditional method. Under Alternatives 1, 3, 4 and 5, regulations would include that no fur seal may be taken except by experienced sealers using the traditional harvesting methods, including stunning followed immediately by exsanguination. Alternative 2 proposes to harvest seals using traditional methods but would manage this aspect through co-management rather than specifying this provision through codified regulations.

The commercial harvest method used by NMFS was independently reviewed and verified by a panel of veterinarians to be the most humane and least disruptive method possible (50 FR 27914, July 8, 1985), while maximizing retrieval of tens of thousands of seal pelts annually. The commercial harvest method of rounding up sub-adult male seals from the hauling grounds has also been adapted and used regularly for current research on entanglement and vital rates. Congress amended the MMPA in 1994 to create the opportunity in Section 119 to cooperatively manage subsistence use of marine mammals, and ACSPI and NMFS have institutionalized that section by signing their agreement in 2000. Changing the regulations to allow for another method of subsistence use that is less labor intensive (*i.e.*, using firearms) has resumed concerns about whether alternative harvest methods or hunting are humane and not wasteful. These issues are discussed in detail in the following sections.

4.3.12.1. Interpretation of the Term "Wasteful" Take

One of the comments received during scoping for this SEIS questioned whether

> *…the proposed methods of conducting the kill [under the Petitioned Alternative] may result in unsustainable levels of impact to this declining species. Further, it is not clear that the methods that would be used meet the [MMPA] requirement that take must not be conducted in a wasteful manner or that the methods of take will be humane…*

Regulations require that the harvests are not accomplished in a wasteful manner. However, there is no consistent definition or interpretation in the statute specific to each species or subsistence use area as to what a "wasteful" manner would be. Although the interpretation of "wasteful manner" is fundamental to current management of the Alaska Native harvest of northern fur seals, and other subsistence species, waste has consistently been inadequately addressed and poorly clarified (Robards and Joly 2015).

NMFS promulgated regulations defining "wasteful manner" that included acceptable language, requiring methods that ensure the capture, killing, and a reasonable effort at retrieval. A "wasteful manner" for NMFS includes:

> *"…any taking or method of taking which is likely to result in the killing of marine mammals beyond those needed for subsistence, subsistence uses, or for the making of authentic native articles of handicrafts and clothing, or which results in the waste of a substantial portion of the marine mammal."*

NMFS explicitly addressed "wasteful manner" with regard to harvest of fur seals on the Pribilof Islands in Alaska (58 FR 42027, August 6, 1993). The subsistence harvest has been monitored by a NMFS observer who has been able to assess visually if the harvest is conducted humanely and not in a wasteful manner. In 1991, NMFS was sued by the Humane Society of the United States (Humane Society), which argued that "adequate seals have been taken to satisfy subsistence needs and the seals taken to date have been taken in a wasteful manner." At that time, the court found that NMFS' use of direct observation of the manner of the harvest and the salvage of required parts, "was entirely appropriate" for making its assessment that the harvest was not accomplished in a wasteful manner. The Humane Society continued to comment that the harvest levels had been established at excessive levels, and were being conducted in a wasteful manner due to allowance of a specific butchering technique referred to as the "butterfly" cut (58 FR 42027, August 6, 1993).

NMFS provided further evidence from data collected from sampling and weighing carcasses during the harvest that the "butterfly cut" represented utilization of a substantial portion of the edible meat and that Humane Society claims of waste of harvested fur seals by Pribilovians were exaggerated (58 FR 42027, August 6, 1993). NMFS continued to contract an independent harvest observer through 2014. Those harvest reports (Spraker 1987 – 2014 https://alaskafisheries.noaa.gov/pr/fur-seal) annually assessed that the harvest was humane and not accomplished in a wasteful manner. NMFS, through co-management with ACSPI and the harvesters, determined that the independent harvest monitor contract was no longer needed. Therefore, in 2012 training was initiated to transition responsibility from NMFS to ACSPI for continuing to collect relevant data on environmental conditions, body temperature of harvested seals, number of male and female seals harvested at each location, harvest duration, incidence of hyperthermia or other sources of accidental mortality previously collected (Lestenkof *et al.* 2014; 2015). In addition, ACSPI reports and responds to seals entangled in marine debris, records, and reports flipper tagged seals, measures standard length of harvested seals, and supports tissue sampling requests from researchers during the subsistence harvest. In 2015, as in previous years, to ensure the harvest continues to be conducted humanely and not in a wasteful manner, ACSPI canceled harvests due to high ambient temperature and high body temperatures of harvested seals.

NMFS has also addressed aspects of what is a "wasteful manner," while updating regulations pertaining to subsistence whaling in Alaska. NMFS considered the term "wasteful manner" to include the use and waste of whale products after landing and butchering. However, it expressed the need to maintain a wide scope on how parts are distributed within communities, including through barter, gifting, and trade, as a whaling crew would not be able to consume an entire whale on their own. In other words, NMFS expects parts to be utilized, not just salvaged, and those parts may be distributed widely because they exceed what is needed by a hunter or hunting crew (summarized by Robards and Joly 2015).

To carry out the subsistence harvest, a crew of three to five people typically walk or crawl from the end of the road system into fur seal resting areas to surround the seals and prevent their escape into the water. Once surrounded, the crew slowly herds the seals inland away from the area previously occupied to avoid field butchering in areas of accumulated feces on the hauling grounds. Crews try to be as close as practical to the end of the road system to minimize transport of the meat and other non-edible portions over long distances. The distances over which seals are herded range from 100 to 500 m on St. Paul Island. No firearms have been used during the fur seal subsistence harvest. Death during the subsistence

harvest is accomplished in the same manner established during the commercial harvest, which included clubbing and severing the aorta to ensure humane death (Keyes 1977; Stoskopf 1984). There are no reported or observed cases on St. Paul of a near-lethal strike where a clubbed seal became lost during the subsistence harvest and later found dead at another location. This is also referred to as a seal "struck and lost".

The lack of struck and lost seals is a function of a controlled harvest process. The seals herded from the beach to the inland harvest area are separated into smaller groups of fewer than 20 and surrounded by the harvesters. Any seal chosen by the harvester is either missed and the seal moves immediately, or it is struck with the club in the head or neck, becomes stunned and immediately collapses. When the chosen seals have been stunned, the remaining seals are allowed to escape at their own pace towards the water. At this point the stunned seal may be struck again depending on involuntary muscle contraction to ensure harvester safety prior to severing the seal's aorta. Typically for each individual seal the interval between stunning and exsanguination by severing the aorta takes about 30 seconds to a few minutes at most. Once the seal stops bleeding it is skinned and butchered for consumption. This harvest process results in a much targeted fur seal subsistence harvest, where the seals themselves are the only animals affected. There is no potential for subsistence harvests to affect habitat, seabirds, or harass or accidentally capture other marine mammal species. There are no instances of such effects to other species or habitats on St. Paul during harvest monitoring by NMFS or NMFS representatives.

On St. George Island in 2014 and 2015, the subsistence harvest of pups occurred from September 15 through November 30 under the regulations at 50 CFR 216.72 (d)(6)-(11). The "traditional" harvest method has been adapted from the sub-adult male harvest to work for pups. The subsistence harvest method includes a round-up by several people to prevent their escape to the water, followed by herding to a separate area for handling, killing, and butchering. There are three main differences between the implementation of the pup harvest in the autumn and sub-adult male harvest in the summer. The first difference is that pups are found concentrated on land at different locations and closer the water than sub-adult males. Second, is that pup congregating areas can include mixed-ages and both males and females. Pups can also occur exclusively with only pups. Sub-adult males are found exclusively with other males during the summer, but comingle with females in the autumn on land. Third, pup movement and behavior on land is different from sub-adults. Pups tend to be more active, and when disturbed they congregate and tend not to move, or attempt to escape in all directions. Sub-adults tend to rest while on land or are active in small groups of less than 5, and when disturbed they tend to congregate and move together in one direction. Large boulders and logs on the beach tend to be impediments to pup movement, whereas older seals can escape over such barriers. Once rounded up, the harvest of pups has included the handling and sexing of all pups prior to stunning. Female pups and pups that cannot be positively confirmed as males are allowed to escape. The remaining pups are then harvested similarly to sub-adults in the summer, and field butchering proceeds similarly.

Scoping comments questioned whether the use of firearms to shoot fur seals at a distance (during the proposed hunting season from January 1 – May 31) is humane, given the potential for animals being struck and lost, perhaps escaping into the sea to die. The use of firearms on St. Paul Island to take fur seals for subsistence uses has been prohibited during the season established under the regulations; however, Steller sea lions have been hunted with firearms on the island for decades. Historically fur seals

were hunted with firearms throughout the Aleutian Islands including the Pribilof Islands, and in Southeast Alaska. NMFS distinguishes "hunting" as an individual killing specifically fur seal(s) from some distance while the seal rests on land or at sea (NMFS 2014a).

The MMPA places a strong emphasis on the humane treatment of marine mammals. The term "humane" is defined to mean "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved" (16 U.S.C. §1362 (4)). Pribilovians currently use firearms to hunt Steller sea lions and harbor seals during the winter and early spring; hunting fur seals at the same time of year would be consistent with that practice.

4.3.12.2. Co-Management as a Means to Continue Humane, Non-Wasteful Take

NMFS entered into a Co-Management Agreement (Agreement) with the ACSPI under Section 119 of the MMPA in 2000. This Agreement is specific to the conservation and management of northern fur seals and Steller sea lions on the Pribilof Islands, with particular attention to the subsistence take and use of these animals. NMFS has worked with St. Paul to develop and implement subsistence management plans for the purpose of consistency with the 1985 fur seal harvest regulations and their subsequent revisions. The ACPSI and TDX have been significantly involved in the harvest implementation and management since 1985 and monitoring since the early 2000s. The subsistence harvest monitoring and management process developed through co-management has advanced the harvest performance beyond the regulations by including temporary harvest suspension and termination if five and eight females are killed, respectively. In addition, ACSPI developed their fur seal harvest management plan in 1999 and has revised it numerous times to continue to ensure the harvest is humane and not accomplished in wasteful manner. NMFS intends to advance the co-management process while also ensuring the harvest continues to strive to meet ACSPI's subsistence needs, is sustainable in a rapidly changing climate, is humane, and is not accomplished in a wasteful manner. This would ensure that NMFS and ACSPI's efforts are aligned consistently with the subsistence regulations, the Co-Management Agreement, and conservation of northern fur seals.

The tenets of co-management specifically address non-regulatory restrictions, monitoring plans, suspension provisions, communication, and reporting to ensure both hunting and harvesting of marine mammals for subsistence purposes can improve performance and minimize effects more cooperatively and expediently. To ensure that marine mammals are conserved for subsistence and other uses, the concept of co-management specifies (as do the Agreements) that there needs to be an action plan that includes means for accurately monitoring the number of animals harvested each year, the age and sex composition of those harvested, and the condition of animals taken in the harvest no matter what method the harvest. The Annual Action Plans also include an assessment of take levels, composition of take, and harvest practices and their influence on population health, measures to encourage the development of local or regional harvest management plans that incorporate local practices to ensure that animals are used for subsistence in a sustainable and non-wasteful manner.

NMFS and the ACSPI plan to implement a subsistence harvest review process to be overseen by ACSPI to develop harvest monitoring and allocation plans intended to minimize sub-lethal effects to seals not harvested, maximize detection and avoidance of females, prevent wasteful taking, and make in-season

allocations among the age groups and locations to be harvested. Under Alternative 2 (Preliminary Preferred/Petitioned Alternative), the potential new hunting period from January 1 – May 31 would allow the annual take of juvenile male fur seals using firearms. Concerns about whether this new method would result in "inhumane or wasteful take" relate to the likelihood of animals being struck and lost. The MMPA definition describes that a subsistence user must make "a reasonable effort to retrieve the marine mammal" in order to ensure they are not hunting in a wasteful manner. Therefore, jointly agreed-upon measures would be developed, which would apply to hunting as well as. As a result, NMFS expects that best hunting practices would be identified based on experience from current Steller sea lion hunting practices, and additional experience gained during the first years of legalization.

The Co-Management Agreement would provide the foundation for ACSPI and NMFS to develop the best hunting and harvest practices and improve them through an annual review process by the Co-Management Council. The best hunting and harvest practices would be useful in setting and sharing the necessary cultural and conservation precepts to ensure the community's ability to meet their subsistence need during each season. Mitigation of possible sub-lethal effects of the pup under Alternatives 2-5 would be accomplished by the development, implementation, and adaptive refinement of best harvest practices with the harvesters.

ACSPI would develop best harvest practices to include such things as a description of field measures intended to: 1) reduce impacts to lactating females; 2) ensure the detection of female pups; 3) distribute the harvest proportionally among all the breeding areas; 4) ensure full utilization of harvested pups, and 5) describe opportunities for coordination of sampling and measuring harvested pups during the harvest season. The best harvest practices would also consider communication methods to specify a harvest schedule, which would minimize repetitive disturbances at breeding areas and allow for NMFS to schedule monitoring during and after the harvest. Jointly agreed-upon measures for the pup harvest would include criteria such as: reducing human presence at harvest locations where adult females are present; choosing a harvest location where adult females are not present; or minimizing harassment or disturbance of seals downwind of harvest locations.

To effectively address the detection of female pups, harvesters would consider a minimum number of independent handlers who would sex every pup seal prior to the harvest, or the number of times a young seal must be sexed as male before it can be harvested. Alternatively, a best harvest practice could be to release all pups not positively identified as male on their first handling. Harvesters would maintain a record of previous harvest attempts to compare with future harvest locations where young have been observed to ensure the harvest is not concentrated at any location where male or female juveniles or adult female fur seals are present. The community and harvesters would identify their individual needs for meat and handicraft materials and any cultural preference for various parts of the young seal to encourage full utilization of the edible and non-edible portions of each harvested seal. ACSPI and NMFS representatives present at each pup harvest would share harvest plans and schedules in advance to ensure opportunities to sample tissues and measure pups in a manner that minimizes effects and is not disruptive to the harvest.

4.4. Direct, Indirect and Cumulative Effects on the Social, Economic and Cultural Environment on St. Paul Island

The results of the analyses of alternatives described in Chapter 2 are provided in this section and are based on the criteria described in Section 4.3.6 and Table 4.2-5, Socioeconomic and Cultural Impact Criteria.

4.4.1. Effects on Subsistence, Culture and the St. Paul Economy

Alaska Native Commission, Final Report (1994):

> *Subsistence should not be seen merely as an issue of fish and game management -because it is not principally about animals, their habitats, or their scientific management by public agencies. It is about human beings. In its distribution of limited resources among competing user groups, subsistence law is social policy on a grand scale. The way in which the current conflict over fish and game allocations is resolved will do more to influence the future economic and social condition of the rural areas of this state than any other issue.*

In 1990, Congress created the Alaska Natives Commission (a joint Federal-State Commission on Policies and Programs Affecting Alaska Natives) and in 1994, the Commission published a report about the social and economic status of Alaska Natives and the effectiveness of the policies and programs of the U.S. and State of Alaska that affect those communities. The analysis of subsistence harvest of fur seals on St. Paul Island incorporates many of the findings of the Commission's Final Report. Further, as stated in Chapter 1, one of the primary issues distinguishing the alternatives considered is the reliance on federal regulations (*e.g.*, Alternative 1) versus the development of an increased role of co-management in the development and monitoring of the Pribilof Island program for fur seals. A description of the subsistence culture and economy on St. Paul Island, and the effect of each alternative on the subsistence culture and economy on St. Paul Island, which is, in large part, dependent on the increased role of co-management in the program, are described in the following sections.

St. Paul Island has what is considered a "mixed" economy: a blend of traditional subsistence cultural and a Western, cash-based network. However, like many rural Alaskan villages, the St. Paul Island economy is relatively underdeveloped, providing few jobs and little cash. There are, of course, some exceptions to this when considering the community's involvement in commercial fisheries. Still, St. Paul Island is a community still in transition from government control since Congress ended the commercial harvest in 1984. During this period, the local halibut commercial fishery became a primary focus and later, through the CDQ program, the St. Paul Island economy became more diversified and somewhat more stable (North Pacific Fishery Management Council [NPFMC] 2015). More information about the CDQ program is presented in Section 3.9.2.

Despite the influence of the commercial fisheries, however, reliable access to subsistence protein sources are seasonal and highly uncertain limiting the stability and sustainability of St. Paul Island's subsistence lifestyle. It is difficult to quantify the importance of the subsistence way of life and the value of co-management for purposes of a NEPA analysis. The subsistence way of life in these communities has remained an important, consistent, and supporting factor in the personal, economic, and traditional

character of the Pribilof Islands. Subsistence is not simply the collection of food that can be replaced by a visit to a grocery store or the replacement of a pound of fresh fur seal meat for a pound of beef or pork or fish, or even other subsistence food. Subsistence connects community members and relatives through food sharing and cooperative hunting and harvesting efforts. Subsistence provides raw materials for the creation of crafts and other saleable items under federal law. Subsistence connects community members to their environment as an integral part of the system. A continued subsistence harvest preserves the traditional skills, cultural values and knowledge, and enables the passing of cultural values on to younger hunters. In terms of the St. Paul socioeconomic and cultural environment, increasing the opportunities for subsistence harvests of fur seals is a beneficial effect, and changing the opportunities for subsistence harvests could result in beneficial or adverse effects depending on the alternative.

The Co-Management Agreement provides the framework for full partnership and full participation in decisions affecting the management of marine mammals used for subsistence purposes on St. Paul Island. Participation and partnership between ACSPI and NMFS in decision-making regarding subsistence is built on trust and communication. In this analysis, we assume actions that build trust, and promote open and regular communication are beneficial to the subsistence community. Actions that could hinder communication, erode trust, or do not support a partnership between ACSPI and NMFS would result in adverse effects on the community.

A 1987 State of Alaska Subsistence Division study on annual subsistence harvests in 98 Alaskan communities gathered data collected between 1980 and 1987 on the taking of fish, land mammals, marine mammals and other species (*e.g.*, birds, plants, invertebrates, etc.), measured by the common statistical unit of “pounds” (dressed-weight), per capita, per year. The study reported two key conclusions:

1. Non-commercial taking of wild plant and animal species for food and other domestic uses continues to produce "significant economic value", particularly in the rural areas; and
2. This sector of the state's economy is generally not reflected government statistics on productivity and growth, and not evident in public policy (Wolfe and Walker 1987).

In this instance, “significant economic value” was defined based on the fact that 45 of the 98 communities surveyed reported wild food harvests through equaling or surpassing the Western U.S. standard for average annual per capita purchases of meat, fish, and poultry (222 pounds). In communities such as St. Paul, purchasing meat that is flown in from Anchorage is very expensive way to supplement a locally available source of protein such as northern fur seals or Pacific halibut.

The distance of St. Paul from larger population centers, along with the unpredictability of events such as storms or flight cancelations that impact the availability of store-bought food, underscores their reliance on local resources for subsistence. Even so, subsistence in Alaskan communities, such as St. Paul, is often a chosen practice for families who do have access to good wages (Kruse 1991). Thus, denying subsistence communities the opportunity to obtain wild resources would not only result in the deterioration of nutrition, public health, and social stability, but also a critical component of local culture. This combination of traditional and modern lifestyle helps to sustain cultural identity and provides a measure of economic security by providing a substitute for potentially unstable cash-based systems.

4.4.1.1. Alternative 1 No Action

Alternative 1 would maintain the same harvest range of 1,645 to 2,000 northern fur seals that has been in place since 1993. The status quo subsistence harvest is efficient (*i.e.*, 100s of non-breeding males can be separated from the population and specific seals can be chosen for subsistence use). The status quo subsistence harvest results in an average of about two females (0.2% of the annual harvest) killed accidentally each year during the harvest. This is considered negligible based on the criteria presented in Table 4.2-4. The level of accidental mortality due to hyperthermia is also negligible (0.2% of the annual harvest), supporting the determination that the harvest is not conducted in a wasteful manner. The methods for conducting the subsistence harvest of fur seals on the Pribilof Islands have been determined by NMFS and an independent veterinarian review during the commercial harvest period to be the most humane and least disruptive methods possible. In 1991, the court[7] found that NMFS' use of direct observation of the manner of the harvest and the salvage of required parts (as conducted under Alternative 1), "was entirely appropriate" for making its assessment that the harvest was being conducted in a non-wasteful manner.

The upper end of the harvest ranges provides a degree of flexibility regarding population changes and unanticipated food needs within the community during the season when fur seals are easily available on the Pribilof Islands. The process for exceeding the lower end of the range limits can be viewed as an unnecessary burden on the community during the end of the harvest season. The NMFS AA is required to suspend the harvest when the lower limit (1,645) of the harvest range has been reached. After a 48-hour suspension, the AA must determine if the subsistence needs of St. Paul have been met, or provide a revised estimate of the number of seals required to satisfy the Pribilovians' subsistence needs by August 8. NMFS analysis includes seal mortality up to 2,000, yet the harvest is required to be suspended for no more than 48 hours when the lower end of the subsistence need is reached. This procedural requirement has not been tested on St. Paul Island, and it is unclear how the AA would determine whether or not the subsistence needs have been met without questioning or surveying the needs of the community.

The harvest restrictions under the No Action Alternative do not allow the opportunity to obtain fresh fur seal meat and handicraft resources at any other time of year. Instead, St. Paul would continue to harvest sub-adult (non-pups less than 124.5 cm) male fur seals between June 23 and August 8 each year. Under Alternative 1, St. Paul's request to reinitiate the pup harvest in autumn and begin winter hunting with firearms to obtain fresh meat and resources for handicrafts in autumn would be denied. In light of the impact criteria based on food resource availability, access, utilization and stability (see Table 4.3-4), Alternative 1 would have an adverse effect on the subsistence needs of the community of St. Paul Island.

Alternative 1 restricts the harvest to a period from June 23 through August 8 and at only seven of the numerous hauling grounds, thus the regulations would continue to restrict food resource availability, access, and utilization. The community would not be allowed the opportunity hunt seals during the winter and spring, nor to harvest male pups as requested in the petition, an historic tradition dating back to at

[7] The Humane Society of the United States v. Mosbacher, No. 91-1915, 1991 U.S. Dist. LEXIS 11077, *4-5 (D.D.C. Aug. 5, 1991). Regulation of this harvest is particularly reflective of reducing utilization-related waste as opposed to loss during the hunt based on very controlled harvesting conditions where the possibility of escaped or wounded, but not killed animals is unlikely.

least the 1800s (see Section 3.9.4). The age and seasonal restrictions of the harvest would not allow the community an opportunity to obtain fresh fur seal meat when needed at other times of the year.

The No Action Alternative would also continue to maintain a size and age restriction, by prohibiting both the taking of seals greater than 124.5 cm in length and also prohibiting the taking of adult fur seals. There is no biological basis for using the length threshold of 124.5 cm. In fact, the 124.5 cm threshold is more closely tied to prices received for fur seal pelts during the commercial harvests. The price per size peaked at a 49-inch long skin (124.46 cm) and was the basis for killing a greater percentage seals up to the 124.5 cm threshold each summer (Scheffer *et al.* 1984). In the subsistence harvest on St. Paul, less than 1% of seals harvested have been greater than 124.5 cm. The current size restrictions create confusion among harvesters and the harvesters cannot and do not measure the seals prior to stunning them using the traditional harvest method found in 50 CFR 216.72(c)(2). Harvesters must make split-second decisions about which seals to harvest. During the harvest, stunners attempt to choose the smallest seals of those in each harvest round-up, therefore the sizes are relative to those in the group. Therefore, there are times when the smallest seal in a group is larger than 124.5 cm, but is harvested because it is relatively small. Male fur seals between age 5 and 6 years have broader shoulders, and longer, different colored guard hairs around their head and neck (Scheffer 1962). They also begin to behave differently by defending the space around them from all smaller and similarly sized seals (Gentry 1998). Sub-adult male seals regularly interact with one another directly and do not defend the space around them from other seals. For these reasons, harvesters can easily distinguish adult males by their physical characteristics and behavior versus attempting to adhere to a regulatory prohibition of less than 124.5 cm in size.

The public has expressed concern about whether changing the methods and restrictions to accommodate the subsistence needs of St. Paul is based on an unrealistic assessment of subsistence need and would result in decreasing the efficiency of the harvest (*i.e.*, result in unnecessary take). To satisfy the subsistence needs of the community, harvesters must try to obtain healthy fresh fur seal meat when seals are available and when individuals in the community have time to harvest. The timing of the fur seal harvest may conflict with earning wages through the few seasonal or full-time job opportunities available. The short fur seal harvest season under Alternative 1 No Action currently conflicts with the commercial halibut season. Thus, the No Action Alternative artificially forces individuals in the community to choose between earning a wage to pay bills (*i.e.*, for heating homes) versus participating in subsistence harvests of fur seals, which contribute to improved food security and have significant cultural and social value.

As described in Section 2.2, Alternative 1 would continue to have significant oversight and responsibility to manage the subsistence harvest through federal regulations as compared to allowing the community of St. Paul Island to manage the harvest through a more comprehensive co-management system, as under Alternative 2. The administrative burden associated with managing by regulations results in slower response to addressing community subsistence needs or changing environmental conditions that may affect the harvest. Under Alternative 1 regulations, harvest could only occur at the seven hauling grounds identified, limiting the flexibility of the community to meet their subsistence need to those specific areas of the island. Alternative 1 would include regulations that the harvest may be suspended if five females were accidentally harvested or terminated if eight females were accidentally harvested. Co-management would not change under Alternative 1, which could degrade trust between ACSPI and NMFS given that ACSPI's petition explicitly requested more responsibility be placed on the co-management system rather

than codified regulations. While some objectives of the co-management agreement would be met, the key action of the agreement to co-manage the harvest and make recommendations for appropriate changes to management measures would not be met. The effects extend across the entire Alaska Native community of St. Paul Island.

4.4.1.2. Alternative 2 (Petitioned / Preferred Alternative)

Alternative 2 (Preliminary Preferred/Petitioned Alternative) directly addresses the subsistence need of the St. Paul community expressed in their 2014 petition and is NMFS' preferred alternative. The petitioned alternative recognizes a formal request by the ACSPI to use co-management rather than federal regulations to restrict subsistence practices. Based on ACSPI's request, current harvest regulations would be modified to increase the opportunities for fur seal harvest by authorizing harvest at any breeding or resting area and by adding a hunting season January 1 through May 31 every year. During the hunting season, firearms would be a permitted method to pursue fur seals on land or in the water. The community would also be authorized to harvest fur seal pups during the extended harvest season. Alternative 2 would also remove the language in the current rule regarding the size limit (124.5 cm in length) of seals to be harvested. Instead, under Alternative 2, harvest regulations would state that seals up to, but not including the age of 7, could be harvested or hunted. The size restriction was included in the emergency rulemaking in 1985, and has been retained even though it was based on maximizing the market value of skins from the commercial harvest. In 1946, the government-marked skins in the field based on length, followed those skins through processing, and determined their individual sale price during the fur auctions held later that year. The analysis showed the highest cost return on skins ranged from 46 to 51 inches (117 to 129 cm). The price per size peaked at a 49-inch long skin (124.46 cm); therefore, this was the basis for killing a greater percentage seals up to the 124.5 cm threshold each summer (Scheffer *et al.* 1984). Under Alternative 2, Pribilovians have petitioned to remove this outdated size restriction from the regulation.

By allowing subsistence opportunities to range across the population of fur seals on St. Paul, the community would have greater resilience in meeting the demands of changing future environmental conditions to meet their subsistence need. The increased access to fur seals addresses both availability and utilization (see Table 4.3-4) of this important resource, thereby improving the stability or "food security" of the community in the long-term. By allowing harvest of pups, NMFS would acknowledge the cultural heritage of the community by legalizing an important subsistence practice and food preference for Priblovians.

Under Alternative 2 Option A, the co-management system would be responsible for suspending the subsistence harvest if five females of any age were killed or terminating the harvest if subsistence needs have been met or if 20 female seals have been killed. Under Alternative 2 Option B, these two stipulations would be codified in regulations and implemented by NMFS. Alternative 2 Option A directly addresses ACSPI's petition to have more responsibility for managing the harvest and could result in more timely response to changing conditions during the harvest than Alternative 2 Option B or Alternative 1. On the other hand, Alternative 2 Option B would provide more assurance that the harvest would be suspended or terminated if and when the specified levels of female mortalities occur. Subsistence harvesters would sex pups prior to harvest under Alternative 2 Options A and B; therefore, the likelihood that five female pups would be killed before harvesters and monitors would identify the mistakes is very small.

Alternative 2 proposes two seasons for obtaining fresh meat and that these seasons would be codified under federal regulations. The first season would occur June 23 through December 31, and is intended to allow the harvest of pups. As described in Section 3.9.4, the Aleut culture has a long history of harvesting pups for food. This change proposed under Alternative 2 directly addresses the community's petition and would result in beneficial effects for the community by reinstating a traditional harvest practice. During the second season, between January 1 and May 31, hunting male juvenile fur seals by firearms would provide community residents significantly more flexibility for obtaining fresh meat during winter months, when the chances of flight cancelations due to bad weather or storms is very high. As described in detail in Section 3.2.3, the chances of accidentally killing a female fur seal during this time of year are extremely low because they are not found on or near the island (see Figure 3.2-3). Allowing winter hunting would significantly reduce food costs for families whose cost of living is inflated due to the remoteness of St. Paul Island (see Section 3.9.8.1). Both Options A and B under Alternative 2 would improve food security and the stability and affordability of food resources on St. Paul Island.

Building an effective monitoring and co-management program to support changes considered in Alternative 2 is critical for successful implementation. The process begins with clearly defining program goals and objectives, partitioning the program into manageable but meaningful pieces, and developing management-oriented monitoring for each component of the program by the co-management partners (*i.e.*, ACSPI and NMFS). Under Alternative 2, NMFS would continue research to monitor the abundance, growth rates, vital rates, and overall status of the northern fur seal population. The St. Paul ECO Program and the harvesters/hunters via NMFS and ACSPI Co-Management Council would be more effective at addressing issues related to the implementation of, and effectiveness of, the fur seal subsistence harvest and hunt to meet the subsistence needs. Option A provides ACSPI with the highest level of responsibility for managing the harvest/hunt as harvest suspension and termination would not be codified under regulation; rather, these measures would be implemented through co-management. Option B proposes to codify these measures under regulation.

By design, local monitoring would include some level of 'trial and error' to determine the most effective means for monitoring. Monitoring plans are designed to detect changes in the effectiveness or implementation of the alternative and effects on the northern fur seal population. To monitor effects of an alternative at a population level, some combination of the NMFS research program and local research and monitoring would be needed. The monitoring data will inform decisions to adjust management measures over time using an "adaptive management" framework. To be effective, each component of the monitoring program should track progress toward conservation and management objectives, maximizing the opportunity to meet defined subsistence needs and objectives in a scientifically defensible manner while minimizing the risks to the resource (*i.e.*, northern fur seals).

The co-management subsistence monitoring program for Alternative 2 would focus on the balance of meeting the subsistence needs of St. Paul and conservation of the fur seal population. Under co-management NMFS and ACSPI, would define goals, objectives, and measures of success of the monitoring program. The program under Alternative 2 would be:

(i) Committed to scientific quality, incorporating scientific input and review at various levels (*i.e.*, programmatic, protocols, sampling design, analysis, and reporting);

(ii) Responsive to management needs, co-management principles, and traditional knowledge;

(iii) Require stakeholders the opportunity for meaningful input into the process; and

(iv) Committed to communication and creating an effective information feedback loop for shared decision-making by the co-management council.

Under Alternative 2, one of the key concerns is whether or not the use of firearms to shoot fur seals at a distance (during the proposed hunting season) meets the "not accomplished in wasteful manner" standard, given the potential for seals to be struck and lost (*i.e.*, potentially escaping into or lost in the sea to drown or die). The current harvest process under Alternative 1 does not result in animals being struck and lost; however, the subsistence use of Steller sea lions and harbor seals throughout Alaska, and on the Pribilof Islands, is accomplished by the use of firearms. Under Alternative 2 Options A and B, the monitoring of struck and lost during the hunting season would be a priority for the monitoring program until a struck-lost ratio can be estimated and incorporated into the total number of animals taken as part of the annual harvest.

Defining a specific monitoring approach at this point in the process would undermine the relationship between NMFS and ACSPI given that ACSPI has requested to co-manage (and monitor) subsistence use of fur seals within the Co-Management Agreement. ACSPI has taken the primary responsibility for monitoring and reporting the hunting of endangered Steller sea lions under Tribal Ordinance, and could add fur seal hunting to their current co-management monitoring. As a result, it may be determined that most monitoring of fur seal hunts would be consistent with that used for Steller sea lions. This would place a greater level of responsibility on ECO to expand the subsistence use monitoring program, including the traditional harvests of juvenile males, the harvest of male pups, and the hunting of fur seals during the winter season (January 1 – May 31). Over time, ECO and NMFS would cooperatively develop means to assess performance and continue to improve harvest and hunt effectiveness and conservation value. This form of "learning by doing" monitoring is similar to adaptive management (Berkes *et al.* 2000).

Under co-management, Alternative 2 Options A and B would institute conservation controls developed in partnership with the ACSPI and harvesters to minimize accidental female mortality and avoid wasteful take by regularly evaluating harvest and hunting methods and minimizing sub-lethal effects by assessing the humane harvest and hunting techniques in use. Best harvest practices based on experiences and methods developed by harvesters and NMFS would promote greater participation and local support in the harvest management process.

Alternative 1, the No Action Alternative, limits harvest to seven locations, irrespective of the stability or size of the breeding site. Alternative 2, the Preliminary Preferred/Petitioned Alternative, has beneficial effects on co-management because it supports trust in the partnership intended under co-management to balance the ability of the community to meet their subsistence needs with conserving the fur seal population based on the best available science. Alternative 2 Options A and B do not increase the number of fur seals that can be harvested for subsistence purposes on St. Paul, but adds flexibility by adding a new season, locations to improve opportunities for successful harvests, and honors the tradition of harvesting pups.

Beneficial effects on subsistence and co-management are likely to occur under Alternative 2. The Preliminary Preferred/Petitioned Alternative provides greater flexibility than the No Action Alternative and provides greater resiliency for the community to withstand dramatic or unanticipated changes to the environmental, social, and economic conditions on the island (see Impact Criteria for Food and Resources Stability in Table 4.3-4). Alternative 2 addresses the petition of the tribal government to reinitiate the pup harvest and winter hunting of fur seals, and institutes practical conservation controls to manage and minimize accidental mortality of females and prohibit harvests at rookeries where the annual pup production cannot sustain a harvest. In addition to fresh meat, the longer harvest period would allow for new resources to be obtained for creation of handicrafts, thus continuing a long cultural history on St. Paul Island. Increased co-management of the subsistence use of northern fur seals under Alternative 2 would use "feedback loops" to improve performance and effectiveness of measures to ensure the subsistence needs of the community are balanced with fur seal conservation. For example, under Alternative 2 co-managers will improve their understanding of the subsistence needs and overall condition of the fur seals while accounting for site-specific conditions, and re-visiting co-management measures after implementation and review of monitoring data by users to evaluate their effectiveness.

It is critical to restate, and more importantly understand, that the Alternative 2 would implement a subsistence use monitoring program that is, at its core, built on adaptive management with co-management. As such, the monitoring program would openly acknowledge a level of uncertainty about the outcomes of the management actions and the response of the resource (*e.g.*, northern fur seals) to co-management actions taken. However, under an adaptive management model, rather than a more restrictive regulatory model, management moves forward in a scientifically-based approach that involves monitoring and applying adaptive management actions over time that are based on near real-time reporting on their effectiveness. Alternative 2 Options A and B would promote more locally-based co-management of the harvest, with Option A providing slightly more flexibility than Option B in terms of when to suspend and terminate the harvest. Alternative 2 Options A and B would have major positive effects on food security, availability and stability.

4.4.1.3. Alternative 3

Alternative 3 incorporates elements of Alternative 2, but also includes certain regulatory controls to monitor the harvest and manage taking of female fur seals in a manner more restrictive than Alternative 2. Given that the ACSPI has requested to co-manage (and monitor) subsistence use of fur seals within the Co-Management Agreement, any alternative or framework predetermining a monitoring approach with the continued dominant role of the federal management as in Alternative 3, as compared to those actions managed under co-management in Alternative 2 (see Table 2.2-2), would be viewed negatively by ACSPI and could undermine the co-management process.

Under Alternative 3, there would be two seasons for taking up to 2,000 male seals (non-adults). The first season (January 1 through March 15) would authorize hunting up to 500 juvenile male fur seals with firearms on land only at Vostochni and Morjovi. The second season would allow harvest of up to 1,500 male pups between August 9 and December 31 from any area that could support a harvest up to once per week per site. Under Alternative 3, the harvest would be suspended if three female seals were killed; the harvest would be terminated if the subsistence need was met, take was determined to be wasteful and not

remedied or if five female seals were killed accidentally. In the regulations, the size restriction would also be removed and changed to read “seals up to 7 years” as under Alternative 2.

While Alternative 3 acknowledges the cultural significance of harvesting young seals by allowing the harvest of up to 1,500 pups, the season would be approximately 6 to 7 weeks shorter than under Alternative 2. This restriction would reduce the opportunity to obtain fresh meat and could result in only a minor beneficial effect on food security and stability. Additionally, the restriction to only allow hunting from two locations located on the northern end of the Island, far from the community, reduces the benefit of this alternative to meeting the community’s food needs. Therefore, some beneficial effects on subsistence and co-management under Alternative 3, as compared to Alternative 1 would occur; however, these benefits do not provide the flexibility or the ability of the community to withstand dramatic or unanticipated changes to the environment as does Alternative 2. The Co-Management Council would be given the responsibility to monitor accidental female mortality and to establish a harvest reporting system to ensure non-wasteful harvest, which could help foster trust. However, these effects would likely be minimized because most of the other management measures would be codified in regulations and managed by NMFS (*i.e.*, harvest locations, practices, suspension, and termination). Therefore, while Alternative 3 would improve availability, access, utilization and stability of the community’s food resource (namely by allowing harvest of pups and limited hunting during a second season), the effects of these actions would be a moderate benefit for the community of St. Paul Island.

4.4.1.4. Alternative 4

Similar to Alternative 3, the harvest range under Alternative 4 would include up to 500 juvenile males and 1,500 pups for a total potential harvest of 2,000 non-adult male fur seals. Three seasons would be allowed under this alternative as follows: January through May 31 and June 23 through August 8 for male juvenile (up to 7 years, excluding pups), and between August 9 and December 31, male pups could be harvested. Harvest could occur at any location that supports a harvest, but the use of firearms would be prohibited. Similar to Alternative 2 (Preliminary Preferred/Petitioned Alternative), harvest would be suspended if five females were accidentally killed and terminated if subsistence need had been met or 20 females were killed. However, contrary to Alternative 2, the harvest suspension would not be handled under co-management.

Alternative 4 is perhaps slightly more flexible than Alternative 3, and therefore, may provide a minor additional benefit due to the additional season allowed for harvesting juvenile male seals between June and August. It is difficult to determine how beneficial this additional season would be given that it would overlap with the Pacific halibut season. Windy weather days that are "unfishable" tend to be good sealing days (cooler temps due to wind result in a longer time window for harvest in the morning). However, rainy and windy weather days that are "unfishable" also tend to be bad sealing days because non-breeding seals vacate the land on rainy days. Under Alternative 4, the following would be codified under regulations: harvest range, seasons, conditions for suspending or terminating the harvest, areas that could be harvested, and method of harvest.

Alternative 4 would improve access, availability, utilization and stability of the St. Paul food resource by expanding the season during which seals could be harvested and would also allow harvest of pups, an

historical tradition. However, under Alternative 4, the roles and responsibilities of those responsible for the harvest continued to be managed and monitored in a large part under federal regulations, as compared to those actions managed under co-management (see Table 2.2-4). Overall, there would be less ownership allowed by the local Co-Management Council under this alternative as compared to Alternative 2, which could have negative consequences to co-management.

4.4.1.5. Alternative 5

Alternative 5 is based on the premise that the harvest need demonstrated by the community would be evident from the number of fur seals harvested annually. Therefore, between 2017 and 2019, the upper harvest limit of male pups and juvenile males (up to 7 years, excluding pups) could be up to 4,902 seals (*i.e.*, 50% of the 2013 PBR for St. Paul[8]). This follows the recommendations from the MMC and the Humane Society of the United States to base the subsistence range on the subsistence need demonstrated by the community in terms of the number of seals actually harvested in a year. There would be two harvest seasons: June 23 through August 8 for juvenile males only, and a second season for male pups August 9 through December 31, and no haul out could be harvested more than once per week. Alternative 5 prohibits the use of firearms.

Beginning in 2020, the 3-year harvest range (*i.e.*, 2020 to 2022) would be set based on the average number of reported seals harvested over the 2017 to 2019 period. Harvest range would continue to be established every 3 years based on the reported harvest levels from the previous 3-year period. As with Alternative 1, the regulations also prohibit the intentional (but not accidental) taking of sub-adult (juvenile) female fur seals. Alternative 5 would include suspension and termination provision within the regulations rather than through co-management, as with Alternatives 2 and 3. Harvest would be terminated if needs have been met or wasteful taking was not remedied or if 10 female fur seals were accidentally killed.

Alternative 5 would result in several beneficial changes compared to the No Action Alternative by basing the harvest solely on demonstrated need. It would not only increase the number of seals that could be taken but increase access and availability to fur seals as a food resource by allowing harvest of male pups during a second season through December. This could provide fresh meat for a longer period throughout the year, thereby minimizing the reliance on expensive and unreliable store-bought food. The potential to increase the harvest range in the first 3 years would be a major beneficial effect on food security.

In subsequent years the harvest range would be set on prior use rather than the community's subsistence need. Under this situation, the harvest range setting process is 'backward looking' (*i.e.*, what was the harvest the past 3 years) rather than 'forward looking' (*i.e.*, what will the community need this year) and could consistently reduce the harvest range after the initial 3-year period. Alternative 5 would likely undermine trust between the community and NMFS and erode the co-management partnership. Monitoring goals of the subsistence harvest under Alternative 5 would be consistent with those under previous alternatives to ensure a humane and non-wasteful harvest program; however, the harvest

[8] Based on the 2012 Stock Assessment Report and used as the basis for the St. George Subsistence Harvest SEIS (Allen and Angliss 2013).

monitoring results would be significantly influenced by the implications of the harvest range setting process. In so doing, there would be no mechanism to account for the socio-economic factors such as St. Paul's future food security. Alternative 5 is more similar to Alternatives 3 and 4, than Alternative 2, in that the federal government retains a large role in setting the harvest range, and managing and monitoring the harvest.

As described, similar restrictions on the harvest would remain in terms of ensuring harvest is humane and not wasteful, and to protect against accidentally killing females. Co-Management would establish a harvest reporting system (as under Alternatives 2, 3 and 4), placing additional responsibility in the hands of local people. The shared monitoring responsibilities of Alternative 5 (see Table 2.2-5) would generally be considered less desirable than monitoring under Alternative 2 to the community. However, Alternative 5 could result in notable and moderately positive effects for the community of St. Paul in terms of access and availability to the subsistence resource when compared to Alternatives 3 and 4. Alternative 5 would provide greater benefits to the community than the No Action Alternative.

4.4.1.6. Environmental Justice

According to 1997 CEQ guidelines, federal agencies must evaluate whether a proposed action would have a disproportionately high adverse impact on low income populations, minority populations or Indian tribes due to a proposed action (CEQ 1997). Analysis of potential impacts may rely on available demographic data from credible sources such as the U.S. Census.

In February 1994, President Clinton issued EO 12898 on Environmental Justice (1994), which requires the federal government to promote fair treatment of people of all races, so no person or group of people bear a disproportionate share of the negative environmental effects from the country's domestic and foreign programs. Fair treatment means that no population, due to lack of political or economic power, is forced to shoulder the negative human health and environmental impacts of pollution or other environmental hazards. Environmental justice means avoiding, to the extent possible, disproportionate adverse environmental impacts on low-income populations and minority communities.

A minority is any individual classified as American Indian, Alaska Native, Asian or Pacific Islander, African American, or Hispanic. A low-income person is a person with a household income at or below the U.S. Department of Health and Human Services poverty guidelines. A minority population and low-income population are defined as any readily identifiable group of minority or low-income persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed program, policy, or activity.

The analysis of environmental justice examines whether disproportionate, adverse human health or environmental impacts would affect minority and low income communities. As described in Section 3.9.1, the majority of the population living on St. Paul Island (82% in 2010) is Alaska Native. Therefore, the community qualifies as a minority population.

For the purposes of this SEIS, major impacts on the availability of northern fur seals as a food resource would raise environmental justice concerns. Under Alternative 1, no change to the status quo would occur and the community would be able to harvest up to 2,000 fur seals. Although the harvest periods and

restrictions on the age class of seals authorized for harvest would have minor to moderate negative effects on the St. Paul community. Continued restriction on the northern fur seal harvest would reduce access, availability, utilization, and stability of a critically important food resource. In addition, the cultural benefits including sharing practices, learning process for young harvesters/hunters, and valued cultural ceremonial events, would be stifled under this alternative.

Alternatives 2 through 5, in general, would provide increased opportunities for subsistence harvest of seals compared to Alternative 1 (No Action). While these alternatives vary in terms of harvest/hunting seasons, allowable methods and co-management aspects, they would each increase the access, availability, utilization, and stability of the local subsistence food resource. Therefore, none of these alternatives would result in environmental justice concerns for the St. Paul community.

4.4.2. Summary of Direct and Indirect Effects

4.4.2.1. Summary of Direct and Indirect Effects of the Alternatives on Northern Fur Seals

Table 4.4-1 provides a summary of potential direct and indirect effects of Alternatives 1 through 5.

Table 4.4-1 Summary of Potential Direct and Indirect Effects of the Alternatives

Direct / Indirect Effects	Alternative 1, No Action	Alternative 2, Petitioned	Alternative 3	Alternative 4	Alternative 5
Mortality					
Sub-adult / Juvenile males	Mortality of up to 2,000 sub-adult male fur seals	Mortality of up to 2,000 male fur seals, up to 7 years	Mortality of up to 500 juvenile male fur seals, up to 7 years	Mortality of up to 500 juvenile male fur seals, up to 7 years	Mortality of up to 4,902 male fur seals, up to 7 years The first 3 years
Male pups	Prohibited pup harvest		Mortality of up to 1,500 male pup	Mortality of up to 1,500 male pup	
Females	Mortality of up to 8 female fur seals	Mortality of up to 20 female fur seals	Mortality of up to 5 female fur seals	Mortality of up to 20 female fur seals	Mortality of up to 200 female fur seals
Summary of Effect on Population	Sub-adult male mortality 20% of PBR = **minor effect** Pup mortality **negligible effect** (no harvest) Female mortality 0.0008% of PBR = **negligible effect**	Juvenile male mortality 20% of PBR = **minor effect** Pup mortality 2% of annual pup production = **negligible effect** Female mortality 0.002% PBR = **negligible effect**	Juvenile male mortality 5-20% of PBR = **negligible to minor effect** Pup mortality 1.6% of annual pup production **=** **negligible effect** Female mortality 0.0003% PBR = **negligible effect**	Juvenile male mortality 5-20% of PBR = **negligible to minor effect** Pup mortality 1.6% of annual pup production = **negligible effect** Female mortality 0.002% PBR = **negligible effect**	Juvenile male mortality 50% of PBR = **moderate effect for the first 3 years then to be determined based on harvest setting process** Pup mortality 5% of annual pup production = **negligible effect** Female mortality 0.02% PBR = **negligible effect**

Direct / Indirect Effects	Alternative 1, No Action	Alternative 2, Petitioned	Alternative 3	Alternative 4	Alternative 5
Mortality					
Geographic Extent	**Moderate**, harvest would be distributed across seven specific breeding grounds	**Minor**, harvest and hunting would be distributed equally across all breeding grounds	**Minor** for the pup harvest, distributed equally across all breeding grounds; **Moderate** for hunting, distributed only at Northeast Point rookeries	**Minor**, harvest is distributed equally among all breeding grounds	**Minor**, harvest is distributed equally among all breeding grounds
Sub-Lethal Effects	**Minor effect**, 3,950 non-pup fur seals exposed to effects	**Moderate effect**, 12,220 pups and 9,150 non-pup fur seals exposed to effects	**Moderate effect**, 9,240 pups and 6,925 non-pup fur seals exposed to effects	**Moderate effect**, 9,240 pups and 14,500 non-pup fur seals exposed to effects	**Moderate effect** for the first 3 years, 16,044 pups and 7,287 - 10,837 non-pup fur seals exposed to effects

4.4.2.2. Summary of Direct and Indirect Effects on St. Paul Island

Table 4.4-2 provides a summary of potential direct and indirect effects of Alternatives 1 through 5 on the St. Paul subsistence community.

Table 4.4-2 Summary of Potential Direct and Indirect Effects of the Alternatives

Direct / Indirect Effects	Alternative 1, No Action	Alternative 2, Petitioned	Alternative 3	Alternative 4	Alternative 5
Food Security (availability, access, utilization and stability)	**Minor beneficial effect;** harvest continues but for short duration; pup harvest prohibited	**Major beneficial effect**; longer harvest season and pup harvest permissible (directly addresses ACSPI petition)	**Moderate beneficial effect**; longer harvest season and pup harvest permissible although hunting restricted to Northeast rookeries as compared to greater flexibility in Alternatives 2 and 4	**Moderate beneficial effect**; longer harvest season and pup harvest permissible although not as flexible as Alternative 2	**Major beneficial effect** due to increased harvest range, longer season and permitted pup harvest
Cultural Integrity and emotional wellbeing	**Negligible effect**; most actions would continue to be codified under federal regulation rather than co-management	**Major beneficial effect;** Option 2A incorporates the highest level of co-management; Option 2B incorporates many of the same co-management benefits but includes some additional regulatory controls	**Minor beneficial effect** due to increased responsibility under co-management		

The summary of direct and indirect effects of Alternatives 1 through 5 presented in Tables 4.4-1 and 4.4-2 provide the context to understand how these effects, in combination with other activities and events external to the proposed action, may result in the cumulative effects described in Section 4.4.3. Past, present and reasonably foreseeable future actions (RFFAs) are summarized in the following section followed by a summary of overall cumulative effects.

4.4.3. Cumulative Effects

Cumulative effects "…result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR 1508.7). These individual actions can have effects on a resource that are additive, antagonistic, or synergistic when considered together (*i.e.*, cumulative effect) acting on a particular wild resource (Crain *et al.*, 2008). The paucity of quantitative studies of cumulative effects in the wild ultimately limits our ability to draw accurate conclusions when evaluating direct and indirect effects of these stressors (MacDonald 2000; Crain *et al.*, 2008). The lack of studies of indirect effects of various human activities on northern fur seals limits our ability to make strong inference regarding cumulative effects of both direct and indirect effects of human activities. The population trend may be considered the best index of the cumulative effects on a species; however, the relative contributions of natural events and human actions to the population trend are often highly speculative in the absence of directed research on wild populations. This is a considerable problem with fur seals where each island breeding population appears to have different abundance trends (NMFS 2007a) and there is increasing evidence of within-island distinctions of "population units" (*i.e.*, Robson *et al.*, 2004).

This analysis, therefore, focuses on a checklist of direct effects as our long history of harvest research provides the best understanding of these stressors on fur seals. The incremental effects of fur seal mortality resulting from NMFS, State of Alaska, and international commercial fisheries management, marine mammal research, subsistence harvests, commercial fur seal harvests, fisheries bycatch, entanglement, and illegal activities have, and continue, to contribute to the cumulative effects on fur seals. There are a number of recent environmental assessments that describe federal actions in the Bering Sea that contribute to the incremental, cumulative effect of the alternatives considered on northern fur seals including the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b), Bering Sea Chinook Salmon Bycatch EIS (NMFS 2009), Steller Sea Lion and Northern Fur Seal Research PEIS (NMFS 2007b), Setting of the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands EIS (NMFS 2005), Steller Sea Lion Protection Measures Final EIS (NMFS 2014) and the Final SEIS for Management of the Subsistence Harvest of Northern Fur Seals on St. George Island, Alaska (NMFS 2014a). These discussions are incorporated by reference and relevant information from these documents is summarized or updated in Section 4.4.3.1 and Table 4.4-3.

In subsequent sections, we summarize the most likely actions, which in our judgement, may contribute to cumulative effects on the northern fur seal population on St. Paul Island. This approach is set in the context of a depleted stock, which is declining, but still numbers well over 400,000 individuals on St. Paul Island and are part of a worldwide population of about 1 million seals that genetically cannot be distinguished from other stocks. Similarly, we summarize those actions, which in our judgement may contribute to cumulative socio-economic and cultural effects on the community of St. Paul Island. These two resources, northern fur seals and Pribilovians residing on St. Paul Island, are inextricably linked. Pribilovians rely on northern fur seals for subsistence purposes and have indicated since the subsistence regulations were implemented by NMFS that additional opportunities for subsistence use of northern fur seals are important to them individually and culturally. Further, Pribilovians often are the first to observe and respond to changes in the fur seal population through their residency and subsistence use on St. Paul Island.

Table 4.4-3 provides an overview of past, present and RFFAs that have resulted in an effect (beneficial + or adverse -) with specific emphasis on the northern fur seal population. Table 4.4-4 presents the subset of effects from those past, present and RFFAs summarized in Table 4.4-3 that are most likely to contribute to overall cumulative effects of the proposed alternatives. The conclusions presented in this table are based on information described in the summary of direct and indirect effects of the proposed alternatives presented in Tables 4.4-1 and 4.4-2, past and present actions and environmental events in Chapter 3, and the RFFAs described in Table 4.4-3. Narrative summaries of the cumulative effects on the northern fur seal population and the community of St. Paul are presented below, followed by the supporting tables. Finally, an integrated summary of the cumulative effects on northern fur seals and the St. Paul community is provided at the end of this section.

4.4.3.1. Summary of Past, Present and Future Actions and Events Contributing to Cumulative Effects on Northern Fur Seals

Relevant past and present actions (federal and non-federal) and events are those that have influenced the current condition of a resource. For the purposes of this SEIS, past and present actions and events are both human controlled (*e.g.*, fur seal harvests, commercial fisheries, and entanglement), and natural (*e.g.*, disease and predation). Relevant past and present actions and events that have affected northern fur seals are listed below and are described in detail in Chapter 3 (Sections 3.2.7 through 3.2.11). Many of these actions have occurred historically and have most likely altered the population structure and population trajectory as a result of exploitation (*e.g.*, sub-adult male fur seal commercial harvests) and over-exploitation (*e.g.*, female fur seal culling). RFFAs have also been identified as likely to contribute to cumulative effects on northern fur seals.

Historically, the past and present effects of human-related activities have resulted in both, negative and beneficial cumulative effects on the northern fur seal population. The commercial harvest of female fur seals contributed significant adverse effects on the fur seal population. The commercial harvest of male fur seals was sustained for decades and the population production and abundance increased under nearly all harvest levels. Mortality and injury from entanglement in derelict fishing gear and marine debris, and bycatch mortality and injury from commercial fishing also contributed to adverse cumulative effects on seals (Table 4.4-4). Illegal high-seas drift net fisheries, illegal shooting, and illegal harvests have likely affected the northern fur seal population in that both male and female fur seals have been killed and injured. Most of these historic sources of direct mortality and injury, except the illegal activities, have been eliminated or thought to be significantly reduced from historic levels such that their cumulative effect may only be acting on the population through an alteration of the population composition. NMFS is in the process of evaluating the current population composition through long-term studies of survival and reproduction, but results are not yet available. These studies, unfortunately, will not provide insight into causation from particular human or natural stressors, but will require additional study.

Significant beneficial effects for both fur seals and their habitat are related to specific legislative actions such as the 1911 Fur Seal Treaty, the FSA, and the MMPA. Northern fur seal scientific research was supported by the past commercial harvests and helped to determine major aspects of fur seal ecology and understand the population response to harvests (Gentry 1998) that support our ability accurately predict the sustainability of subsistence harvests at the significantly lower exploitation levels. This research has

continued at significantly lower levels under general federal appropriations and has helped to further refine our understanding of fur seal foraging ecology and develop management measures that protect and conserve the species.

Commercial fishing has directly and indirectly affected those species consumed by fur seals throughout their range and contributed to cumulative effects, but whether these individual effects are additive, antagonistic or synergistic is unknown. Due to the inter- and intra-specific competitive interactions between different trophic levels of fishes and fur seals, our ability to distinguish these cause and effect mechanisms between fur seals and their prey is highly uncertain. Other factors, such as global climate change, have altered the distribution and abundance of northern fur seal prey, and changed the timing and frequency of physical features (*e.g.*, storms, increased air temperatures, and water temperatures) of the eastern Bering Sea, which have likely had a cumulative effect. In addition, fur seals occupy the North Pacific Ocean from December through May and environmental changes there and the resulting effect on fur seals is unknown. Since environmental conditions strongly influence important fur seal prey year-class success and fur seal survival, fur seals could be directly impacted in different ways in the eastern Bering Sea and North Pacific Ocean. Despite a basic understanding of the basic environmental relationships, the impact on northern fur seals is unknown because there is no evidence to predict the extent to which these effects are additive, antagonistic, or synergistic when assessed in a cumulative fashion.

Overall, the cumulative effects of past human-related actions have little residual direct effect on the fur seal population trend at the present time. The history of harvest exploitation and over-exploitation, however, has likely influenced the ability of this long-lived species to respond positively from the alteration of the population composition that resulted from decades of harvesting. Present activities on the Pribilof Islands, such as disturbance from aircraft overflights, tourists, subsistence harvests, or research, are unlikely have a greater cumulative effect on fur seal population demographics and trends than the effect of historic commercial harvest activities. Commercial harvests displaced and killed thousands to tens of thousands of seals 5 days a week during the entire summer and sometimes continued into the autumn. None of these human actions would affect fur seals 5 days a week like the commercial fur seal harvest. The subsistence harvest is the primary human activity with quantifiable direct effects on the fur seal population and has been shown to have negligible effects on the population (Table 4.4-18). On a broader scale, to assess the cumulative effects on the worldwide northern fur seal population, Olesiuk (2012) completed a population viability analysis and determined that fur seals in the North Pacific are not at risk of extinction. Though the Pribilof sub-population has had numerous 5- to 10-year periods of stability, it is significantly lower than the peak in the 1950s, and represent about half of the world's population of northern fur seals. Sufficient inter-mixing during their annual winter migration and behavioral plasticity to colonize new sites, such as Bogoslof Island, will maintain population viability for the next 100 years (Olesiuk 2012).

4.4.3.2. Summary of Past, Present and Future Actions and Events Contributing to Cumulative Effects on the Community of St. Paul

Present, past and likely future actions will have a continued cumulative effect on the St. Paul community culture and subsistence lifestyle. The St. Paul community has shown significant resilience to the effects of Russian and U.S. governments before, during, and after the commercial harvest of fur seals. St. Paul

residents have endured difficult conditions associated with cultural preservation due to government-run commercial harvests and little recognition for cultural and historic practices until more recently. The commercial harvest provided an excess of fur seal meat to meet the community's nutritional needs; however, the quality and availability of that food resource was much different than that collected by subsistence users today. The transition from the commercial harvest, which provided unlimited fur seal meat to a highly regulated and limited subsistence harvest, has had significant direct effects on the community of St. Paul and contributed to negative cumulative effects on the socio-economic conditions on St. Paul Island. The signing of the Co-Management Agreement in 2000 between NMFS and ACSPI established an expectation that ACSPI would continue to develop and have a meaningful role in the decision-making regarding subsistence use of northern fur seals and the lack of changes in the regulations since signing the agreement has further contributed to negative cumulative effects on the community.

In more recent years, St. Paul has been working to diversify their economy through commercial fisheries to provide better long-term stability and resilience of their cultural identity. Initially, the community had no involvement in the commercial fisheries in the region, but fisheries rationalization and the CDQ program has provided additional economic opportunities that have had positive cumulative effects on the community. However, even with the influence of the commercial fisheries, reliable access to subsistence protein sources that are seasonally available, but have restricted and regulated access, limits and reduces the stability and sustainability of St. Paul's subsistence lifestyle.

Implementation of Alternative 2 would have the most beneficial contribution of all alternatives on overall food security for the ACSPI. Alternative 2 would also have the most substantial effect on building trust and support for locally-based co-management of subsistence use of the fur seal population. Alternatives 3 through 5 would generally increase subsistence opportunities for harvesting fur seals, but retain a substantial regulatory burden such that cumulative effects on the community would be less than Alternative 1, but greater than Alternative 2.

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Table 4.4-3 Northern Fur Seal Cumulative Actions and Events

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Commercial Activities			
Historical Northern Fur Seal Commercial Harvest (Land and Pelagic) Northern fur seal commercial harvest under the Treaty (sub-adult male and accidental sub-adult female)	• Mortality • Disturbance • Injury • Alteration of age and sex composition of the population	• 1786-1867: estimated 2.5 million seals killed by Russians (Sims 1906). • 1870: 20-year harvest lease to Alaska Commercial Company; approx. 2.2 million fur seals killed • 1890: 20-year harvest lease to North American Commercial Company; approx. 960,000 fur seals killed • 1911-1984: Approx. 3.1 million male fur seals killed; approx. 350,000 females killed (this includes those females killed during the herd reduction program, which are not distinguished in the record from accidental female mortalities). • 1943: Peak male harvest totaling 116,407 sub-adult males killed in 1 year, 757 females killed accidentally (accidental female harvest rate of 1 female for every 153 males harvested in 1943). • Averaged across all years of the commercial harvest for every 465 males harvested, there was one female accidentally killed (excluding the herd reduction program years) • See Section 3.9.3.	-
U.S. Government Herd Reduction Program (Females) 1956-1968	• Mortality • Disturbance • Injury • Alteration of age and sex composition of the population • Reduced reproduction • Reduced survival	• 1956-1968: a total of 320,135 females were killed during the herd reduction program by U.S. government; an average of 24,625 females killed per year, compared to 105 accidental female mortalities during the male harvest when excluding the 13 herd reduction years. • 1956-68: 676,515 males were killed. • 1961: Peak total harvest 126,046 seals killed (82,197 males and 43,849 females) • See Section 3.9.3.	-
Commercial Fisheries	• Bycatch-Mortality • Disturbance • Injury • Prey availability • Prey distribution	• 1978-1988: incidental take mortality of 246 fur seals both the foreign and joint U.S.-foreign commercial groundfish trawl fisheries. • 1989-2001: 31 mortalities from domestic groundfish fisheries (Perez 2003). • 1991: foreign high seas driftnet fisheries incidentally killed estimated 5,200 fur seals (Larntz and Garrott 1993). • 1992: high seas drift gill-net fisheries terminated due to high marine mammal mortality. • 2010-2014: bycatch of northern fur seals estimated to result in 1.1 incidental mortality and injury; effect considered negligible at population level. • BSAI Fisheries: commercial fisheries and fur seal presence in Bering Sea overlap in range and target species May – November. • Both international and domestic commercial fisheries and fur seal presence in the North Pacific Ocean overlap in range and target species from December – April. • Spatial or temporal changes in fishing activity or concentration of fishing activity may impact fur seal foraging. • Whether the indirect effects of commercial fisheries affect fur seal survival or reproduction in the Bering Sea or North Pacific Ocean is unknown. • See Section 3.2.11; See also entanglement under Other Activities (below).	-

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Subsistence Harvest			
Subsistence Harvest (Effects on Seals)	• Mortality • Injury • Disturbance	• 1870-1917: first recorded subsistence harvest during commercial harvests. • 1985-94: 1,816 seals harvested from average stock size of 919,871. • 1881: commercial harvest lease agreement banned subsistence harvest of pups. • 1881: average consumption of seal meat in Pribilofs calculated as 600 pounds seal meat annually per person. • See Section 3.9.5. • July 9, 1985: NMFS published rule to authorize subsistence harvest of fur seals (see the FSA below). • 1,645-2,000 sub-adult (2- to 5-year-olds) male fur seals between June 23 and August 8. No pup harvest authorized; impact of lethal take minor relative to PBR (20%). • Since 1985: 69 females accidentally harvested (0.2% of total harvest); negligible effect. • See Section 2.2.1 Alternative 1 No Action for more information.	-
Subsistence Harvest (Effects on St. Paul Community)	• Food availability • Food security • Food utilization • Food stability	• Historically, Native Alaskan harvest seals (including pups) throughout the year resulting in improved food availability, security, utilization, and stability. • 1973-1984: St. George restricted to harvest only 350 seals. • 1984: 3,200 pounds of fresh seal meat and 3,000 pounds of frozen seal meat shipped from St. Paul to St. George to help satisfy subsistence need (due to St. George restricted harvest). • 1985: under Section 105(a) of the FSA, NMFS issued emergency rule to allow a 19-day subsistence harvest (consisting of a 5-day/week harvest schedule at specified locations) July 8 - August 5. • 1993-Current: NMFS codified regulations to allow 1,645 - 2,000 sub-adult male seals to be harvested. No pup harvest permitted. Harvest season June 23 - August 8. Fresh seal meat not available year-round. • See Section 2.2.1.	+
Scientific Research			
Northern Fur Seal Research	• Education • Disturbance • Mortality • Injury	• 1909: documented research on Pribilof Island northern fur seal populations • 2007: estimated mortality of 67 fur seals (0.4% of PBR) per year due to research; considered a minor cumulative effect (NMFS 2007b). • While mortality has occurred, overall benefits of research and enhancement are beneficial for long-term seal survival. • Research improves understanding of species for better management of populations • Based on the 2007 PEIS on fur seal research (NMFS 2007b), long-term effects not anticipated due to low % of mortality and disturbance relevant to PBR; effects considered negligible to minor at a population level. • See Section 3.3.	+
2014 Amendment to St. Paul Research Permit No. 14330-02		• Increase in potential takes to increase 1) disentanglement; 2) sample collection from dead animals and sample export; and 3) haulout and rookery observations, monitoring, and remote camera maintenance. • New research permits for Tribal Governments of St. Paul and St. George being processed for 2016-2021.	+
Natural Events			
Predation	• Mortality • Injury	• Springer *et al.* (2003) hypothesized that sequential declines were due to increased predation by killer whales through DeMaster *et al.* (2006) reported both top-down and bottom-up hypotheses are more likely. • Steller sea lions kill weaned fur seal pups close to shore on St. George Island (Gentry and Johnson 1981), and were seen killing fur seal pups in 1992 (reported in NMFS 1993).	-

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Climate change El Niño Pacific Decadal Oscillation (PDO) Severe storm events	• Prey availability • Changes in habitat • Injury • Mortality	• Warmer waters could favor productivity of certain species of forage fish, but the impact on recruitment dynamics of fish important to fur seals is unpredictable. • 1950: severe storms and low temperatures during the winter may have contributed to the deaths of 700 fur seals found on the Oregon and Washington coasts (Scheffer 1950). • 1975 to 1997: fur seal strandings off California during El Niño (1992 and 1997) (Fauquier *et al.* 1998). El Niño of 1972, 1983, 1992, and 1997 had dramatic impacts on birth rates, and pup growth and survival for seals on San Miguel Island (MML, unpublished data). • Pup survival on San Miguel is lower during El Niño events, but survival of Pribilof juvenile males over longer time periods is positively correlated with El Niño (York 1991) and higher air and sea surface temperature trends (York 1995). • Kuzin and Shatilina (1990) reported correlation between survival of fur seals less than 2 years and temperature of the sea water near Hokkaido where fur seals winter. • Increased global temperatures and decreased ice coverage result in higher sea levels, which could directly affect terrestrial rookery and haulout sites used by seals. • See Section 3.5.	- / +
Disease and parasites	Disturbance	• 1950s – 1960s: ascarid (nematode worm) mortality. • 1970s: leptospirosis mortality. • 1974 – 1977: hookworm responsible for 45% pup mortality. • 2012 - 2014: parasitic acanthocephalans and anisakids (Kuzmina *et al.* 2012 and 2014). • Evidence of *Coxiella burnetii* and *Brucella spp.* (Duncan *et al.* 2014). • Despite evidence of parasites, Spraker and Lander (2010) found no evidence over the past 27 years to implicate diseases or mortality as factor in population decline on St. Paul; effects considered insignificant at population level.	-
Other Activities			
Direct Mortality Other Than Subsistence	Mortality	• Evidence of seals shot by fishermen. • Illegal harvest on St. Paul Island. • Harvest of pups and juvenile males in Russia and Japan.	-
Removal of marine debris	• Injury • Mortality	• 1995-97: removed trawl net from 88 seals; packing bands from 146 seals and twine from 87 fur seals. • 2007 - 2011: mean annual mortality and serious injury rate due to fishing gear of all types was 1.0.	+
Entanglement in marine debris or fishing gear		• More fur seals are entangled in marine debris than any other marine mammal in Alaska (Laist 1987, 1997; Fowler 1987a). • 1970s-80s: Significant mortality due to entanglement in fishing gear (Fowler 1987a, 1988; Swartzman *et al.* 1990). • Late 1980s: entanglement a plausible mechanism for reduction in adult female survival. Fowler (1985, 1997, 2002) estimated that entanglement mortality could be as high as 15% for seals from birth to age three. • 1985: DeLong *et al.* (1988) estimated 0.06 - 0.23% of adult females on select St. Paul rookeries observed entangled. • See Section 3.2.11.3 and Table 3.2-3 for additional information.	-/+

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Disturbance and Harassment due to Human Presence or Activities (*i.e.*, vehicle, vessel of aircraft traffic, harbor development, etc.)	• Disturbance • Mortality • Injury	• MMPA 50 CFR 216, subpart G precludes human access to fur seal breeding and resting areas from 1 June until 15 October without prior authorization. Evidence suggests that environmental context (*i.e.*, what a seal is doing) at time of exposure to human disturbance likely affects their response (NMFS 2007a). • Human presence on land, vehicles, nearshore vessels or aircraft may contribute to sub-lethal effects due to disturbance. • Aircraft noise may disturb seals although in 1993 and 1994 Williams did not find evidence of significant population-level effects due to noise on St. George. Aircraft Advisory Zones and Requested Aircraft Flight Paths reduce overflight of seal rookeries. • Vessel and traffic noise may cause seals to avoid ships; however, few studies have documented effects. Whether vessels temporarily displace seals is unknown. • 1990 (Gentry): non-breeding fur seals did not avoid prolonged, airborne construction sounds of ~ 85 dB re 20 µPa peak source level. Other evidence suggests airborne noise does not result in significant change in behavior (NMFS 2007a). • 2010: St. Paul Small Boat Harbor construction; no documented direct or indirect effects on fur seal population. • 2015: Tribal Government Dock; no evidence of an effect on the fur seal population. • Planned Central Bering Sea Fishermen's Association Boat Shop and Tribal Government Multi-Use Facility. Timeline for construction is unknown. • See Section 3.2.10.	-
Contaminants	• Mortality • Injury	• Evidence of organochlorine linked to reproductive effects on similar species (NMFS 2007a); found in St. Paul fur seal blubber. • Evidence of PCBs in fur seal milk. • 1974: evidence of mercury in fur seal liver. • NMFS (2007a) notes gaps in data on effects of toxics on fur seals on a population scale specifically of vital rates, population trends or human consumers; population-level effects unknown.	-
Oil and Gas Development	• Mortality • Injury	• Oil and gas development, harbor development, shipping and transportation activities not likely to cause significant effects but could disturb seals or modify habitat. • However, a large oil spill could result in fur seal injury or mortality. The high concentration of the fur seal population on St. Paul means an oil spill could have a catastrophic effect. • North Aleutian Basin oil and gas development: In 2010, Sale 214 was removed from the 2007-2012 5-Year Program.	-
Legislation			
Treaty for the Preservation and Protection of Fur Seals and Sea Otters in 1911	Increased survival	• 1911 – 1917: Prohibited pelagic sealing and required a reduction in the harvest of seals on land; 8% population growth after cessation of pelagic harvest.	+
1957 Interim Convention on the Conservation of North Pacific Fur Seals	Mortality	• Postulated higher pregnancy and survival rates from a smaller herd (Anonymous 1955). • 1956 – 1968: 300,000 female fur seals were killed on Pribilof Islands; pelagic collection of 16,000 females taken for research (1958-19740 (York and Hartley 1981). Concurrently, 30,000 to 96,000 juvenile males were harvested per year (Lander and Kajimura 1982).	-
Fur Seal Act of 1944	Increased survival	• Termination of commercial fur seal harvest • Authorization of Subsistence • July 9, 1985: NMFS published rule to govern subsistence harvest of fur seals under the authority of Section 105(a) of the FSA.	+

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Marine Mammal Protection Act (50 CFR 216)	Overall protection	• 1972: ecosystem approach to natural resource management and conservation of marine mammals. • 1988: northern fur seal stock declared depleted. • Regulatory closures preclude unauthorized human access to posted fur seal breeding and resting areas from 1 June until 15 October. • MMPA allows regulations to limit taking "any species or stock of marine mammal" by Alaska Natives under 16 U.S.C. § 1371(b). • 1994: MMPA amended to include Section 119 co-management agreements with Alaska Native Organizations to conserve and provide for the subsistence uses of marine mammals.	+
Northern Fur Seal Conservation Plan	Overall protection	• 1988: MMPA amended to develop a species Conservation Plan. • 1993: first Northern Fur Seal Conservation Plan; revised in 2007. Established four objectives to restore and maintain the Eastern Pacific stock of fur seals to its OSP level, consistent with 1988 MMPA amendments.	+

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Table 4.4-4 Cumulative Effects of the Proposed Alternatives Considering Other Past, Present and Reasonably Foreseeable Future Actions

	Northern Fur Seals		St. Paul Island Community
	Northern Fur Seal Mortality	**Northern Fur Seal Sub-Lethal Effects**	**St. Paul Island Food and Resource Availability, Access, Utilization and Stability**
Proposed Alternatives			
Alternative 1 No Action	**Minor adverse effect** on the population**; negligible effect** on pups	**Minor adverse effect** on the population	**Moderate beneficial effect** on food availability, access, utilization and stability; **Negligible effect** on building locally based co-management system
Alternative 2 Preliminary Preferred/Petitioned Alternative	**Negligible to Minor adverse effect** on the population; **negligible effect** on pups	**Minor to Moderate adverse effect** on the population	**Major beneficial effect** on food availability, access, utilization and stability; **Major beneficial effect** (Option 2A) on building locally based co-management system Option 2B has a **minor beneficial effect** on co-management
Alternatives 3 and 4	**Negligible to minor adverse effect** on the population; **negligible effect** on pups	**Moderate adverse effect** on the population	**Major beneficial effect** on food availability, access, utilization and stability; **Minor beneficial effect** on building locally-based co-management
Alternative 5	**Moderate negative effect** on population for Alternative 5 for initial 3-year period; **negligible effect** on pups	**Moderate adverse effect** on the population	**Major beneficial effect** on food availability, access, utilization and stability; **Minor beneficial effect** on building locally-based co-management
Commercial Activities			
Historical Northern Fur Seal Commercial Harvest; U.S. Government Herd Reduction Program (Females)	**Major adverse effect** during the peak harvest years particularly when female seals were harvested	**Major adverse effect** due to high number of rookeries disturbed and likelihood of injury and disturbance	**Major adverse effect** due to limitations on subsistence harvesting during commercial harvest
Commercial Fisheries	**Minor to moderate adverse effect** due to entanglement, which can result in mortality or injury; **unknown effects** on prey distribution or disturbance-type effects		**Moderate beneficial effect** due to the fact that several community members participate in the fisheries
Research			
Northern Fur Seal Research	**Negligible effect** on mortality due to low numbers of seals killed during research	**Unknown effects** (disturbance is likely however the effects of disturbance due to research on a population level is likely minor) (NMFS 2007a)	**Minor beneficial effect** on food availability, access, utilization and stability due to the fact that research contributes to better overall management of the species and therefore, improved fur seal survival
Natural Events			
Northern Fur Seal Predation	**Minor adverse effect;** while direct mortality does occur the number of animals that die to predation does not currently appear to result in a population level effect	**Minor adverse effect** due to injuries from predation; not likely to result in population-level effect	**Negligible effect**; not likely to reduce subsistence opportunities in a measurable way

	Northern Fur Seals		St. Paul Island Community
	Northern Fur Seal Mortality	**Northern Fur Seal Sub-Lethal Effects**	**St. Paul Island Food and Resource Availability, Access, Utilization and Stability**
Climate change, El Nino, PDO	**Unknown effects;** dependent on whether changes in ocean conditions result in changes in prey distribution (*i.e.*, increased prey abundance would be beneficial while reductions in prey abundance would be adverse to the population but the magnitude of these changes are unknown).		**Unknown effects**; the changes in ocean conditions and general climate could impact subsistence resources by increasing or decreasing their abundance depending on the type and magnitude of change. These effects cannot be predicted at this time.
Severe Storms	**Minor to Moderate adverse effect**; correlation between severe storms and reduced survival of pups; storms could result in injury and effects on reproductive success depending on magnitude of the storm		**Major adverse effect**; severe storms may reduce availability of subsistence resources but may also limit or stop the delivery of fresh food by aircraft or ocean barge. St. Paul experiences storms that result in grounded airplanes on a regular basis.
Disease and Parasites (Seals)	**Minor adverse effect**; the rate of mortality due to disease and parasites is relatively low and not likely to result in a population-level effect	**Minor adverse effect**; while diseases and parasites may negatively affect seal health, there is little evidence these are having a population-level effect in St. Paul at this time	**Minor adverse effect**; diseases and parasites would decrease the availability of seals although the low rate of disease/parasites in St. Paul seals is not likely to affect the subsistence harvest.
Other Activities			
Removal of Marine Debris	**Major beneficial effect** due to increased survival rates and reduced injuries		**Major beneficial effect** due to fewer mortalities and injury making animals more available for subsistence
Entanglement in Marine Debris or Fishing Gear	**Moderate to major adverse effect** due to mortality and injury		**Moderate adverse effect** due to fewer animals available for subsistence if they are dead or injured
Disturbance and Harassment due to Human Presence or Activities	**Minor adverse effect** due to small proportion of population that would die as a result of disturbance or harassment	**Unknown effects**; while disturbance can cause stress, the effects of stress on overall reproduction is unknown.	**Negligible effect;** it is unlikely that disturbance would result in fur population level changes that would reduce the opportunity for or availability of animals for subsistence
Contaminants/Oil and Gas Development	**Negligible to minor adverse effects** for exposure to contaminants or oil and gas development; potential **major adverse effect** if an oil spill occurred near St. Paul Island as it could result in high mortality and injury due to effects of oil on fur bearing animals		**Minor to moderate adverse effects** due to potential consumption of contaminants however the likelihood of this is very low; potential **major adverse effect** if an oil spill occurred near St. Paul Island as it could result in high mortality and injury due to effects of oil on fur bearing animals making them unavailable for subsistence
Legislation			
1911 Fur Seal Treaty, Fur Seal Act, MMPA, Northern Fur Seal Conservation Plan	**Major beneficial effect** due to eventual termination of the commercial fur seal harvest; overall protection of seals through the FSA and MMPA.		**Major beneficial effect** due to eventual termination of the commercial fur seal harvest; overall protection of seals through the FSA and MMPA; better protection of seals results in more animals available for subsistence.
1957 Interim Convention on the Conservation of North Pacific Fur Seal	**Major adverse effect** on population growth due to overharvest of females.		**Major adverse effect** due the effects on fur seal reproduction because of overharvest of females and associated long-term effects on population growth; population decreases result in fewer animals available for subsistence.

4.4.3.3. Integration of the Cumulative Effects on Northern Fur Seals and the Community of St. Paul Island

The northern fur seal population on St. Paul Island is estimated to include about 400,000 seals, with annually about 91,000 pups born (Chapter 3), but the population is declining. Human and natural actions are causing the negative cumulative effect in that the population is declining. Whether cumulative human actions are the main reason contributing to northern fur seal decline is unknown. The relatively recent and rapid transition and hybridization between traditional subsistence culture and a western-oriented cash economy has resulted in stress-related cumulative effects in terms of cultural identity, community, and individual social and physical welfare on St. Paul Island. Complicating this is the fact that St. Paul is an extremely remote island in the Bering Sea where plane and ocean barge shipments can be canceled or delayed throughout the year due to weather conditions, thus making store-bought food expensive. Therefore, the community remains vulnerable to the cumulative effects of unreliable sources of income, unstable store-bought food supply, uncertain access to available subsistence resources, and loss of cultural identity.

The continued tension between NMFS and subsistence users would be reduced if more flexibility is provided through co-management. For example, Alternative 2 intends to make local residents an integral part of the co-management system that oversees and encourages local responsibility for their own subsistence activities. Alternative 2 improves access, availability, stability, and utilization of local, wild food (northern fur seals) over all the other alternatives and would help further integrate local responsibility for conservation of northern fur seals with the nutritional and cultural relationships of the community of St. Paul. The survival of the subsistence lifestyle may hinge on opening up a different kind of dialogue through identification and collaborative design of a co-management program built on common goals and objectives to conserve northern fur seals and subsistence use shared between NMFS, the ACSPI, and the community.

The complexity of ecosystem relationships and interconnectedness of its various elements is evident when the removal or disturbance of one ecosystem component affects the functioning of many others in the ecosystem. For example, the seasonal presence of about 1 million northern fur seals in the Bering Sea and North Pacific make them an important component of the food web; fur seals serve as prey for Steller sea lions and killer whales and are also responsible for consuming significant fish and squid biomass. The exact role that northern fur seals play in maintaining the integrity of the Bering Sea ecosystems is uncertain. Such uncertainty is not unusual; knowledge of ecosystem relationships are often incomplete, and the results of altered abundance and distribution throughout their range are thus to some extent unpredictable. Northern fur seals do not necessarily have to be a "keystone species" to have value. Rather, the mere existence of northern fur seals is valuable. In fact, thousands of people donate funds to organizations that support marine mammal protection just because they want the animals to exist.

Investigations of the intrinsic or existence value of Steller sea lions and Minke whales (Turcin and Giraud 2001; Giraud *et al.* 2002; Aron *et al.* 2000) suggest that northern fur seals would also be viewed similarly. Given the historic interest in northern fur seals expressed by environmental advocacy groups and through public comments received on Federal Register notices regarding subsistence use provides evidence of the non-consumptive and intrinsic value of fur seals. It is likely that some people derive pleasure from the contemplation of the varied life forms existing in the Bering Sea and North Pacific Ocean ecosystems and

are willing to pay to preserve the structure and integrity of those biological communities even if they never directly experience them. For these individuals, the knowledge that these biological communities exist, and human influences are well managed. While subsistence harvest of northern fur seals does affect the existence of individual seals that would be killed, none of the alternatives would affect their continued

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6. DISTRIBUTION LIST

NMFS sent the Draft SEIS to the following organizations. NMFS also posted the Draft SEIS for download on the NMFS Alaska Region web page at: https://alaskafisheries.noaa.gov/pr/fur-seals under NEPA Analyses.

Pribilof Island Aleut Community of St. Paul Island, Traditional Council

- City of St. Paul
- Aleut Community of St. Paul Island, Tribal Government
- Central Bering Sea Fishermen's Association
- Tanadgusix Corporation
- Aleutian Pribilof Island Association, Inc.
- Indigenous People's Council for Marine Mammals
- Marine Mammal Commission
- United States Environmental Protection Agency, Region 10
- Humane Society of the United States
- Greenpeace
- Nature Conservancy
- World Wildlife Fund

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8. INDEX

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APPENDIX A

Definition of Terms

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The following terms are used throughout this document.

- Action Area – The action area or geographic scope of the SEIS is defined consistent with ESA regulations as the area within which all direct and indirect effects of the Project will occur. Pursuant to this SEIS the action area is limited to St. Paul Island and its immediate surroundings.
- Alaska Native - a person defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1602(b)) (85 Stat. 588) as a citizen of the United States who is of one-fourth degree or more Alaska Indian (including Tsimshian Indians enrolled or not enrolled in the Metlakatla Indian Community), Eskimo, or Aleut blood or combination thereof. The term includes any Native, as so defined, either or both of whose adoptive parents are not Natives.
- Alaska Native Exemption - Alaska Natives are exempted from the "take" prohibition in the MMPA under section 101(b) if the taking of marine mammals is: (1) by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or Arctic Ocean for subsistence, or (2) for the purposes of creating and selling authentic native articles of handicraft and clothing, and (3) in each case, not accomplished in a wasteful manner.
- Breeding Ground - a site where fur seals congregate to give birth, breed, and copulate. This term is synonymous with the term rookery (see Rookery).
- Carrying Capacity (K) - the population level of a given species or stock which is the largest supportable within the ecosystem (K).
- Code of Federal Regulations (CFR) - Regulations created by various Federal agencies to support and explain Federal statutes. For purposes of this document, USFWS and NMFS have created wildlife and fisheries regulations to support and clarify sections of the MMPA and ESA. The wildlife and fisheries regulations pertaining to marine mammals and endangered species can be found in 50 CFR 1 - 599.
- Co-management – Generally, for purposes of this EIS co-management is a process under which NMFS shares management authority with the resource users (Aleut Community of St. Paul Island), with each given specific rights and responsibilities relating to information, adaptive management, governance and decision-making, pluralism, and conflict management regarding the management of the fur seal resource and subsistence harvests. Generally, co-management has been defined as "a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources".

- Conservation Plan - Under the MMPA, a conservation plan delineates actions for "conserving and restoring the [depleted][1] species or stock to its optimum sustainable population" (16 U.S.C. 1383b (b)).
- Context – Context can be referred to as the extent of the effect (*i.e.*, geographic extent or extent within a species, ecosystem, or region) and any special conditions, such as endangered species status or other legal status. Duration or frequency provides the context of time and may use the following terms:
- Short-term – temporary effect that lasts from a few minutes to a few days, after which the affected animals or resource revert to a "normal" condition.
- Long-term – more permanent effects that may last for years or from which the affected animals or resource never revert to a "normal" condition.
- Intermittent or infrequent effects – effects that only occur a couple times a year or fewer.
- Frequent - effects that occur on a regular or repeated basis each year.
- Cumulative Effects – see Effects
- Depleted Stock - The MMPA defines the term "depletion" or "depleted" (16 U.S.C.1362(1)) as meaning any case in which it is determined, after consultation with the MMC and the Committee of Scientific Advisors on Marine Mammals established under title II of this Act, that a species or population stock is below its optimum sustainable population… or when a species or population stock is listed as an endangered species or a threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.). On 18 May 1988, NMFS declared the Pribilof Islands (St. Paul and St. George Islands) stock of northern fur seals depleted under the MMPA
- Dimorphic: when males and females are distinguishable by physical appearance and behavior [as in northern fur seals].
- Direct Effects – see Effects
- Distinct Population Segment (DPS) - A DPS or “distinct population segment” is the smallest division of a taxonomic species permitted to be protected under the ESA recognized as a taxonomic species or subspecies of plant or animal, or in the case of vertebrate species.
- Effects - The CEQ regulations for implementing the procedural provisions of NEPA, state “Effects and impacts as used in these regulations are synonymous” (40 CFR §1508.8). In this analysis, the terms “effects” and “impacts” are used interchangeably.

[1] The MMPA defines the term "depletion" or "depleted" (16 U.S.C.1362(1)) as meaning any case in which "(A) the Secretary of Commerce, after consultation with the MMC and the Committee of Scientific Advisors on Marine Mammals established under title II of this Act, determines that a species or population stock is below its optimum sustainable population; (B) a state, to which authority for the conservation and management of a species or population stock is transferred under U.S.C. 1379, determines that such species or stock is below its optimum sustainable population; or (C) a species or population stock is listed as an endangered species or a threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531, *et seq.*)."

- *Direct Effects* – caused by the action and occurring at the same time and place (40 CFR §1508.8). Differences between direct and indirect effects are primarily linked to the time and place of impact. Direct effects are those that result from the action and occur at the same time and place. Direct impacts pertain to the proposed action and alternatives only.
- *Indirect E*ffects – effects "caused by an action and are later in time or farther removed in distance from the location of the direct effects (40 CFR 1508.27). Indirect effects are those reasonably foreseeable effects that are caused by the action but that may occur later and farther). Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of resource use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8).
- *Cumulative Effects* – additive or interactive effects that would result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.
- *Sub-lethal Effects* – an effect on an animal that does not lead to mortality but may otherwise compromise health or reproduction. For example, a painful injury may make it more difficult for an animal to forage efficiently. The analysis of sub-lethal effects in this SEIS focuses on reproductive success of northern fur seals because it is a biologically meaningful and is measureable on the population.

- Endangered Species Act (ESA) – refers to the ESA of 1973 at 16 U.S.C. 1531 et seq.
- Endangered: Defined under the ESA as "any species which is in danger of extinction throughout all or a significant portion of its range."
- Food Security – Food security has been defined as that situation when "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life". Food security is defined by the following four dimensions[2].
  - *Food availability*: "The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports …
  - *Food access*: Access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet …
  - *Food utilization*: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met ….

[2] The full definitions can be found here: www.fao.org/bioenergy/foodsecurity/befsci/definitions

- *Food stability*: The level to which a population, household or individual has consistent access to adequate food at all times. The risk of losing access to food as a consequence of sudden shocks (*e.g.*, an economic or climatic crisis), unneeded regulatory restrictions, or cyclical events (*e.g.*, seasonal food insecurity) should be small…"

- Frequent Effects – see Context
- Geographic Scope – see Action Area
- Harvesting - The "harvest" of fur seals is defined as organized herding and driving groups of fur seals from their hauling grounds to inland locations, where they are stunned by harvesters with clubs who come in close proximity with the seals before striking them. The harvest includes the take of male fur seals using the method of roundup, driving to an inland site, stunning, and exsanguination, but prohibits any use of firearms.
- Hauling Ground – see Haulout
- Haulout– an inland site where fur seals congregate to rest and interact. A rookery is a specific form of hauling ground for reproduction and nursing pups. Not all hauling grounds are rookeries.
- Humane Take - The MMPA (40, 16 U.S.C. 1362) states that "For the purposes of this chapter the term "humane" in the context of the taking of a marine mammal means that method of taking, which involves the least possible degree of pain and suffering practicable to the mammal involved."
- Hunting - Hunting includes the taking of juvenile male fur seals (*i.e.*, up to 7 years old) by hunters using firearms. NMFS distinguishes "hunting" from harvesting. The Aleut people and other coastal indigenous peoples hunted fur seals for food, clothing, and raw materials prior to contact with Russian fur traders. The Aleut word used as reference to autumn is "Kimadgim tugida" which translates to "time of fur seal hunting."
- Indirect Effects – see Effects
- Intensity – The intensity of the impact includes the type of impact (beneficial versus adverse), duration of impact (short versus long-term), magnitude of impact (minor versus major), and degree of risk (high versus low level of probability of an impact occurring). The intensity of an impact is the result of its magnitude and duration or frequency. A component of both the context and the intensity of an effect is the likelihood of its occurrence.
- Juvenile – a fur seal up to 7 years old, excluding pups.
- Major Effects – see Significance Thresholds
- Marine Mammal Protection Act (MMPA) – refers to the MMPA at 16 USC. 1351-1407.
- Maximum Net Productivity Level (MNPL) or Rate - Maximum net productivity (MNPL) is the greatest net annual increment in population numbers or biomass resulting from

additions to the population due to reproduction and/or growth losses due to natural mortality."

- Maximum Sustainable Population (MSP) – The MMPA defines the MSP level as " . . . with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the optimum carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element (16 U.S.C.1362(9). Historically, MSP level has been expressed as a range of values (generally 50-70 percent of K) determined theoretically by estimating what stock size in relation to the original stock size will produce the maximum net increase in population
- Minimum Population Level - Defined by the MMPA as an estimate of the number of animals in a stock that is based on the best available scientific information on abundance, incorporating the precision and variability associated with such information; and provides reasonable assurance that the stock size is equal to or greater than the estimate.
- Minor Effects – see Significance Thresholds
- Moderate Effects – see Significance Thresholds
- Negligible Effects – To implement the MMPA, NMFS defined the insignificance threshold for fisheries related marine mammal mortality as being 10 percent of PBR for the stock of marine mammals. To be consistent with this threshold, and with similar analyses in NMFS (2014a), this analysis considers subsistence harvest-related mortality less than 10 percent of PBR as “negligible”.
- Optimum Sustainable Population (OSP) - NMFS regulations at 50 CFR 216.3 define OSP as "…a population size which falls within a range from the population level of a given species or stock which is the largest supportable within the ecosystem (K) to the population level that results in maximum net productivity (MNPL).
- Pribilovian - Indians, Aleuts, and Eskimos who live on the Pribilof Islands (50 CFR 216.3).
- Philopatry - Philopatry is the tendency of an organism to stay in or habitually return to a particular area. Natal philopatry, where animals return to their birthplace to breed, may be the most common form.
- Polygamy - the tendency for one male to mate with two or more females
- Potential Biological Removal (PBR) – PBR is a precautionary or conservative measure of human-caused mortality that could be expected to affect a population’s ability to recover from a depleted state or to remain at a sustainable level. Under the 1994 reauthorized MMPA, PBR is defined as "...the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population." PBR is calculated as the “product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: PBR = $N_{MIN} \times 0.5R_{MAX} \times FR$. The recovery

factor for this stock is 0.5, the value for depleted stocks under the MMPA. Thus, for the Eastern Pacific stock of northern fur seals, PBR = 11,802 animals (548,926 × 0.043 × 0.5).

- Pup – young of the year, a fur seal less than a year old and dependent on its mother for food.
- Reasonably Foreseeable Future Actions or Events – reasonably foreseeable future actions (RFFA) or events are those that are likely to occur and are not purely speculative. RFFAs can include both human-induced actions as well as natural events. Typically, a list of RFFAs is developed based on information from existing plans, permit applications, announcements or evidence of ecosystem patterns.
- Recovery Factor – Under the MMPA a recovery factor [based on the status of the stock] of between 0.1 (endangered and threatened), 0.5 (depleted) and 1.0 (healthy, non-depleted stocks) is assigned to each marine mammal stock to calculate the Potential Biological Removal level.
- Rookery – A rookery is a hauling ground or haulout used by adult male fur seals for about 90-120 days to establish territories where females congregate to give birth, nurse their young, and reproduction occurs. A rookery is a specific form of hauling ground for mothers to give birth and breed. Rookeries revert to non-breeding hauling grounds after adult male abandon their territories and are used by fur seals to rest and interact until they depart on their winter migration.
- Significance - The CEQ regulations implementing NEPA state that an EIS should discuss the significance, or level of impact, of the direct, indirect, and cumulative effects of the proposed alternatives (40 CFR 1502.16). Significance is determined by considering both the context in which the action will occur and the intensity of the action (40 CFR 1508.27).
- Significance Thresholds –
    - *Insignificant* -To implement the MMPA, NMFS defined the insignificance threshold for fisheries related mortality as being 10% of PBR for the stock of marine mammals.
    - *Negligible* - To be consistent with this threshold, the analysis in this PEIS considers harvest-related mortality less than 10% of PBR “negligible”.
    - *Major* - This analysis considers harvest-related mortality more than or equal to 50% of PBR “major”.
    - *Minor and Moderate* -There are no comparable thresholds used in the fishery regulations to distinguish between “minor” and “moderate” levels of mortality. For the purposes of this analysis, these thresholds are evenly divided between the 10% (negligible) and 50% (major) thresholds. Thus, this analysis considers harvest-related mortality between 10% and 30% of PBR to be “minor” and mortality equal to or more than 30% and less than 50% of PBR to be “moderate”.

- Stock: As defined by the MMPA, the term "stock" means a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature.
- Strategic Stock - The MMPA, Section 3 (19) defines the term "strategic stock" as a marine mammal stock— (A) for which the level of direct human-caused mortality exceeds the PBR level; (B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA of 1973 [16 U.S.C. 1531 et seq.] within the foreseeable future; or (C) which is listed as a threatened species or endangered species under the ESA of 1973 (16 U.S.C. 1531 et seq.), or is designated as depleted under this chapter.
- Sub-adult – a fur seal between 2 and 5 years old and less than 124.5 cm long, this term was used during the commercial harvest period and is used in the No-Action Alternative: subsistence harvest regulations at 50 CFR 216.72(e)(5).
- Sub-lethal Effects – see Effects
- Subsistence – the use of marine mammals taken by Alaskan Natives for food, clothing, shelter, heating, transportation, and other uses necessary to maintain the life of the taker or those who depend upon the taker to provide them with such subsistence (50 CFR 216.3).
- Subsistence Uses - the customary and traditional uses of fur seals taken by Pribilovians for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of marine mammals taken for personal or family consumption; and for barter, or sharing for personal or family consumption (50 CFR 216.3).
- Take - Take" is defined under the MMPA (16 USC 1362) and further defined by regulation (at 50 CFR 216.3) as "to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal. Take is further defined under the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."
- Wasteful Take - The regulations require that the taking for subsistence, in each case, is 'not accomplished in a wasteful manner'. NMFS has described the three facets to the definition of the term "wasteful manner" as follows: (i) it means any taking that is likely to result in the killing of fur seals beyond those needed for subsistence purposes; (ii) wasteful manner includes takings that result in the waste of a substantial portion of the fur seal; and (iii) it means employment of a taking method, which is not likely to ensure the killing and retrieval of the fur seal (50 FR 27914). Therefore, a "wasteful manner" for NMFS includes: "…any taking or method of taking which is likely to result in the killing of marine mammals beyond those needed for subsistence, subsistence uses, or for the making of authentic native articles of handicrafts and clothing, or which results in the waste of a substantial portion of the marine mammal."