United State Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Alaska Region
Final
Supplemental Environmental Impact Statement

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

September 2019

- Page Intentionally Left Blank –

Final Supplemental Environmental Impact Statement for Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska

September 2019

Lead Agency: United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Silver Spring, Maryland

Responsible Official: James W. Balsiger, Ph.D.
Administrator, Alaska Region

For Further Information Contact: Michael Williams
National Marine Fisheries Service
222 West 7th Avenue
Anchorage, Alaska 99513
(907) 271-5117

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 has evaluated alternatives, which consider balancing the use of federal regulations and cooperative management with ACSPI to co-manage fur seal subsistence use. NMFS evaluated 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 shared management with ACSPI in the Co-Management Council. NMFS received comments on the draft Supplemental Environmental Impact Statement (SEIS), and responded to those substantive comments in preparing the Final SEIS. Alternative 2 Option B is the Preferred Alternative, and it includes broad regulation of subsistence use under the Fur Seal Act. The Preferred Alternative also includes the Co-management Council to share specific decision-making between ACSPI and NMFS for management consistent with the requirements of Marine Mammal Protection Act to provide greater flexibility in subsistence use, conservation, and food security.

TABLE OF CONTENTS

List of Figures ..... **v**

List of Tables ..... **v**

EXECUTIVE SUMMARY ..... **viii**

ES 1. INTRODUCTION ..... **viii**

ES 1.1. The Petitioned Action viii

ES 1.2. Public Scoping and Comments ix

ES 1.3. Purpose and Need ix

ES 1.4. Action Area x

ES 2. ALTERNATIVES CONSIDERED ..... **x**

ES 2.1. Alternative 1 (No Action) x

ES 2.2. Alternative 2 (Petitioned and Preferred Alternative) xiii

ES 2.3. Alternative 3 ..... **xvii**

ES 2.4. Alternative 4 ..... **xix**

ES 2.5. Alternative 5 ..... **xxi**

ES 3. AFFECTED ENVIRONMENT ..... **xxiv**

ES 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES ..... **xxv**

ES 5. AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED ..... **xxvii**

1. INTRODUCTION **1**

1.1. Background on the Management of Northern Fur Seal Subsistence Harvest 1

1.2. Purpose and Need for the Proposed Action 4

1.3. Description of the Action Area and Scope for Analysis 4

1.4. Definitions 5

1.5. Federal Trust Responsibilities and Other Relevant Federal Mandates 6

1.6. Co-Management of Subsistence Harvest of Fur Seals on the Pribilof Islands 7

1.7. Cooperating Agencies 9

1.8. Public Participation 9

1.9. Related NEPA Documents that Influence the Scope of this Environmental Impact Statement 10

1.10. Northern Fur Seal Conservation Plan & Relevance to the St. Paul Island Subsistence Harvest 13

2. ALTERNATIVES CONSIDERED 15

2.1. Federal Regulations versus a Co-Management System 15

2.1.1. Federal Regulations 15

2.1.2. Co-Management Rules and Restrictions 16

2.2. Alternatives 18

2.2.1. Alternative 1 (No Action) 18

2.2.2. Alternative 2 (2A: Petitioned Action and 2B: Preferred Alternative) 22

2.2.3. Alternative 3 26

2.2.4. Alternative 4 29

2.2.5. Alternative 5 32

2.2.6. Comparison of Alternatives 36

3. AFFECTED ENVIRONMENT 41

3.1. The Pribilof Islands 41

3.2. Northern Fur Seals 42

3.2.1. Population Size 43

3.2.2. Status of the Northern Fur Seal Under the MMPA 45

3.2.3. Northern Fur Seal Behavior and Biology 47

3.2.4. Annual Cycle and Migration Patterns 50

3.2.5. Emigration and Immigration 52

3.2.6. Reproductive Ecology 53

3.2.7. Diet of Northern Fur Seals 54

3.2.8. Natural Mortality including Predation (Excluding Disease) 57

3.2.9. Disease and Parasites 58

3.2.10. Environmental Contaminants 59

3.2.11. Illicit Subsistence Harvest of Northern Fur Seals 61

3.2.12. Interaction between Commercial Fisheries in the Bering Sea and Northern Fur Seals 61

3.3 Northern Fur Seal Research Program 67

3.3.1. Research under Co-Management Agreements 69

3.4. Physical and Oceanographic Environment 69
3.4.1. Bering Sea Ecosystem 69
3.5. Climate Change and Northern Fur Seals 70
3.5.1. Consideration of Future Climate Condition in this SEIS 72
3.6. Seabirds 73
3.7. Other Marine Mammals 74
3.7.1. Cetaceans 74
3.7.2. Sea Otters 75
3.7.3. Polar Bear 75
3.7.4. Pinnipeds Other than Northern Fur Seals 75
3.7.5. Land Mammals - Caribou (Reindeer) 79
3.8. Pacific Halibut 79
3.9. Social, Economic and Cultural Environment 79
3.9.1. Population 80
3.9.2. Employment, Income and Local Revenue 80
3.9.3. Commercial Harvests of Northern Fur Seals on the Pribilof Islands 82
3.9.4. Aleut Culture, the Subsistence Economy and Northern Fur Seals 85
3.9.5. Section 119 and Co-Management of the Subsistence Harvest 92
3.9.6. Non-Consumptive Value of Northern Fur Seals 95
3.9.7. Seabird Subsistence on the Pribilof Islands 95
3.9.8. Pacific Halibut Subsistence Fishery on the Pribilof Islands 95
3.9.9. Subsistence, Nutrition and Food Security in St. Paul, Alaska 96
4. ENVIRONMENTAL CONSEQUENCES 102
4.1. Incomplete or Unavailable Information 102
4.2. Methods for Impact Analysis 103
4.2.1. Direct and Indirect Mortality 105
4.2.2 Sub-lethal Effects Due to Harvesting 107
4.2.3. Sub-lethal Effects Due to Hunting 109
4.2.4. Process Used to Assess Probability of Mortality Due to Sub-Lethal Effects Due to Harvest or Hunting 111

4.2.5. Process Used to Assess Potential Mortality Due to Struck and Lost 112

4.2.6. Criteria for Evaluating Effects on the Social, Economic & Cultural Environment on St. Paul 115

4.2.7. Methods for Evaluating Cumulative Effects 116

4.3. Direct, Indirect and Cumulative Effects on Northern Fur Seals 117

4.3.1. Elements Common to All Alternatives 117

4.3.2. Elements Common to Alternatives 2, 3, and 4 118

4.3.3. Context for Impact Analysis 119

4.3.4. Alternative 1 No Action 124

4.3.5. Alternative 2 (Petitioned/Preferred Alternative) 130

4.3.6. Alternative 3 138

4.3.7. Alternative 4 145

4.3.8. Alternative 5 151

4.3.9. Summary of Direct and Indirect Mortality Relative to Potential Biological Removal ... 157

4.3.10. Sub-lethal Effects of Harvesting Northern Fur Seals 158

4.3.11. Sub-lethal Effects of Hunting 177

4.3.12. Consideration of Whether the Subsistence Harvest is Humane and Not Wasteful as Described in the MMPA 181

4.4. Direct, Indirect and Cumulative Effects on the Social, Economic and Cultural Environment on St. Paul Island 186

4.4.1. Effects on Subsistence, Culture and the St. Paul Economy 186

4.4.2. Summary of Direct and Indirect Effects 197

4.4.3. Cumulative Effects 199

5. LITERATURE CITED 218

6. LIST OF PREPARERS AND PERSONS CONSULTED 248

7. DISTRIBUTION LIST 250

8. Appendix A - DEFINITION OF TERMS 252

9. APPENDIX B - COMMENT ANALYSIS 259

9.1 Introduction 261

9.2 Analysis of Public Comments 261

9.3 Quality Control and Review 262

9.4 Response to Comments 262

10. APPENDIX C - DSEIS COMMENTS 286

11. INDEX 288

LIST OF FIGURES

Figure 2.2-1 Key Aspects of a Co-Management System 17

Figure 3.2-1 St. Paul Island Pup Births by Year 44

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 48

Figure 3.2-3 Location of Northern Fur Seals during the Winter in the Bering Sea. 52

Figure 3.9-1 Regulatory and Legal History of Federal Actions Related to Northern Fur Seals on St. Paul Island 84

Figure 4.3-1 Harvest of Male Northern Fur Seals, St. Paul Island 120

Figure 4.3-2 Harvest of Northern Fur Seals on St. Paul Island, Alaska 1975-2018 121

Figure 4.3-3 Number of Northern Fur Seals Accidentally Killed Under Alternative 1 125

Figure 4.3-4 Number and Percentage of Female Northern Fur Seals Accidentally Killed Under Alternative 1 130

Figure 4.3-5 St. Paul Steller Sea Lion Struck / Lost Estimates 1999 - 2015 180

Figure CAR 2 The number and percentage of female northern fur seals killed during subsistence harvests from 1985 to 2018 on St. Paul Island, Alaska. 269

LIST OF TABLES

Table ES-1 Alternative 1 (No Action) xii

Table ES-2 Alternative 2 Option A xv

Table ES-3 Alternative 2 Option B xvii

Table ES-4 Alternative 3 xix

Table ES-5 Alternative 4 xxi

Table ES-6 Alternative 5 xxiv

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

Table 2.2-1 Alternative 1 (No Action) 22

Table 2.2-2 Alternative 2 Option A 25

Table 2.2-3 Alternative 2 Option B 26

Table 2.2-4 Alternative 3 29

Table 2.2-5 Alternative 4 32

Table 2.2-6 Alternative 5 36

Table 2.2-7 Comparison of the Primary Features of Alternatives 1 – 5 38

Table 3.2-1 Total St. Paul Fur Seal Winter Observations Compiled from 2000 to 2015 51

Table 3.2-2 Summary of incidental mortality and serious injury of Eastern Pacific northern fur seals due to U.S. commercial fisheries in 2013-2017 and calculation of the mean annual mortality and serious injury rate (Breiwick 2013; MML, unpubl. data). 62

Table 3.2-3 Summary of mortality and serious injury of Eastern Pacific northern fur seals, by year and type, reported to the NMFS Alaska Region and NMFS West Coast Region marine mammal stranding networks in 2013-2017 (Delean et al. in press.) 65

Table 3.3-1 Northern Fur Seal Research 68

Table 3.6-1 Number of Adult Breeding Seabirds Observed on the Pribilof Islands, Alaska 73

Table 3.7-1 Sentinel Program Marine Mammal Observations 2006 - 20161 74

Table 3.9-1 Census Data for Alaskan Communities 80

Table 3.9-2 NMFS Costs for the Administration of the Pribilof Islands Program 1979-1985 81

Table 3.9-3 The Cumulative Northern Fur Seal Pup Harvest for St. Paul Island 86

Table 4.2-1 Number of Assumed* Harvest Events Under Each Alternative 108

Table 4.2-2 Number of Assumed Hunting Events Under Each Alternative 1 111

Table 4.2-3 Estimated Subsistence Takes of Steller Sea Lions by Alaska Natives on St. Paul Island, Alaska, 1992 – 2018 114

Table 4.2-4 Criteria for Determining Impact Level for the St. Paul Subsistence Harvest on Northern Fur Seals 115

Table 4.2-5 Socioeconomic and Cultural Impact Criteria 116

Table 4.3-1 The number of northern fur seals killed by sex and harvest type from 1975 to 2018 on St. Paul Island, Alaska 121

Table 4.3-2 Impacts of Lethal Take Relative to Potential Biological Removal 158

Table 4.3-3 Number of Assumed* Harvest Events Under Each Alternative 159

Table 4.3-4 Sub-lethal Effects for Alternative 1 162

Table 4.3-5 Sub-lethal Effects of Alternative 2 (Option A) 164

Table 4.3-6 Sub-lethal Effects of Alternative 2 (Option B) 167

Table 4.3-7 Sub-lethal Effects of Pup Harvests in Alternatives 3 171

Table 4.3-8 Sub-lethal Effects of Alternative 4 173

Table 4.3-9 Sub-lethal Effects of Alternative 4 174

Table 4.3-10 Sub-lethal Effects of Alternative 5 (Harvest of 3,863 Juveniles) 176

Table 4.3-11 Sub-lethal Effects of Alternative 5 (Harvest of 3,863 Pups) 177

Table 4.3-12 Number of Assumed* Hunting Events Under Each Alternative 178

Table 4.3-13 15-Year Account of Northern Fur Seals between the Months of January and May . 179

Table 4.3-14 Probability of Sighting a Single Fur Seal Each Day Between January and May 179

Table 4.3-15 Estimated Subsistence Takes of Sea Lions by St. Paul Hunters, 1999 - 2015 180

Table 4.4-1 Summary of Potential Direct and Indirect Effects of the Alternatives 198

Table 4.4-2 Summary of Potential Direct and Indirect Effects of the Alternatives 199

Table 4.4-3 Northern Fur Seal Cumulative Actions and Events 204

Table 4.4-4 Cumulative Effects of the Proposed Alternatives Considering Other Past, Present and Reasonably Foreseeable Future Actions 212

Table CAR-1: The number of northern fur seals killed by sex and harvest type from 1975 to 2018 on St. Paul Island, Alaska. * 268

EXECUTIVE SUMMARY

This Final Supplemental Environmental Impact Statement (FSEIS) 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 prepared this FSEIS 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 established the subsistence take range for St. Paul Island at 1,645 - 2,000 male seals less than or equal to 124.5cm in length. 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 FSEIS.

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] 216.71-216.74) established under the Fur Seal Act (FSA) in 1985 (50 FR 27914). 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 clarifying its position to NMFS 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. ACSPI then submitted a revised petition on November 17, 2014, to assist NMFS in preparation for scoping for the Draft Supplemental EIS (DSEIS) (see Section 1.8). NMFS announced the availability of the DSEIS on January 13, 2017, for public comment (82 FR 4336). NMFS reviewed and responded to substantive public comments on the DSEIS. On August 14, 2018, NMFS announced the opening of the public comment period for the proposed rule modifying the subsistence harvest of northern fur seals on St. Paul Island (83 FR 40192).

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 the subsistence use seasons. 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 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, ACSPI and NMFS as the St. Paul Co-management Council would share responsibility under the existing co-management agreement to make subsistence use decisions not governed by regulation.

ES 1.2. Public Scoping and Comments

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 (80 FR 44057). NMFS received comments and in response increased the number of alternatives under consideration and incorporated comments into components of several of the alternatives. Alternative 2 Option A represents the Petitioned Alternative in its entirety, and Alternative 2 Option B represents the Preferred Alternative. NMFS received public comments on the DSEIS and has included responses to comments and revisions to the FSEIS in Chapter 9/Appendix B.

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. In addition, the proposed action is needed to fulfill NMFS's federal trust responsibilities under the MMPA and FSA to conserve the northern fur seal population and co-manage subsistence use with ACSPI. NMFS's trust responsibilities include recognizing the subsistence food needs of Alaska Natives on St. Paul Island to the fullest extent possible consistent with applicable law.

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] Federal Register 51 FR 17896

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 petitioned action is 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, meaning the geographic scope, of the FSEIS 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 Parts 1500-1518), developed five alternatives for evaluation in this FSEIS. 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 existing regulatory process, which establishes harvest take levels every 3 years, and under a set of restrictions that have been in place since 1994 (59 FR 35471, July 12, 1994). Federal regulations at 50 CFR 216.72 currently restrict subsistence harvests of male fur seals less than or equal to 124.5cm in length 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 Subsistence Fur Seal Harvests:

  (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.

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

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

  (c) (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, that alternative methods will not result in increased disturbance to the rookery or the increased accidental take of female seals.

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

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

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

  (f) Harvest suspension provisions.

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

(h) (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

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

(j) (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; or

(k) (iv) [Not Applicable].

(l) (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 that led to the determination that the harvest was being conducted in a wasteful manner have been remedied.

(m) (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 suspended 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.

(n) (4) [Not Applicable].

(g) Harvest termination provisions.

(o) (1) The AA shall terminate the annual 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.

(p) (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.

(q) (3) [Not Applicable].

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.	

Alternative Component	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
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 when: 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 when: 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] If 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 and 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 216.72, 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.

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

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

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

8. 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).

9. 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.

10. Alternative 2 [Options A and B] eliminates the AA's authority to suspend or terminate the take as described in Section 216.72 (f) and (g). 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 have been killed.

11. Alternative 2 [Options A and B] eliminates the regulatory restriction that only experienced sealers may take fur seals.

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).

Tables ES-2 and ES-3 provide additional detail about Alternative 2 - Option A and Option B.

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.	

	Federal Regulations (Shaded) and Co-Management Conservation Control (White)	
Termination of Subsistence use	The AA determines 2,000 fur seals have been killed. The AA determines the conditions that led to the harvest 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 conditions that led to the harvest 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 the use of firearms to hunt fur seals but restrict the use of firearms to hunt 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 at 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 terminates the subsistence use when 2,000 juvenile seals have been killed. The AA determinates 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 (assumes the harvest at this time would occur similar to Alternative 1);

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);

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; and

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. The AA determines 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 subsistence 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 7,726 seals[2]; therefore, the upper limit of the subsistence harvest range would be 3,863 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

[2] Based on the 2018 Stock Assessment Report (Muto et al. 2019).

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 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 based 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. Specific population information for northern fur seals was updated in the FSEIS.

ES 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This FSEIS analyzes the direct, indirect, and cumulative impacts of five alternatives for managing the subsistence use and 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 minor to major with regard to PBR (Table ES-7). Alternative 5 total lethal take would be considered major 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 (3,863) since the upper limit of the harvest range would be 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 decrease. 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), Preferred/Petitioned	Alternative 3	Alternative 4	Alternative 5
Mortality					
Sub-adult / Juvenile males	Mortality of up to 2,000 male fur seals less than or equal to 124.5cm	Mortality of up to 2,000 male fur seals, up to 7 years, including pups	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, in the first 3 years
Male pups	Prohibited pup harvest		Mortality of up to 1,500 male pups	Mortality of up to 1,500 male pups	
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 26% of PBR = minor effect Pup mortality (unknown illicit harvest) Female mortality 0.1% of PBR = negligible effect	Juvenile male and male pup mortality 26% of PBR = minor effect Female mortality 0.2 % PBR = negligible effect	Juvenile male and male pup mortality 26% of PBR = minor effect Female mortality 0.06% PBR = negligible effect	Juvenile male and male pup mortality 26% of PBR = minor effect Female mortality 0.2 % PBR = negligible effect	Juvenile male and male pup mortality 50% of PBR = major effect for the first 3 years then to be determined based on harvest setting process Female mortality 2.6 % PBR = negligible effect
Geographic Extent	Moderate, harvest would be distributed by regulation across seven specific breeding grounds	Minor, harvest and hunting would be distributed within the co-management review process among all breeding grounds	Minor for the pup harvest, distributed within the co-management review process among all breeding grounds; Moderate for hunting, distributed by regulation only at Northeast Point rookeries	Minor, harvest would be distributed by regulation among all breeding grounds	Minor, harvest would be distributed by regulation among all breeding grounds
Sub-Lethal Effects	Up to 11,450 non-pup fur seals exposed to effects	Up to 12,220 pups or up to 16,650 non-pup fur seals exposed to effects	Up to 9,240 pups or up to 6,925 non-pup fur seals exposed to effects	Up to 9,240 pups or up to 9,450 non-pup fur seals exposed to effects	For the first 3 years, up to 13,966 pups or up to 20,579 non-pup fur seals exposed to effects

None of the sub-lethal effects of the alternatives result in an increase in the overall effects from one significance category to the next. 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 commercial 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 2A (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 manage and restrict subsistence practices. Alternative 2 addresses the petition of the tribal government to reinitiate the pup harvest and winter hunting of fur seals, and 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 subsistence use of 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 non-breeding male population of fur seals on St. Paul, the community would have greater resilience in responding to 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 socio-economic effects to the community of St. Paul Island (see Table 4.4-2).

NMFS's preferred alternative is Alternative 2B due to the high likelihood of positive or beneficial effects on the community, and similar environmental consequences to all other alternatives. NMFS's conclusion 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 FSEIS 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 subsistence mortality of male fur seals is generally minor. Modifying the existing harvest regime increases opportunities for harvest and co-management to be coordinated between NMFS

and the ACSPI. Comments on the DSEIS have been received, reviewed, and considered by NMFS and the ACSPI when developing the FSEIS. NMFS summarizes and responds to the substantive comments in Chapter 9/Appendix B.

- Page Intentionally Left Blank -

1. INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) manages the subsistence[3] use and harvests of northern fur seals (Callorhinus ursinus) in the Pribilof Islands under federal regulations found in 50 Code of Federal Regulations (CFR) Part 216, Subpart F - Taking for Subsistence Purposes. Initially, these regulations were issued as a single-year emergency interim rule[4]. 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[5], under the authority of the Fur Seal Act (FSA) (16 United States [U.S.] Code [U.S.C.] §§ 1151-1187) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. §§ 1361-1407).

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 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 the community's nutritional and cultural needs.

ACSPI submitted a resolution on February 16, 2007, requesting that NMFS issue an immediate moratorium of 50 CFR Part 216, 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's 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 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(a)). 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

[3] 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)).
[4] Federal Register 50 FR 27914.
[5] Federal Register 51 FR 24828.

uses of marine mammals (16 U.S.C. § 1388(a)). On St. Paul Island, NMFS works with the Co-Management Council, guided by a Co-Management Agreement[6], 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 subsistence use of northern fur seals by Pribilovians.

The process to change subsistence harvest management on St. Paul Island began with the ACSPI tribal resolution, passed on February 16, 2007, requesting NMFS to immediately start the process to impose a moratorium on the regulations at 50 CFR Part 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 ACSPI 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[7] 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[8].

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 (77 FR 41168), and NMFS 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 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

[6] 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).
[7] 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.
[8] *Federal Register* 77 FR 41168, July 12, 2012.

centimeters (cm), established in the 1986 Subsistence Taking of North Pacific Fur Seals; Final Rule[9]. 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. As noted in Chapter 3 there is significant overlap in the length distribution of young seals, such that the 124.5 cm restriction does not preclude the taking of 5-year-old males. The range of lengths from a sample of 5-year-old males killed was 107 – 150 cm (R. Towell pers comm. July 30, 2019). 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 for subsistence 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 Final Supplemental Environmental Impact Statement (FEIS) 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 and use on St. Paul Island. NMFS decided to prepare this FEIS 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-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

[9] *Federal Register* 51 FR 24828, July 9, 1986.

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 2014 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 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. In addition, the proposed action is needed to fulfill NMFS's federal trust responsibilities under the MMPA and FSA to conserve the northern fur seal population and co-manage subsistence use with ACSPI. NMFS's trust responsibilities include recognizing the subsistence food needs of Alaska Natives on St. Paul Island to the fullest extent possible consistent with applicable law.

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 northern fur seal 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 FSEIS 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). There is significant overlap in the length distribution of seals between 2 and 5 years old, such that the 124.5 cm restriction does not preclude the taking of 5-year-old males. The range of lengths from a sample of 5-year-old males killed was 107 – 150 cm (R. Towell pers comm.);
- 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 fur seals 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 male 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 the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land 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's 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 and use does not adversely affect the northern fur seal population;

- The regulation and co-management of the subsistence harvests and use by Alaska Natives and NMFS given that the species used for subsistence purposes is listed as depleted[10] 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[11] required each federal agency to establish meaningful consultation and collaboration with Indian Tribal Governments (including Alaska Natives) in formulating policies that significantly or uniquely affect their communities. The E.O. required 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 directed each agency to "explore and, where appropriate, use consensual mechanisms" for developing regulations.

E.O. 13175 replaced E.O. 13084 on November 6, 2000[12]. 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[13]. Section 119 established a formal framework for Tribal Governments, and other Alaska Native Organizations, to develop co-management agreements to conserve marine mammals and 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[14] to work in partnership to achieve the following:

---

[10] 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 [the MMPA], 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 [16 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. 1531-1544)."
[11] E.O. 13084, "Consultation and Coordination with Indian Tribal Governments", issued May 14, 1998.
[12] E.O. 13175 "Consultation and Coordination with Indian Tribal Governments", replaced E.O. 13084 on November 6, 2000.
[13] Section 119, MMPA Amendments of 1994, P.L. 103-238.
[14] Co-Management Agreement between ACSPI and NMFS for the Steller Sea Lion and Northern Fur Seal, 2000 (signed on June 13, 2000).

- 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.

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 for protection, conservation, and management of this population (NMFS 2007a). With the adoption of Co-Management Agreements between NMFS and the 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.

NMFS and ACSPI have revised the Co-management Agreement to reflect the new regulatory framework governing the subsistence take of northern fur seals on St. Paul Island and to include harbor seals. The

revised Co-management Agreement provides for the conservation and co-management of northern fur seals, Steller sea lions, and harbor seals. NMFS and ACSPI will also develop and finalize in-season monitoring and management plan(s), which would specify details of hunting and harvest management that the Co-management Council would implement via consensus within the parameters of the regulations. This approach will strengthen co-management consistent with Section 119 of the MMPA (16 U.S.C. 1388), insofar as ACSPI would be an equal partner with NMFS in determining the details of how the subsistence use seasons are managed under the regulations. ACSPI would monitor the juvenile male hunting and harvest seasons with independent monitoring by NMFS representatives. NMFS and ACPSI would monitor the male pup harvest and hunting seasons consistent with the intent of the revised Co-management Agreement, while ensuring compliance with regulatory requirements and any restrictions or limitations identified in the in-season monitoring and management plan(s).

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 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 of, 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 respond to 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[15], 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's 30-day comment period did not 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.

The Notice of Availability for the "Draft Environmental Impact Statement" (DSEIS) was published in the Federal Register (82 FR 4336, January 13, 2017). The 45-day public comment period ended February 27, 2017. A summary of substantive comments is provided in Chapter 9/Appendix B along with NMFS's responses.

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 Islands" (NMFS 2005)[16]. 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.

[15] *Federal Register* 80 FR 44057, July 24, 2015.
[16] Available at: https://repository.library.noaa.gov/view/noaa/17330

- On May 12, 1986, NMFS published an Environmental Assessment (EA) on the first regulations governing the subsistence taking of northern fur seals[17]. 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[18]. 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[19]. 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 these findings, NMFS, in consultation with 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[20]. 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.

---

[17] 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.
[18] *Federal Register* 66 FR 33209, June 21, 2001.
[19] 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).
[20] *Federal Register* 68 FR 36539, June 18, 2003.

- In May 2005, NMFS completed the required final EIS for setting annual harvest (NMFS 2005)[21]. 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[22], 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[23] 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[24] to satisfy the specific St. George community subsistence needs. The final rule modifying the harvest regulations for St. George Island was published on November 4, 2014[25]. 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[26]. The proposed action did not change take ranges or methods of harvest, but did allow for the limited subsistence take of male young of the year fur seals, as well changes to when and where the subsistence harvests can occur on St. George 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.

[21] Final EIS, May 2005, "Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands", NMFS, Alaska Region.
[22] *Federal Register* 72 FR 26814, May 11, 2007.
[23] *Federal Register* 75 FR 21243, April 23, 2010.
[24] *Federal Register* 75 FR21243, April 23, 2010.
[25] *Federal Register* 79 FR 65327, November 4, 2014.
[26] *Federal Register* 79 FR49774, August 22, 2014.

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][27] 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 May 18, 1988, because it declined to less than 50% from levels observed in the 1940s and 1950s[28]. 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 continued 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[29].

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

[27] 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 the MMPA, 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. 1531-1544-).
[28] *Federal Register* 53 FR 17888, May 18, 1988.
[29] *Federal Register* 72 FR 73766, December 28, 2007.

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

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 and use 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's 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 Parts 1500-1508), developed five alternatives for evaluation in this FSEIS. 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 subsistence use of fur seals is also described for each alternative.

As described in Section 2.2, and in line with CEQ guidance on scoping (40 CFR 1501.7), NMFS has considered comments received during scoping and the period of availability of the DSEIS 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 and DSEIS review 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 2A and preferred Alternative 2B, 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 and use 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 (16 U.S.C. 1155(a)) 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 (51 FR 24828, July 9, 1986). Although NMFS recognized its statutory authority to regulate fur seals under both the FSA and MMPA, NMFS relied on its broad statutory authority under the FSA to promulgate regulations to authorize the subsistence use of northern fur seals on the Pribilof Islands (51 FR 24828, 24829). Section 103(b) of the FSA provides an exemption to the prohibition on taking for subsistence purposes 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 (16 U.S.C. 1153(b)). 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 of the FSA and the exception that allows NMFS to promulgate regulations to authorize and regulate subsistence take is provided for by the broad authority under Section 105(a) (16 U.S.C. 1152 & 1155(a)).

2.1.2. Co-Management Rules and Restrictions

Recommendation from the Alaska Natives Commission[30] 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.

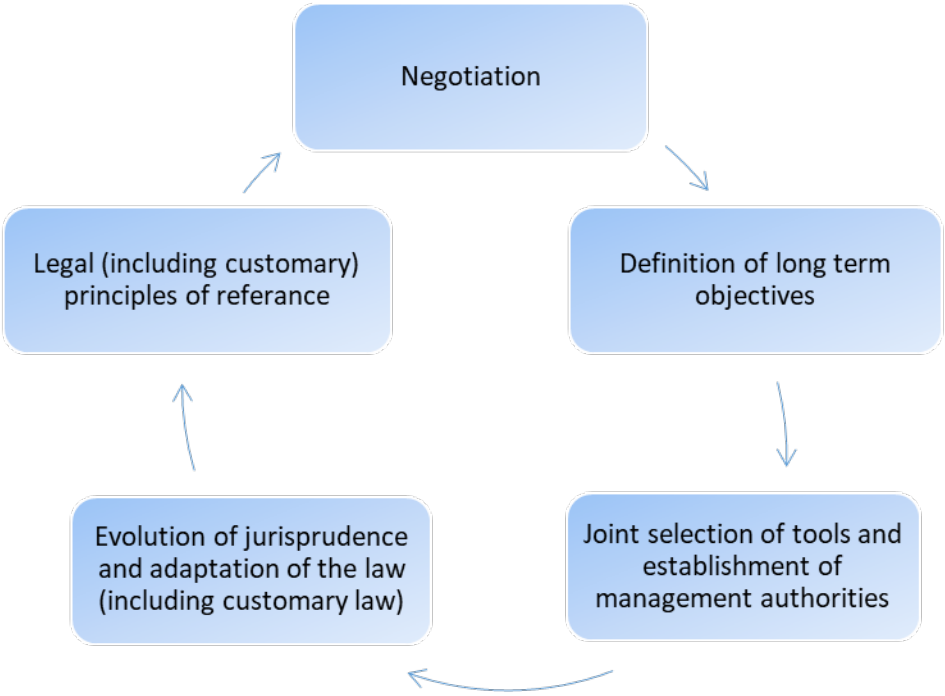
The MMPA was amended in 1994 to include Section 119, which states, “The Secretary may enter into cooperative agreements with Alaska Native organizations to conserve marine mammals and provide co-management of subsistence use by Alaska Natives.” Generally, co-management is a process under which a government 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.

[30] 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 (items C, D, and E) 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[31]. 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 subsistence use of marine mammals.

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).

[31] 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 FSEIS. 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's authority to regulate fur seal subsistence use with NMFS's authority to co-manage subsistence use with St. Paul under Section 119 of the MMPA under non-regulatory restrictions. Each alternative also describes 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 has selected Alternative 2B as the preferred alternative, which includes clarifying regulations for suspending and 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 216.71-216.72. 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 1994 (59 FR 35471, July 12, 1994). 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, July 9, 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." There is significant overlap in the length distribution of seals between 2 and 5 years old, such that the 124.5 cm restriction does not preclude the taking of 5-year-old males, but rather maximizes the taking of 3- and 4-year-old males. The range of lengths from a sample of 5-year-old males killed was 107 – 150 cm (R. Towell pers comm.) The harvest of adults and pups is prohibited in 50 CFR 216.72(e)(4).

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 Subsistence Fur Seal Harvests:

(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 fur 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, that 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.

(7) 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; or

(iv) [Not Applicable].

(8) 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 that led to the determination that the harvest was being conducted in a wasteful manner have been remedied.

(9) 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 suspended 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.

(10) [Not Applicable].

(g) Harvest termination provisions.

(1) The AA shall terminate the annual 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.

(3) [Not Applicable]

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 when: 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 when: 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] If 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 (2A: Petitioned Action and 2B: Preferred Alternative)

Alternative 2A will directly address the ACSPI's petition (see Section 1.1). Alternative 2A 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, who can participate in subsistence activities, and non-regulatory suspension or termination provisions to the St. Paul Island Co- Management Council. Alternative 2A would retain 50 CFR 216.71 and replace the provisions under 50 CFR 216.72 that 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 Alternatives 2A and 2B. Alternative 2A would authorize in the regulations 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 2A 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 accomplished in a humane and non-wasteful manner.

Alternative 2B would terminate the continuation of subsistence use based on mortality of female fur seals. Alternative 2A (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 ACPSI petitioned for no regulatory limitations on female fur seal mortality, but instead intended to limit such mortality by using non-regulatory co-management decision-making. Pursuant to the FSA, take of fur seals in the manner petitioned by ACSPI is prohibited unless otherwise authorized by the statute or through regulations promulgated by the Secretary of Commerce. Thus, absent the promulgation of regulations to authorize mortality of female fur seals, Alternative 2A could not be implemented consistent with the FSA. To address the FSA take prohibition, NMFS created Alternative 2B (Table 2.2-3) with an additional regulatory provision to authorize mortality of up to 20 females during the hunting or harvesting seasons. If 20 females are killed on St. Paul Island subsistence use will be terminated for the year by a regulatory provision. Alternative 2B is the preferred alternative in the FSEIS. Thus, Alternative 2A differs from 2B in authorizing an allowance for annual female mortality. Alternative 2B authorizes the mortality of up to 20 female fur seals during subsistence activities, and terminates subsistence use for the remainder of the year if 20 females are killed, and 2A attempts to delegate the authority to manage female mortality solely to the Co-Management Council.

Alternatives 2A and 2B both:

- retain the Assistant Administrator's authority to suspend or terminate the take if there is a determination that subsistence use is being accomplished in a wasteful manner;
- eliminate the regulatory process used to establish harvest take levels every 3 years;
- eliminate the regulatory restriction to establish a lower harvest take level;
- eliminate the regulatory restriction of harvesting fur seals 124.5 cm or less in length;
- eliminate the regulatory restriction that the Pribilovians must give adequate notice of their harvest schedules to NMFS;
- eliminate the regulatory restriction that no haulout area may be harvested more than once per week;
- eliminate the regulatory prohibition to allow harvesting of fur seals with tags or entangling debris;
- eliminate the regulatory prohibition on taking of pups and adult fur seals (*i.e.*, 7 years or older);

- eliminate the regulatory restriction that only experienced sealers may participate in subsistence use activities;

- create an annual upper harvest take level of 2,000 northern fur seals in the regulations;

- create a new subsistence hunting season from January 1 through May 31 and extend the summer harvest season from June 23 through December 31 by regulation;

Alternatives 2A and 2B both use the Co-Management Council to create and implement an annual subsistence use management plan. The annual plan could include limitations on timing, frequency, and locations for subsistence use; monitoring and reporting; and additional suspension or termination provisions to be implemented by the Co-Management Council. Co-Management Council's plans are intended to minimize sub-lethal effects on seals not harvested, maximize detection and avoidance of females, minimize struck and loss, 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 by time or area. That is, the Co-Management Council:

- Would create annual plan(s) to monitor and manage subsistence use and then create a process to make decisions about the need to take in-season 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.

Table 2.2-2 Alternative 2 Option A

Alternative Component	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 conditions that led to the harvest 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

Alternative Component	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 conditions that led to the harvest 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 the use of firearms to hunt fur seals but restrict the use of firearms to hunt 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 at 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, some of which would be addition to existing provisions. 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 (2014), 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 consider prohibiting subsistence use at all breeding areas that meet those thresholds 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, and to 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 estimates of the number of seals struck and lost.

Table 2.2-4 Alternative 3

Alternative Component	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 terminates the subsistence use when 2,000 juvenile seals have been killed. The AA determines 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 (assumes the harvest at this time would occur similar to Alternative 1);

8. Create a provision to prohibit the harvest from breeding locations at risk of reaching unsustainable population levels;

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);

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; and

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 would continue to be managed and monitored under federal regulations more than by the Co-Management Council (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

Alternative Component	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. The AA determines 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 subsistence 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 7,726 seals[32]; therefore, the upper limit of the subsistence harvest range would be 3,863 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;

[32] Updated based on the 2018 Stock Assessment Report (Muto et al. 2019).

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 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 after 2019 would be set at 50% of PBR from the most recent stock assessment, 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 years' 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 Co-Management Council (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

Alternative Component	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 based 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.

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

Alternative Component	Alternative 1 - No Action	Alternative 2 - Petitioned/Preferred Alternative		Alternative 3	Alternative 4	Alternative 5[4]
		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 juvenile 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] (3,863 seals[5]). 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 annually based on pup production and trend projection (see Johnson et al. 2013)	Determined annually based on pup production and trend projection (see Johnson et al. 2013)	Same as Alternative 4
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	Female mortality threshold to be set by Co-Management Council.	Female mortality threshold to be set by Co-Management Council.	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	Retain AA authority to suspend harvest based on "wasteful manner" provision.		The AA determines the harvest or hunt is being conducted in a wasteful manner results in a 2-day suspension	Same as Alternative 3	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.
	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	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	After (1) August 8; (2) Subsistence need has been met; (3) Conditions that led to waste or wasteful taking have not been remedied. Also per co-management 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 conditions that led to the harvest being conducted in a wasteful manner have not been remedied	The AA terminates the subsistence use when 2,000 juvenile seals have been killed The AA determines the conditions that led to the harvest or hunt being conducted in a wasteful manner have not been remedied	Same as Alternative 3	The AA determines the upper end of the subsistence harvest range has been reached. The AA determines conditions that led to the harvest being conducted in a wasteful manner have not been remedied.

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	
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 seals 124.5 cm or less in length (which are considered to be seals aged 2 to 5 years old).

[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 (Muto et al. 2019) 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 7,726 seals; therefore, 50% of PBR is 3,863 seals.

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

[4] - 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.

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

3. AFFECTED ENVIRONMENT

The environment affected by the subsistence use 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 Eastern Bering Sea (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 use alternatives described in Chapter 2. Due to: 1) the isolation and independence of subsistence use on each island; 2) the prescriptive and restrictive methods used in the past 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 (NRC 1996). 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.

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 accessible beach habitat. The islands are treeless and covered with mixed vegetation, wet to dry tundra, dwarf shrub communities and scattered small-patch wetlands (NRC 1996). 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.

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 (NMFS 2007a). 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 – no evidence of differences; 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 FSEIS.

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 2018 Marine Mammal Stock Assessment Report (Muto et al. 2019). 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 population estimate for the Eastern Pacific stock of northern fur seals is calculated as the estimated number of pups born at rookeries in the eastern Bering Sea multiplied by a series of expansion factors determined from a life table analysis to estimate the number of yearlings, 2-year-olds, 3-year-olds, and animals 4 or more years old (Lander 1981). The resulting population estimate is equal to the pup production estimate multiplied by 4.47. The expansion factor is based on a sex and age distribution estimated after the harvest of juvenile 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 on the Pribilof Islands. The most recent estimate for the number of fur seals in the Eastern Pacific stock, based on pup production estimates from Sea Lion Rock (2014), on St. Paul and St. George (mean of 2012, 2014, and 2016), and on Bogoslof Island (mean of 2011 and 2015), is 620,660 (4.47 × 138,850) (Muto et al. 2019). The St. Paul portion of this stock is estimated at 424,531 fur seals (R. Towell, Pers. Comm. April 24, 2019).

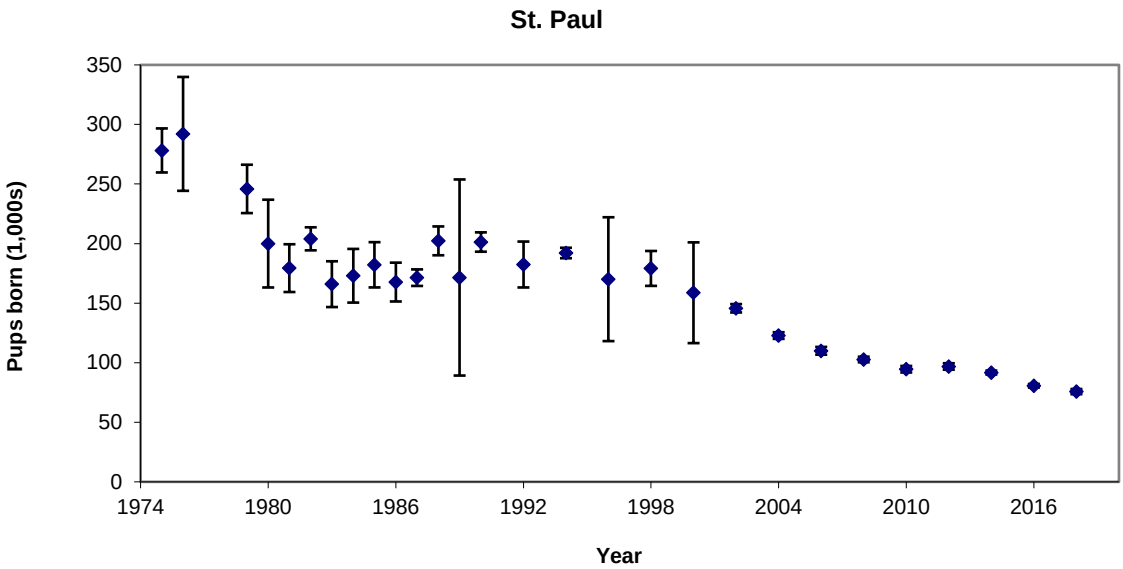
3.2.1.1. Minimum Population Estimate

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): $N_{MIN} = N/\exp(0.842\times[\ln(1+[CV(N)]^2)]^{½})$ and is 525,333 for the stock (Muto et al. 2019). Using the St. Paul population estimate (N) of 424,531 and the default CV (0.2), N_{MIN} for the St. Paul northern fur seal population is 359,327 (R. Towell, Pers. Comm. April 24, 2019). From the minimum population size NMFS calculates the potential biological removals for the stock as 11,295. This is the conservative estimate of the number of human-caused seal mortalities that could occur based on the guidelines (Wade and Angliss 1997). The St. Paul portion of PBR is 7,726 (R. Towell, Pers. Comm. April 24, 2019).

3.2.1.2. Current Population Trend

Estimates of the size of the Alaska population of northern fur seals increased to approximately 1.25 million in 1974 after the termination of commercial sealing on St. George in 1972 and pelagic sealing for science in 1974; commercial sealing on St. Paul continued until 1984. The population then began to decrease, with pup production declining at a rate of 6.5-7.8% per year into the 1980s (York 1987). By 1983, the total stock estimate was 877,000 fur seals (Briggs and Fowler 1984). Annual pup production on St. Paul Island remained stable between 1981 and 1996 (York and Fowler 1992). Between 1998 and 2016, the St. Paul pup production declined 4.12% per year (SE = 0.49%; $P < 0.01$); the most recent biennial pup production estimate in 2018 shows continued decline of pup production on St. Paul and an increase on St. George (Towell et al. 2019). The ongoing decline in pup production at St. Paul is the determining factor for the overall stock estimate (Muto et al. 2019).

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



3.2.1.3. Current and Maximum Net Productivity Rates

Pelagic sealing led to a decrease in the fur seal population at the turn of the century; however, a moratorium on fur seal harvesting and termination of pelagic sealing resulted in a steady increase in the northern fur seal population during 1912-1924. 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, NMFS-AFSC-MML (retired), unpubl. data). This growth rate is similar and slightly higher than the 8.1% rate of increase (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 (Muto et al. 2019).

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)).[33] The maximum net productivity level (MNPL) is directly related to the OSP.[34] 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 and Smith 1981). MNPL is an assessed range that will produce the maximum net increase in population.[35]

The MNPL for marine mammals is at least 50% of carrying capacity (Eberhardt and Siniff 1977), and may be as high as 80% (Fowler and Smith 1981; Fowler 1988). In 1977, the mid-range value of 60% was used to determine if a stock of dolphins was depleted.[36] The 60% value was supported by NMFS[37] in the final rule governing the taking of marine mammals that are incidental to commercial tuna purse seine fishing operations in the eastern tropical Pacific Ocean.[38] 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:

> *the Secretary [of Commerce], after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under [the MMPA], 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 [16 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. 1531-1544)].*

On May 18, 1988, NMFS declared the Eastern Pacific (Pribilof Island population) stock of northern fur seals depleted under the MMPA because it declined to less than 50% of population levels observed in the 1940s and 1950s[39]; at that time, there was no compelling evidence carrying capacity (K) had changed substantially since the 1940s and 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[40].

Congress directed the Secretary of Commerce 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). Section 115 of the MMPA on conservation plan development (16 U.S.C. 1383b(b)(2), Sec

---

[33] 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 carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element" (16 U.S.C.1362(9)).
[34] 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
[35] *Federal Register* 41 FR 55536, December 21, 1976.
[36] *Federal Register* 42 FR 64548, December 23, 1977.
[37] 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 to the population level that results in maximum net productivity."
[38] Federal Register 45 FR 72178, October 31, 1980.
[39] Federal Register 53 FR 17888, May 18, 1988.
[40] Federal Register 51 FR 47156, December 30, 1986.

115. (b)(2)) indicates that conservation plans are to be modeled on recovery plans required under section 4(f) of the Endangered Species Act of 1973 (16 U.S.C. 1533(f)). NMFS has included information on the status of the stock, 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

NMFS determined that the decline of fur seals was attributed to the culling 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 (2000) 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;

- 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[41] 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.

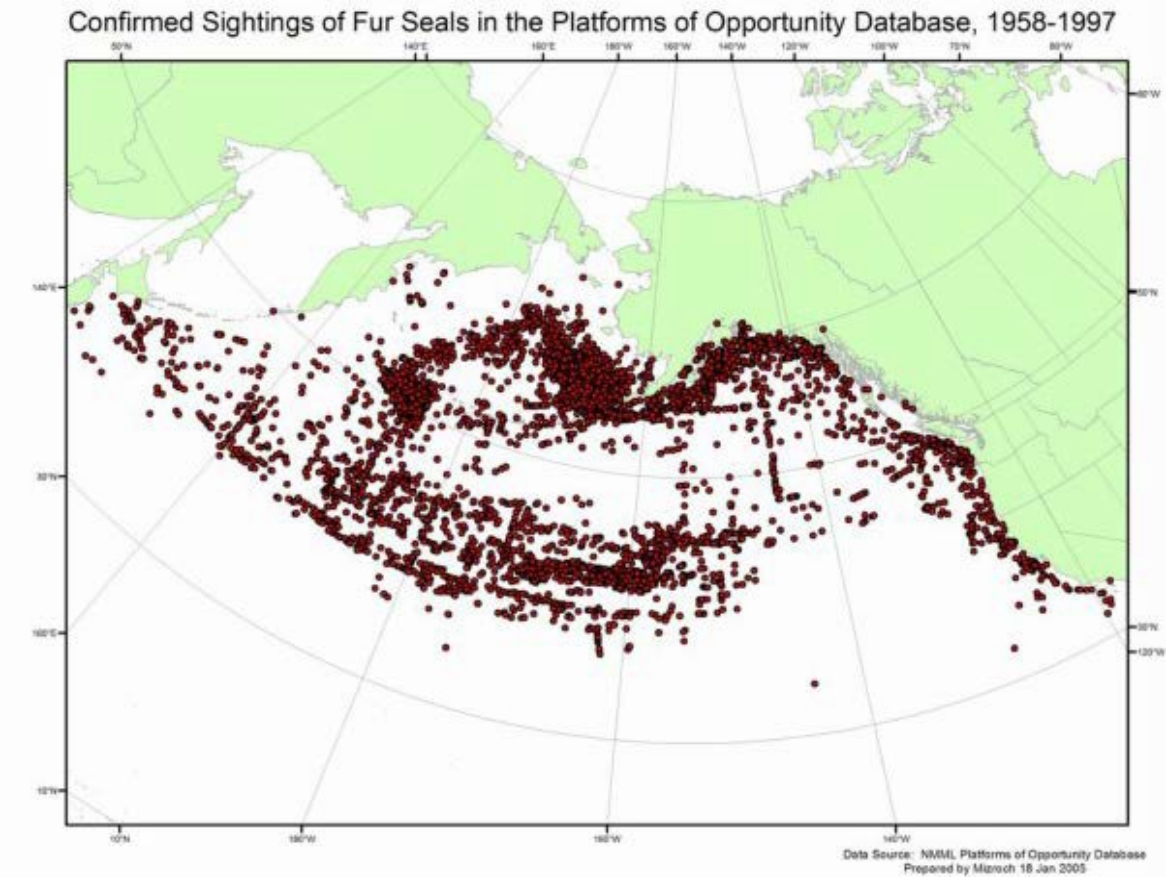
3.2.3. Northern Fur Seal Behavior and Biology

The Pribilof Islands are the primary terrestrial habitat for the majority of the Eastern Pacific stock for pupping, mating, and rearing of pups, as well as breeding, molting, and resting habitat for breeding and non-breeding seals. 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 of use of specific Aleutian passes is not quantified except for Unimak Pass, which is a known primary migration corridor. 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) non-breeding 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).

[41] The MMPA (16 U.S.C. 1362(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. 1531-1544] 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. 1531-1544), 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.



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 (50 CFR 216.72(a)); 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 breed at the breeding area where they were born. 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 their 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 depart from their island of birth to begin their pelagic winter migration (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 from St. Paul Island (NMFS unpublished, R. Ream, Pers. Comm. December 18, 2015). In summary:

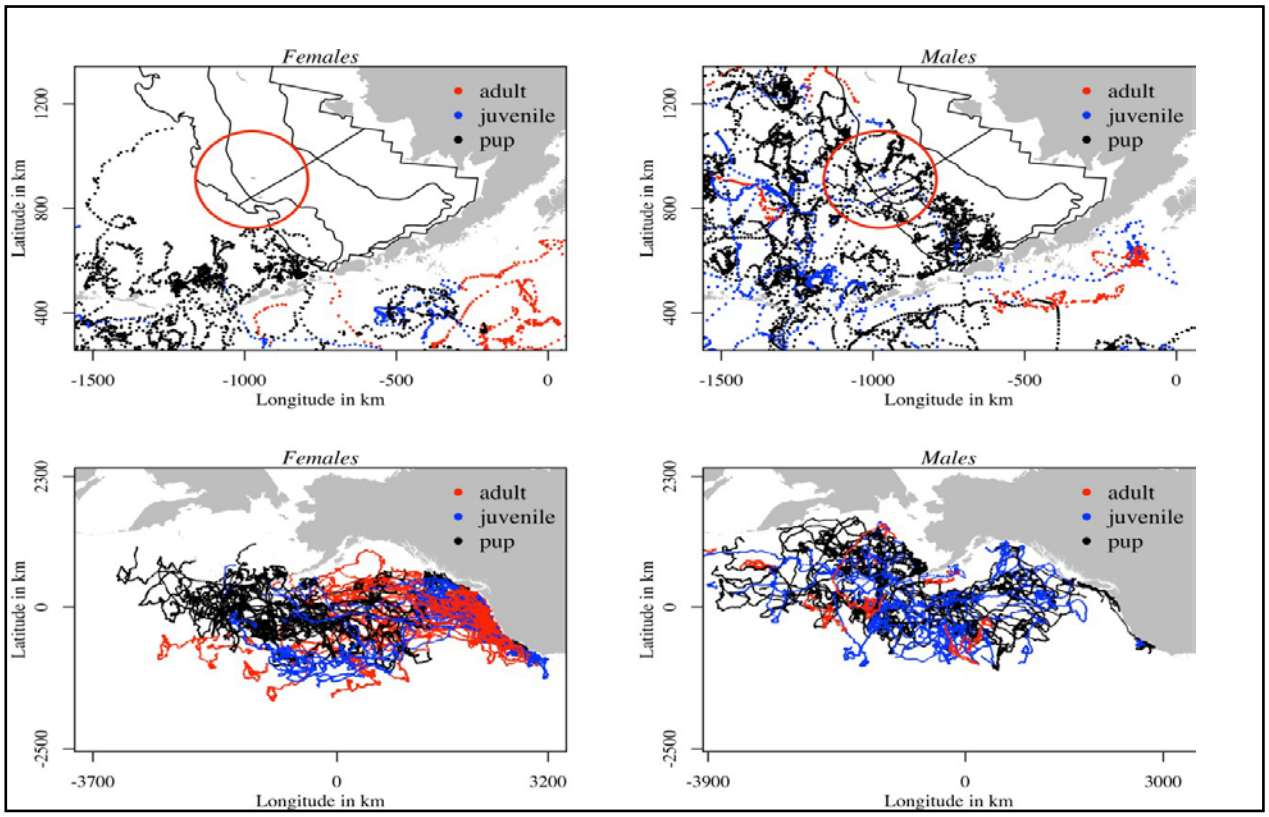
1. Based on tagging data, there is a relatively low number of fur seals in the Bering near the Pribilof Islands from January through May;

2. Animals that are in the Bering Sea and near the Pribilof Islands between January and May are primarily males; and

3. Females were not located within 100 nm of St. Paul between January and May, only males were located within 100 nm.

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 (J. Sterling, NMFS unpubl. data) recorded a maximum distance traveled by female pups of 43 km and average maximum daily distance of 20.86 km prior to weaning. 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 (J. Sterling, NMFS unpubl. data).

Figure 3.2-3 Location of Northern Fur Seals during the Winter in the Bering Sea.



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 in California 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 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 and nursing 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 opportunities 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. 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 non-breeding males 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 breeding areas. 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).

Northern fur seal diet 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 on-shelf pelagic habitat 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 and 1996.

In a 1999 survey of mesopelagic nekton in the slope and oceanic waters of the southeastern Bering Sea, Sinclair and Stabeno (2002) reported bathylagid fishes 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 breeding area. 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 breeding area (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, lactating female fur seal foraging paths are defined by juvenile pollock aggregations.

A number of studies have found Bogoslof Island fur seals swim shorter foraging trips both temporally and spatially relative to St. Paul Island animals (Nordstrom et al. 2013; Kuhn et al. 2014a). 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 when fur seals use waters <200 m deep. 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 fur seal 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) 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 used both epipelagic (at night) and benthic (at day) dives; primarily foraging on-shelf in areas with deeper thermoclines that may concentrate prey closer to the ocean floor. In contrast, lactating fur seals on Bogoslof used strictly epipelagic (at night) dives and 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 both St. Paul and St. George Islands. 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).

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. 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).

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.

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).

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 the Pribilof Islands.

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 with 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. Duncan et al. (2013) detected C. burnetii in tissue samples from subsistence harvested sub-adult male northern fur seals on St. Paul in 2010 and 2011. 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 2013 study 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 resulting mortality of pups prior to weaning as an important factor contributing to 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 changes in the Bering Sea and North Pacific.

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 et al. 1993). 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 sub-adult male fur seals harvested 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/harvesting of fur seals that is unreported. This illegal use 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 taking 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 a total of 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 a total of 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 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 the Alaska Stock Assessment Reports (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region).

Between 2013 and 2017, incidental mortality and serious injury of northern fur seals was observed in one of the federally-managed U.S. commercial fisheries in Alaska monitored for incidental mortality and serious injury by fisheries observers: the Bering Sea/Aleutian Islands flatfish trawl fishery (Table 3.2-2; Breiwick 2013; MML, unpubl. data). The estimated mean annual mortality and serious injury rate in this fishery in 2013-2017 is 0.4 northern fur seals (Muto et al. 2019).

Observer programs for Alaska State-managed commercial fisheries have not documented any mortality or serious injury of northern fur seals (Wynne et al. 1991, Manly 2007).

Table 3.2-2 Summary of incidental mortality and serious injury of Eastern Pacific northern fur seals due to U.S. commercial fisheries in 2013-2017 and calculation of the mean annual mortality and serious injury rate (Breiwick 2013; MML, unpubl. data).

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean estimated annual mortality
Bering Sea/Aleutian Is. flatfish trawl	2013	obs data	99	0	0	0.4 (CV = 0.03)
	2014		100	1	1	
	2015		100	0	0	
	2016		99	0	0	
	2017		100	1	1	
Minimum total estimated annual mortality						0.4 (CV = 0.03)

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. A summary of entanglements in fishing gear reported in 2013-2017 is provided in Table 3 (Delean et al. in press). These mortality and serious injury estimates result from an actual count of verified human-caused deaths and serious injuries and are minimums because not all

entangled animals strand nor are all stranded animals found, reported, or have the cause of death determined. Three northern fur seals entangled in commercial Bering Sea/Aleutian Islands halibut longline gear and six northern fur seals entangled in commercial Bering Sea/Aleutian Islands trawl gear were reported to the NMFS Alaska Region stranding network in 2013-2017, resulting in minimum mean annual mortality and serious injury rates of 0.6 and 1.2 fur seals, respectively, in these fisheries (Table 3; Delean et al. in press).

An additional seven northern fur seals were initially considered to be seriously injured due to entanglement in commercial Bering Sea/Aleutian Islands trawl gear (1 in 2014), Bering Sea/Aleutian Islands trawl gear (1 in 2015), unidentified trawl gear (3 in 2016), and unidentified net (1 each in 2016 and 2017); however, because these animals were disentangled and released with non-serious injuries (Delean et al. in press), they were not included in the mean annual mortality and serious injury rate for 2013-2017.

The total mean annual mortality and serious injury rate incidental to U.S. commercial fisheries in 2013-2017 is 2.2 northern fur seals (0.4 from observer data + 1.8 from stranding data).

The minimum mean annual mortality and serious injury rate due to entanglements in gillnet (0.4), unidentified fishing gear (0.2), unidentified fishing net (0.2), and trawl gear (0.6) in Alaska waters in 2013-2017 totaled 1.4 northern fur seals (Table 3.2-3; Delean et al. in press). 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.

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 is assigned to both the Eastern Pacific and California stocks of northern fur seals (see Table 3). Reports to the NMFS West Coast Region stranding network in 2013-2017 resulted in a minimum mean annual mortality and serious injury rate of 0.6 northern fur seals from entanglements in trawl gear (0.4) and unidentified fishing net (0.2), from unknown (commercial, recreational, or subsistence) fisheries, off the U.S. west coast in December through May (Table 3.2-3; Delean et al. in press). This mortality and serious injury estimate results from an actual count of verified human-caused deaths and serious injuries and is a minimum because not all entangled animals strand nor are all stranded animals found, reported, or have the cause of death determined.

Table 3.2-3 Summary of mortality and serious injury of Eastern Pacific northern fur seals, by year and type, reported to the NMFS Alaska Region and NMFS West Coast Region marine mammal stranding networks in 2013-2017 (Delean et al. in press.)

Cause of injury		2013	2014	2015	2016	2017	Mean annual mortality
Entangled in commercial Bering Sea/Aleutian Is. halibut longline gear		0	3	0	0	0	0.6
Entangled in commercial Bering Sea/Aleutian Is. trawl gear		0	6		0	0	1.2
Entangled in Bering Sea/Aleutian Is. trawl gear*		0	0	1	0	0	0.2
Entangled in Bering Sea/Aleutian Is. gillnet gear*		0	0	1	0	0	0.2
Entangled in Bering Sea/Aleutian Is. unidentified fishing gear*		0	0	1	0	0	0.2
Entangled in gillnet*		0	1	0	0	0	0.2
Entangled in unidentified net*		0	1 + 1[a]	0	0	0	0.4
Entangled in trawl gear*		0	2[a]	0	1	1	0.8
Entangled in marine debris		1	11	0	9	13	6.8
Struck by car		0	0	1	0	0	0.2
Dog attack		0	1[a]	0	0	0	0.2
Oil/tar		0	1[a]	0	0	0	0.2
Total in commercial fisheries							1.8
*Total in unknown (commercial, recreational, or subsistence) fisheries							2
Total in marine debris							6.8
Total due to other sources (car strike, dog attack, oil/tar)							0.6

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

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 Bering Sea and 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 Pacific cod 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. The Pribilof Islands blue king crab stocks in the PIHCZ have not recovered as a result of the trawl closures in 1994 and the Pacific cod pot gear closures in 2014. In October 2018, the NPFMC took final action to recommend changes to

management measures in the BSAI fisheries, which, if implemented by NMFS, would prohibit all use of pot gear in the PIHCZ.

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:

1. Competition may vary depending on the availability of smaller prey in foraging areas;

2. 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;

3. 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;

4. 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);

5. 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 represents about one percent of 1-year-old biomass and about four percent of 2-year-old biomass 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 - 2018
Adult Males Census	Bogoslof Island	2005
Pup Census	Bogoslof Island	1993, 1994, 1995, 1997 and 2005, 2011, 2015
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, 2016, 2018
Pup Tagging and Re-sighting	San Miguel Island	1993 - 2005
Pup Tagging	Pribilof Islands	2009 - 2017
Tagged seal resighting	Pribilof Islands	2010 - 2018
Movements and Distribution		
Pup Migration	St. Paul Island	1996, 1997, 2005, 2015
Pup Migration	St. George Island	1997, 2005, 2015
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	Pribilof Island	2002, 2009 – 2011, 2015 - 2017
Adult Female Reproductive Studies	St. Paul Island	2005
Mortality		
Pup Necropsies	St. Paul Island	1993 - 2002, 2004 - 2007
Pup Necropsies	San Miguel Island	1996
Ecology, Diet and Energetics		
Adult Female Foraging	St. Paul Island	1994 - 1996, 1998, 2000 - 2002, 2004 – 2014, 2016, and 2017
Adult Female Foraging	St. George Island	1995, 1996 and 2004-2014, 2018
Adult Female Foraging	San Miguel Island	1996, 2001, 2004 and 2005
Adult Female Foraging	Bogoslof Island	1997 2005, 2011, 2015
Sub-adult Foraging	St. Paul Island	1999 and 2000
Scat Sampling	Pribilof Islands	1993 – 2002, 2004 – 2018 (even years)
Scat Sampling	Bogoslof Island	1997 and 2005, 2011, 2015
Stable Isotope Sampling	Pribilof Islands	1997
Pup Diving Development	Pribilof Islands	1995 and 1996
Fisheries Interactions		
Entanglement Surveys, juvenile male	Pribilof Islands	1995 – 1997, 2003
Entanglement Surveys, opportunistic	Pribilof Islands	2009 - present
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. 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[42], 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 October 8, 2014[43], 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 have been issued 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 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.

---

[42] *Federal Register* 74 FR 44822, August 31, 2009.
[43] *Federal Register* 79 FR 60811, October 8, 2014.

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 Arctic Climate Impact Assessment (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

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's 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 FSEIS addresses aspects of the NMFS OPR policy as described below (2016)[44]:

> *The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) presents 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 when data are available to allow such evaluation. When data specific to that pathway are not available, we will use information that is most consistent with the underlying direction of that pathway (i.e., assuming a lower rather than higher level of effective mitigation efforts). 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). . . . For certain species, climate change may result in some potentially beneficial effects such as, for example, new suitable habitat being 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 of climate change as part of the decision-making process. When the best available information is fairly certain as to the relative magnitude of beneficial to adverse effects, NMFS will treat them as either predominantly beneficial or adverse in accordance with that information ; when uncertain of the relative magnitude of effects, more weight will be given to the detrimental effects in decisions made after the initial listing determination. This is consistent with the principle institutionalized caution approach.*

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

[44] https://www.fisheries.noaa.gov/national/endangered-species-conservation/endangered-species-act-guidance-policies-and-regulations.

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 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 - 20161

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)[45].

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

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

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 population of Steller sea lions, including those on the Pribilof Islands, was listed as threatened under the ESA throughout its range on November 26, 1990[46] 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[47]: the population segment west of 144°W, Cape Suckling, Alaska, was reclassified as endangered at that time [48] 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[49] 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[50]. 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

[46] **Federal Register** 55 FR 49204, November 26, 1990.
[47] **Federal Register** 62 FR 24345, May 5, 1997.
[48] **Federal Register** 62 FR 24345, May 5, 1997 (NMFS); 62 FR 30772, June 5, 1997 (FWS).
[49] **Federal Register** 77 FR 23209, April 18, 2012.
[50] **Federal Register** 78 FR 66140, November 4, 2013.

for breeding purposes (Elliott 1875; Preble and McAtee 1923). Human habitation of St. George and St. 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 that 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 total number of harbor seal stocks from the three stocks (i.e., Bering Sea, GOA, Southeast Alaska) previously recognized to 12 separate stocks. Harbor seals found on St. Paul Island are considered part of the Pribilof Islands Stock (Muto et al. 2019).

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 (including the Beringia DPS and Okhotsk DPS) were listed as threatened under the ESA and as depleted under the MMPA[51].

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).

Three subspecies of ringed seals (including the Arctic subspecies) were listed as threatened and one subspecies was listed as endangered under the ESA in 2012[52] 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[53].

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-

[51] *Federal Register* 77 FR 76740, December 28, 2012.
[52] *Federal Register* 77 FR 76706, December 28, 2012.
[53] *Federal Register* 79 FR 73010, December 9, 2014.

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 http://live.laborstats.alaska.gov/cen/hist.cfm
** 1990 Census Data. http://live.laborstats.alaska.gov/cen/hist.cfm
*** 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" (see report to Congress62 FR 18316, April 15, 1997). 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 City of St. Paul worked with the Army Corps of Engineers under the Water Resources Development Act to complete development of the St. Paul harbor with State and private funds to match federal funds of about $19 million in 1989. The St. Paul commercial halibut fishery started in 1981, 33 small fishing boats (16 to 33 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 available to CDQ groups in that particular area (IPHC Area 4C), while the remaining 15% of the quota available to CDQ groups is allocated to the Aleutian Pribilof Islands Community Development Association (i.e., a group representing

St. George) (IPHC 4C[54]). In 2016, CBSFA's portion of the total allowable catch (quota) for halibut was 311,780 pounds (NOAA 2016). While CBSFA owns several crab vessels[55], 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 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 both islands. 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

[54] http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/chart03_bs.pdf
[55] CBSFA owns two crab vessels outright, two vessels at 75%, and two additional vessels at 35%.

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, 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.

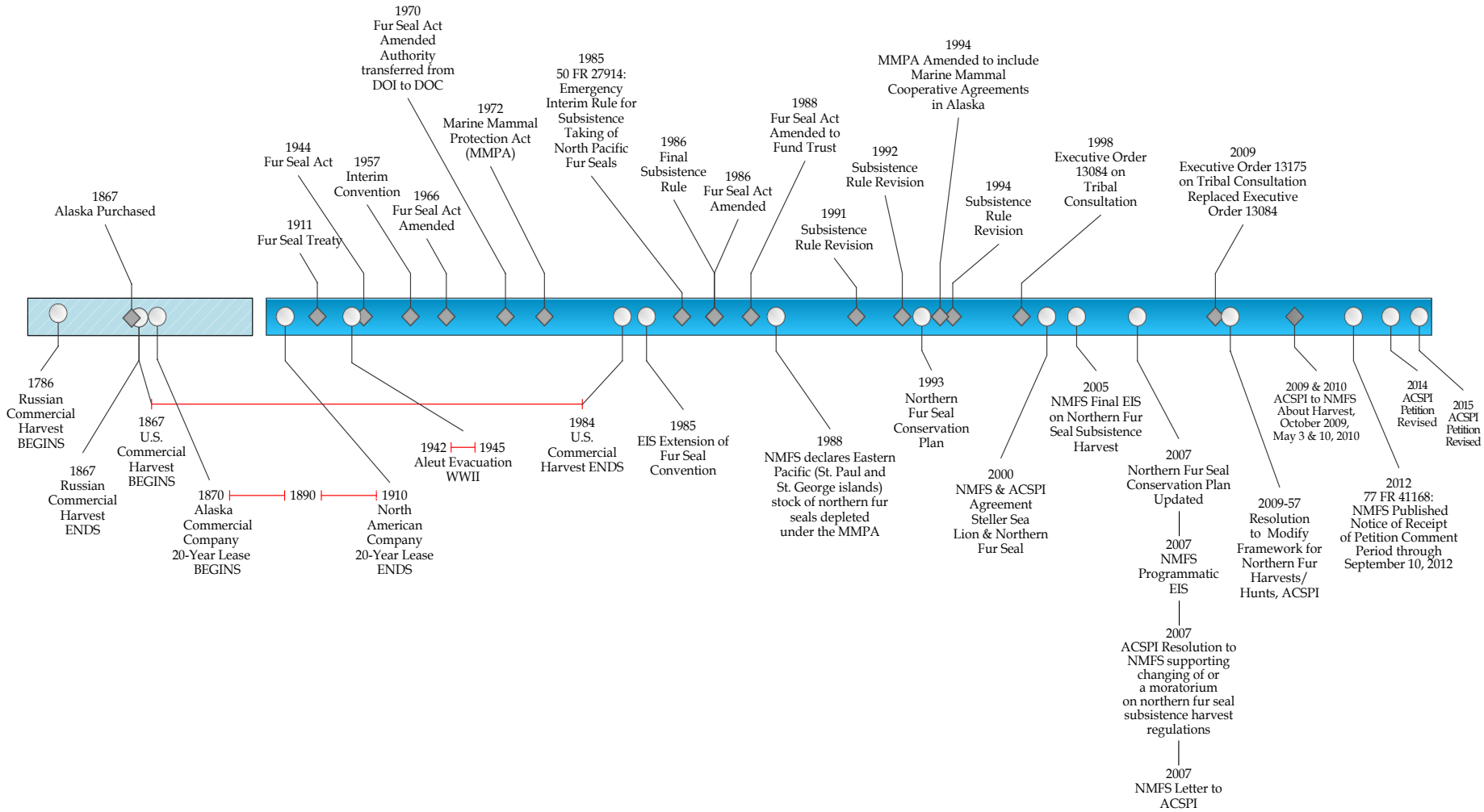
The population grew rapidly after the cessation of pelagic sealing until the mid-1940s. From 1918 to about 1941, the Pribilof Island fur seal stock grew at 8% per year under a harvest, which ranged from 15,862 animals in 1923 to 95,016 animals in 1941 (Roppel 1984). In 1941, Japan abrogated (revoked) 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 1995). 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



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 are caught locally, thus fur seals are the most reliable source of fresh meat on St. Paul.

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 allowed the 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 from mid-August through December 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[56] 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).

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[57], 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[58] by, among other things, providing for the administration of the Pribilof Islands as a special

[56] *Federal Register* 51 FR 24828, July 9, 1986.
[57] 37 U.S. Statutes at-Large Chapter 373, Page 499-502 (37 Stat. 499); August 24, 1912.
[58] "To implement…provisions of the Convention, Congress enacted the Fur Seal Act of 1966." *Fouke Co. vs. Mandel*, 386 F. Supp. 1341, 1346 n.6 (D. Md. 1974). Also see House Report No. 89-2154 (1966), 1966 U.S. Code Congress and Admin. News (U.S.C.C.A.N.) 3628.

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[59].

From 1957 through 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.

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 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 Commission (NPFSC) under the Convention, and since MMPA Section 101(b) (16 U.S.C. 1371(b)) only allowed restrictions on Alaskan Native subsistence takes if the stock has been designated as depleted[60]. The preamble to the 1985 emergency interim 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."[61] At that time, NMFS noted that "in the absence of a functioning Convention, it is not clear what force should be afforded various provisions of the FSA. Some section[s] obviously have an authority independent of the Convention, others may not."

Section 103(b) of the FSA (16 U.S.C. 1153(b)) states: " Indians, Aleuts, and Eskimos who live on the Pribilof Islands are authorized to take fur seals for subsistence purposes as defined in [16 U.S.C. 1379(f)(2) of the MMPA], under such conditions as recommended by the [NPFSC] and accepted by the

[59] DOC, the 1970 Reorganization Plan No. 4.
[60] NMFS designated the Pribilof Islands northern fur seal stock depleted under the MMPA on June 17, 1988 **(Federal Register** 53 FR 17888, May 18, 1988). Until then NMFS did not have the authority under the MMPA to regulate subsistence harvests for those marine mammal stocks used for subsistence purposes.
[61] *Federal Register* 50 FR 27914, July 8, 1985.

Secretary of State pursuant to regulations promulgated by the Secretary [of Commerce]." Therefore, under this section of the FSA (16 U.S.C. 1153(b)), 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[62] 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 emergency interim rule NMFS relied on Section 105(a) the FSA (16 U.S.C. 1155(a)), which authorizes 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 fur seal population…" As noted in the preamble to 1985 rule NMFS evaluated whether to regulate subsistence harvest under the FSA or MMPA. While NMFS noted that "[t]wo statutes are potentially applicable to the taking of fur seals on the Pribilof Islands absent the Convention, the MMPA and the FSA," NMFS determined in 1985 that the general rulemaking authority of the FSA was the most appropriate for regulating subsistence harvest and so NMFS relied on that "broad" statutory authority.[63]

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 harvests in the late 1970s 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 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.

NMFS published a final rule on July 9, 1986[64], 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 1985 emergency interim regulations under the MMPA (16 U.S.C. 1361[65]) and, again, under Section 105(a) of the FSA (16 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, although NMFS reiterated that the 1986 regulations were also issued under the "broad" rulemaking authority of section 105(a) of the FSA (16 U.S.C. 1155(a)). The 1985 emergency regulations

[62] Federal Register 50 FR 27914, July 8, 1985.
[63] Federal Register 50 FR 27914, July 8, 1985.
[64] *Federal Register* 51 FR 24828, July 9, 1986.
[65] Federal Register 51 FR 24828.

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.

The revised 1986 regulations[66] 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, since 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: "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

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

The purpose of the regulations[67] 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 1986-1992), 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[68]. 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.

---

[66] Federal Register 51 FR 24828.
[67] 50 CFR 215 Subpart D--Taking for Subsistence Purposes (former citation for Fur Seal subsistence take regulations).
[68] MMPA, Section 3(4). Definition (16 U.S.C. 1362(4)) states that for the purposes of the MMPA 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."

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 1992, 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[69].

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[70], 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[71]. 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 modifying the season to begin on June 23 (instead of June 30[72]), and removed 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[73].

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[74]. 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[75], 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. NMFS has relied on Section 105(a) of the FSA (16 U.S.C. 1155(a)) as the authority for the 1986 final rule, under which NMFS still operates. The continued authority of some aspects 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. The FSA, however, continues to provide statutory authority over the regulation of northern fur seals for their conservation, management, and protection.

It was not until the MMPA was amended in April 1994 to include Section 119, Marine Mammal Cooperative Agreements in Alaska (16 U.S.C. 1388(a)), that it became clear that the intent of Congress

---

[69] Section 215.32(t)(2) (former citation for regulation) 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.
[70] *Federal Register* 53 FR 28886, August 1, 1988.
[71] 50 CFR 215.32(c)(I) (former citation for regulation).
[72] Federal Register 57 FR 33900, July 31, 1992.
[73] Federal Register 57 FR 33900, July 31, 1992.
[74] Federal Register 59 FR 25024, May 13, 1994.
[75] Federal Register 59 FR 35471, July 12, 1994.

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[76] between the Pribilof Community of St. Paul an NMFS is specific to the conservation and co-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; the revised Co-management Agreement will cover the conservation and co-management of harbor seals as well as northern fur seals and Steller sea lions (see Chapter 1.6 of this SEIS).

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

The MMPA, Section 119 (16 U.S.C. 1388(a)) 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 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 do not currently fully reflect the intent of the 1994 amendments to the MMPA for greater cooperation and flexibility regarding subsistence harvest management. NMFS and ACSPI entered into an Agreement on June 13, 2000[77] to work in partnership to achieve the following:

1. Promote the conservation and preservation of fur seals and sea lions;

2. 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;

3. 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.;

4. 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

5. 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, recommend, 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 216.71-216.74.

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

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

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 on St. Paul Island 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 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 on St. Paul Island 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 needs to 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 and 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, including 'not accomplished in a wasteful manner'[78]. 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 that is not likely to ensure the killing and retrieval of the fur seal (50 FR 27914, 27916, July 8, 1985).

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 (16 U.S.C. 1362(4)).

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 Co-Management Agreement at sub-section (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://www.fisheries.noaa.gov/alaska/marine-mammal-protection/northern-fur-seal-subsistence-harvest-estimates-and-reports.

[78] 16 U.S.C. 1371(b)(3) (MMPA provision prohibiting taking for subsistence purposes from being accomplished in a wasteful manner).

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 Aleut 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 defined by NMFS to mean ‘‘halibut caught by a rural resident or 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’’ (50 CFR 300.61). 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. NMFS defined ‘‘subsistence’’ as ‘‘non-commercial, long-term, customary and traditional use of halibut’’ (50 CFR 300.61). 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[79]. 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 April 13, 2003[80]. Regulations that manage the subsistence program have been repeatedly amended[81], once in 2005[82] and again on November 4, 2009, when NMFS published a final rule[83] 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:

---

[79] *Federal Register* 67 FR 54767, August 26, 2002.
[80] *Federal Register* 68 FR 18145, April 15, 2003.
[81] The regulations that govern the subsistence halibut fishery can be found at 50 CFR 300, Subpart E.
[82] *Federal Register* 70 FR 16742, April 1, 2005.
[83] *Federal Register* 74 FR 57105, November 4, 2009.

> *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, as defined at 50 CFR 216.3, means:

> *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. No non-edible marine mammal part may be sold or transferred to any person other than an Alaska Native, unless that non-edible marine mammal part has first been transformed into an authentic native article of handicraft or clothing.

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, 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[84] 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 that 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 originally defined at the 1996 World Food Summit and then revised in 2002 as that situation when “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization [FAO] 2002). 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 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.

[84] *Federal Register* 51 FR 17896, 17899 (May 15, 1986).

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).

- Page Intentionally Left Blank -

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 regulations 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 incomplete or 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[85] 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

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

Steller sea lion struck and lost rates on St. Paul. If Alternative 2 or 3 were implemented, data would be collected to characterize rates of struck and lost fur seals from subsistence hunting. These estimates would be used to inform future subsistence use management (see Chapter 2). In Sections 4.2.2 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 1994) 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 petition 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" (16 U.S.C. 1362(20)). PBR was intended to serve as an upper limit guideline for fishery-related mortality for each stock rather than population unit, is annually reported in the stock assessment report (Muto et al. 2019), 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 harvest regulations for St. George Island (NMFS 2014a). PBR is a precautionary 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 an average of the three most recent pup production estimates from the Pribilof Islands to estimate the minimum population size and PBR. For the 2018 Stock Assessment report (Muto et al., 2019), NMFS estimated the Eastern Pacific stock of northern fur seals as 620,660. When correcting for the St. Paul portion of the population to be affected, the minimum population size is 359,327 (R. Towell, Pers. Comm. April 24, 2019). 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 7,726 for St. Paul versus 11,295 for the entire stock. By using the St. Paul specific PBR in our analysis we have provided a conservative estimate of effects that is 32% smaller than using the stock-level estimate of effects.

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, July 20, 2004). To be consistent with this prior policy NMFS defined a “negligible effect” as subsistence use-related mortality less than or equal to 10% of PBR. Following the logic of this threshold for fishery-related regulations, this analysis considers harvest-related mortality equal to or greater than 50% of PBR to be a “major effect”. 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 11% and 30% of PBR to be a “minor effect” and mortality equal to or more than 31% 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, subsistence users are able to select male fur seals due to their behavior and presence at

predictable sites or times of year. This male-only harvest protects the female portion of the population and provides an additional protection factor because mortality of non-breeding males for subsistence purposes will not negatively affect pup production (DOC 1985, NMFS 2014a). 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 exact 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 non-breeding 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, over 90% of the population of young males that could be used for subsistence purposes would die naturally before breeding whether or not they are harvested. Therefore, human-caused mortality on younger age-classes will have less effect on the population than the same mortality of older 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 subsistence mortality of seal pups reduces the likelihood of population levels effects compared to the subsistence mortality of older animals (Brandon et al. 2017, Towell 2019).

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 Programmatic EIS (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 subsistence use activities analyzed here is that fewer animals (likely less than a few hundred per event) are rounded up for subsistence harvests than those typically herded for research (approximately a thousand seals per event).

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 4 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 (Ream 2019) and 2016 have been collected and analyzed, and the 2017 and 2018 data are still being analyzed (NMFS unpublished). 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 one harvest per week for the harvest season (NMFS unpublished data, available online at https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/northern-fur-seal-subsistence-harvest-estimates-and-reports#subsistence-harvest-reports).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, while the community of St. Paul could subsistence harvest seals on 49 days under the current regulations they actually have 8 subsistence harvests per year that kill 48 juvenile males per harvest on average during the past 15 years. We anticipate this amount of subsistence harvest effort (about 1 subsistence harvest per week during the season) to continue under the preferred alternative. Similarly, NMFS estimated that St. George would have more than one pup harvest per week, but in practice they have had on average 10 harvests during their first four full pup harvest seasons (1 harvest per week). NMFS expects similar subsistence pup harvest effort on St. Paul Island. Thus NMFS overestimated the possible number of subsistence harvests in the preferred alternative (i.e., 137 harvests to kill 2,000 seals) in order to provide a conservative (maximum) estimate of disturbance. Thus for analysis purposes, 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* Harvest Events Under Each Alternative

	Alternative 1	Alternative 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

*It is assumed that for each week during the harvest season, approximately 5 of those days would be spent harvesting pups.
** 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 sub-adult/juvenile or male pup harvests were estimated as follows:

1. Pups: two pups are disturbed for each pup harvested (these individuals are captured by the round-up method but are not harvested), 60 additional pups are disturbed for each harvest event (these individuals escape the round-up and enter the water). No pups are disturbed during the harvest of non-pups (due to habitat separation between pups and non-pups; see Section 3.2.6 for more information).

2. Non-pups: 1.15 non-pups are disturbed for each pup harvested (these individuals are initially captured in the round-up but are allowed to escape the pup round-up), 50 additional older animals (i.e., non-pups) are disturbed for each harvest event (these individuals escape the round-up and enter the water).

3. Non-pups: 4.9 non-pups are disturbed for every non-pup harvested (these individuals are captured in the round-up but are not harvested and allowed to escape based on the new analysis of subsistence harvest data), 50 additional non-pups are disturbed for each harvest event (these individuals escape the round-up and enter the water).

Therefore, to calculate potential mortality due to disturbance, analysts multiplied the number of harvest events by the number of animals (pups or non-pups) potentially exposed. This approach allows NMFS to estimate the range between the minimum and maximum level of disturbance of pups or non-pups that could result in sub-lethal effects under the proposed alternatives. The actual level of sub-lethal effects to pups and non-pups due to the proposed harvest of pups and juveniles 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 events under each of the five alternatives.

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

	Alternative 1[2]	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
– 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. – 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 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 that 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. Thus as the hunting season progresses monitoring will estimate the struck and lost rate for fur seals and that number will be added to the total number of seals retrieved. After the hunting season the Co-management Council will evaluate and agree on the total number of seals hunted (i.e., retrieved plus struck and lost) prior to the start of the subsistence harvest season. Additional detail on the impacts of Alternative 2 and total potential mortality is provided in Section 4.4. The Preferred Alternative will estimate struck and lost annually through the subsistence use monitoring program administered by the Co-Management Council. 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 on St. Paul Island, Alaska, 1992 – 2018

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
2015	17 71%	7 29%	24 100%	Memo for Record St. Paul
2016	17 55%	14 45%	31 100%	Memo for Record St. Paul
2017	17 57%	13 43%	30 100%	Memo for Record St. Paul
2018	22 79%	6 21%	28 100%	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 total during the year. 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 31% and less than 50% of PBR	Total mortality assessment between 30%-11% 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, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 2002). 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[86].

[86] The full definitions can be found here: http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf

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

- **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 non-Federal) 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 on St. Paul Island 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 continue to be co-managed by the Tribal Government of St. Paul Island and NMFS under a Co-Management Agreement[87].

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 a 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 216.71-216.74, 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 consensus.

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). The Preferred 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, under 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

[87] 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.

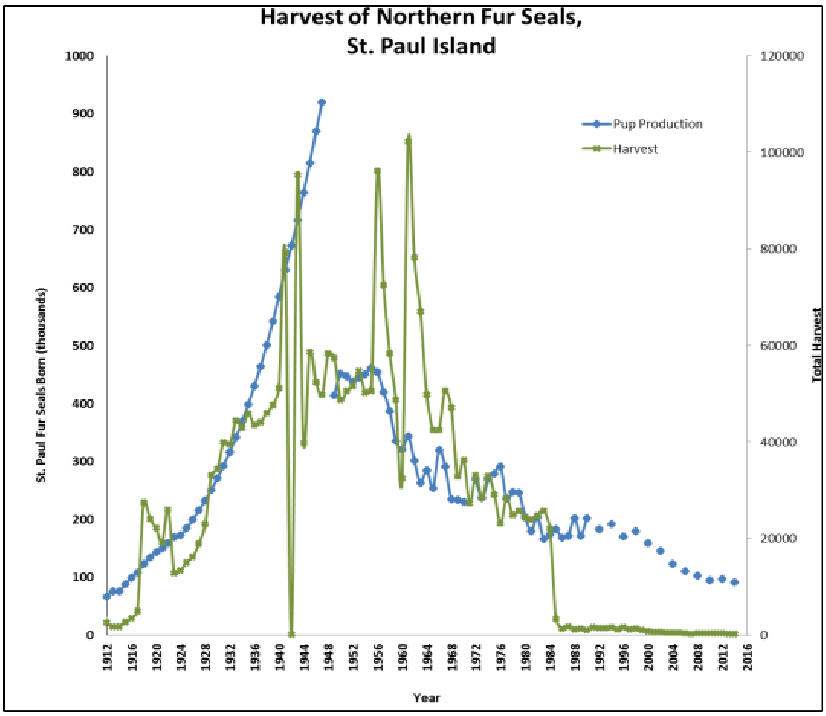
decisions to the Co-Management Council. See Section 2.2 and Table 2.2-6 for additional detail on the alternatives.

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's 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 on St. Paul, data indicate that almost 100 times the number of sub-adult male seals were killed annually in the commercial harvest between 1911 and 1984 (34,131 annually) compared to those taken for subsistence between 1985 and 2015 (29,246 total). Further, the Russians harvested approximately 34% to 93% of the estimated surviving sub-adult males on Tyuleniy Island from 1990 to 2003 (Kuzin 2010), which 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 2018) 71 females have been killed accidentally, or about 2 females per year. The rate of accidental female mortality during the entire subsistence period is 0.0023, which is approximately half of the rate observed during the commercial period. This rate compares total females killed to total males killed during the entire subsistence period (1985 to 2018).

NMFS evaluated the rate of accidental female mortality during the last 10 years of the commercial harvest leading to subsistence harvest (Table 4.3-1). Due to the number of seals killed during the commercial harvest, it is important for the public to understand is that every fifth fur seal harvested was sampled to identify age and sex. From this sampling scheme the actual number of females accidentally killed from 1975 through 1984 would have been approximately 5 times greater than available from the sampled portion of the commercial harvest. For example, in 1975 twenty percent of the 29,093 male seals commercially harvested were sampled (about 5,800). Of that sample of the commercial harvest, 55 of 5,800 sampled were females. Thus we must multiply 55 by five to estimate a total of 275 females were

accidentally killed during the 1975 commercial harvest. Therefore about one (0.94) female was accidentally killed for every 100 male seals killed during the commercial harvest in 1975. Similarly, in 1984, 32 females were identified from the twenty percent sample of the commercial harvest, thus about 160 females may have been killed in 1984.

Because of the concerns over illegal selling of seal baculum from the 1985 subsistence harvest, every seal killed during the subsistence harvest was checked by the NMFS hired veterinarian so all actual accidental female mortalities would have been detected in 1985 and afterwards. Therefore the number of female mortalities does not need to be corrected (i.e., multiplied by five) for sampling of the subsistence harvest (Table 4.3-1). From 1985-2018 (i.e., the entire subsistence period) 71 females have been accidently killed during the subsistence harvest of males. By comparison the average annual rate of accidental female mortality under the subsistence harvest (0.32 females per 100 males killed) has been about three times lower than the average annual rate of female mortality during the last ten years of the commercial harvest (0.96 females per 100 males killed).

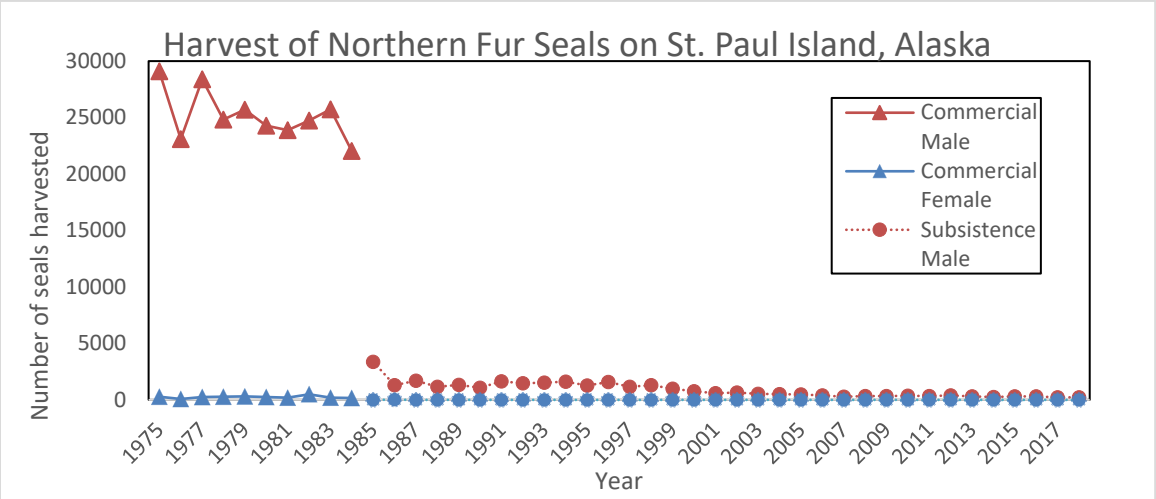
Table 4.3-1 The number of northern fur seals killed by sex and harvest type from 1975 to 2018 on St. Paul Island, Alaska

*Number in parenthesis represents the estimated total female mortality based on sampling of the commercial harvest.

Year	Males Harvested: St. Paul Island	Females killed accidentally: St. Paul Island	Females killed per 100 males harvested	Harvest Type
1975	29,093	55 (275)*	0.95	Commercial
1976	23,081	15 (75)*	0.32	Commercial
1977	28,396	48 (240)*	0.85	Commercial
1978	24,829	56 (280)*	1.13	Commercial
1979	25,702	60 (300)*	1.17	Commercial
1980	24,278	49 (245)*	1.01	Commercial
1981	23,892	36 (180)*	0.75	Commercial
1982	24,730	98 (490)*	1.98	Commercial
1983	25,728	40 (200)*	0.78	Commercial
1984	22,034	32 (160)*	0.73	Commercial
1985	3,379	5	0.15	Subsistence
1986	1,299	16	1.23	Subsistence
1987	1,704	6	0.35	Subsistence
1988	1,145	0	0.00	Subsistence
1989	1,340	0	0.00	Subsistence
1990	1,077	0	0.00	Subsistence
1991	1,644	1	0.06	Subsistence
1992	1,480	2	0.14	Subsistence
1993	1,518	0	0.00	Subsistence
1994	1,615	1	0.06	Subsistence
1995	1,263	2	0.16	Subsistence
1996	1,588	3	0.19	Subsistence
1997	1,153	3	0.26	Subsistence
1998	1,297	5	0.39	Subsistence
1999	1,000	0	0.00	Subsistence

Year	Males Harvested: St. Paul Island	Females killed accidentally: St. Paul Island	Females killed per 100 males harvested	Harvest Type
2000	754	1	0.13	Subsistence
2001	595	2	0.34	Subsistence
2002	646	2	0.31	Subsistence
2003	522	0	0.00	Subsistence
2004	493	0	0.00	Subsistence
2005	466	0	0.00	Subsistence
2006	396	4	1.01	Subsistence
2007	269	3	1.12	Subsistence
2008	328	3	0.91	Subsistence
2009	341	0	0.00	Subsistence
2010	357	0	0.00	Subsistence
2011	322	1	0.31	Subsistence
2012	383	0	0.00	Subsistence
2013	298	3	1.01	Subsistence
2014	262	4	1.53	Subsistence
2015	312	2	0.64	Subsistence
2016	308	1	0.32	Subsistence
2017	227	0	0.00	Subsistence
2018	224	1	0.45	Subsistence

Figure 4.3-2 Harvest of Northern Fur Seals on St. Paul Island, Alaska 1975-2018



Towell and Williams (2016) and Towell (2019) 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 projections from each of the proposed alternatives in the DSEIS (NMFS 2017) were compared to zero subsistence mortality (not an alternative considered in the DSEIS), because the differences among the model runs were very small. Towell (2019) modeled mortality of 20 female pups and 20 juvenile females (see Section 4.3.5., for possible outcomes of Alternative 2) and showed in either case there would be less than one-half of one percent reduction in the female portion of

the population after 25 years. Female pup mortality would result in at least twice as many females still in the population after 25 years when compared to the same number of juvenile female mortalities. The mortality of 200 juvenile females (see Section 4.3.8., for possible outcome of Alternative 5) would result in the loss of between 0.86 and 1.4 percent of the female portion of the population.

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. However, 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 the pup production of the 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 herd reduction 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. Additionally, scientists predicted an increase in adult survival, which was not observed (York and Hartley 1981). Direct losses of adult and juvenile females 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 Burkanov). Ten 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 killed on Bering Island 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 during subsistence harvests occurs at a very low rate (See Table 4.3-1), which is about half of the rate observed during the entire commercial harvest. The current level of accidental female mortality during the subsistence period (1985 to present) 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 1994 (59 FR 35471, July 12, 1994). 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's 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 (124.5 cm or less) generally 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. NMFS estimated about 48 percent of the subsistence harvest is 3 year olds, 46 percent is 2 year olds, and about 4 percent are 4 year olds. Towell (2019) modeled the population effect of a harvest of 2,000 sub-adult males according to their percentage occurrence in the harvest by age and estimated a 4 percent to 6 percent 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.

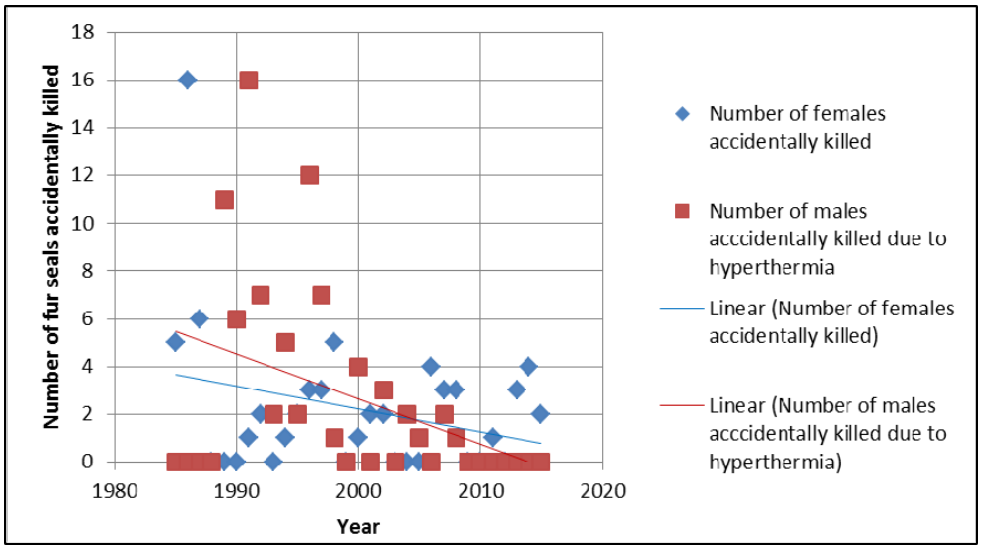
4.3.4.1. Key Aspects of Alternative 1

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 (2019) modeled the population effect of a harvest of 2,000 sub-adult (*i.e.*, 98 percent of the harvest is 2- to 4-year-olds) males and found that type harvest strategy resulted in between a 5.3% and 7.5% reduction in the male portion of the population after 25 years of harvest. They estimated the harvest of exclusively 6-year-old males (i.e., Alternative 2) would result in between a 4.6% to 9.8% reduction in the male portion of the population after 25 years of harvesting when compared to a harvest of 2,000 males less than 124.5 cm. The difference of 1 to 2 percent between Alternative 1 and 2 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 4.3-3). 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 (including prescribing who can harvest 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 4.3-3 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 been 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 be confused with sub-adult males during harvests. NMFS originally implemented the August 8 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 that requires "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 (21% of PBR) can be harvested prior to any controls being initiated by NMFS, unless NMFS suspends the harvest for being conducted in a wasteful manner[88]. When the lower limit has been reached, the harvest is suspended until the AA reviews the harvest data. Unless the harvest is suspended because subsistence need has been met, the AA must provide a revised estimate of the number of seals required for subsistence needs. Practically, this process requires the community to promptly send a written request identifying their subsistence need has not yet been met and asking that they be allowed to continue to harvest (58 FR 42027, 42029; August 6, 1993). 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, 26% 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 about 7,700 seals from St. Paul to

[88] 50 CFR 216.72 (f)(1)(iii).

die from other human 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 1997).

Based on the impact criteria in Table 4.2-4, the potential effect of the harvest proposed under Alternative 1 (No Action) is considered minor because mortality would be 26% of PBR.

4.3.4.2.2. Male Pup Mortality

There is no authorized harvest for pups under Alternative 1. Therefore, 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.

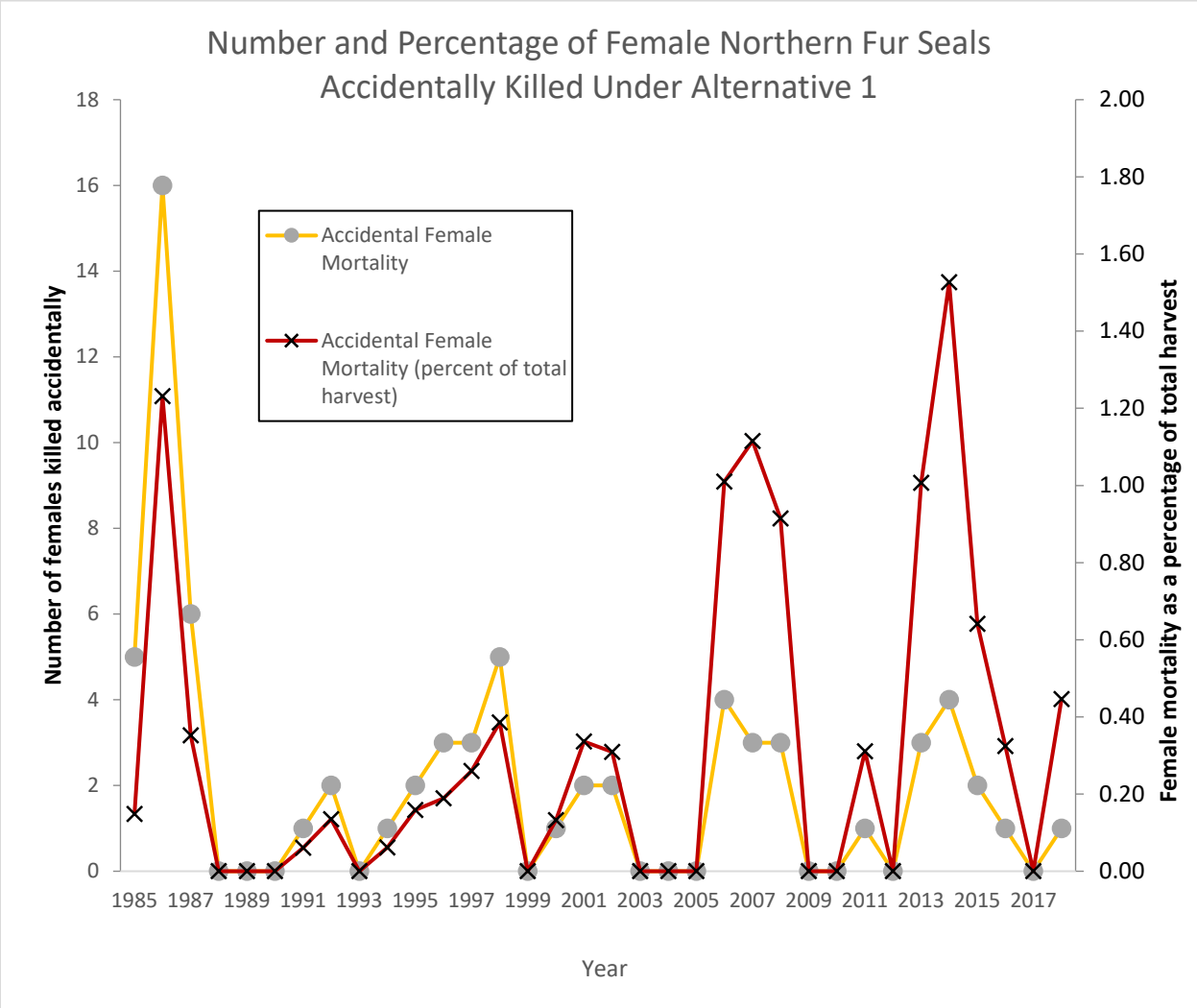
4.3.4.3. Female Mortality

Since 1985, there have been 71 reported sub-adult females accidentally harvested on St. Paul Island (Figure 4.3-3 and 4.3-4) out of a total harvest of 30,005 males seals (0.23 accidental female mortalities as a percent of the male harvest). 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 accidental 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 71 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 younger females more commonly come ashore, such that prohibiting the extension of the 2- to 4-year-old male harvest season past August 8 is one of the 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 Co-management Agreement at sub-section (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 females killed in 2006-2008 to about 1 percent of the harvest versus 0.4 percent from 2000 to 2010. Regardless, Figure 4.3-3 shows a declining linear trend in the number of females accidentally taken in the harvest and as can be seen in Figure 4.3-4 and Table 4.3-1 that the number of females in recent years has been zero or one. 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 0.6 percent of the total harvest. Under Alternative 1, if eight females were accidentally killed (the termination threshold in the Co-management Agreement), that would represent 0.001 percent of PBR. 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.

Figure 4.3-4 Number and Percentage of Female Northern Fur Seals Accidentally Killed Under Alternative 1



4.3.4.4. Geographic Extent of Effects

Under Alternative 1, direct and indirect mortality would be concentrated at seven haulouts authorized in regulation, and during a 47-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 seven specified haulout sites within a short period of time.

4.3.5. Alternative 2 (Petitioned/Preferred Alternative)

Alternative 2 was developed with two options, the first is the Petitioned Alternative, simplifying 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 mortality of up to 20 female fur seals annually as a result of 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 a Co-Management Agreement.

Alternative 2 Option B is the Preferred Alternative and 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 the fur seal regulations. 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 Sections 102 and 105(a) prohibit 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) and females 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 seal for subsistence uses as a non-breeding seal less than 7 years old (referred to as a juvenile). The direct mortality effects of the Preferred and Petitioned Alternative are considered minor since the limit of 2,000 seals (26 percent of PBR) can be used, and are similar to the mortality effects of the No Action Alternative (Alternative 1). Towell (2019) modeled the population effect of the subsistence mortality of both 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 mortality of exclusively 6-year-old males would result in estimated a reduction of between 4.6 and 9.8 percent of the male population after 25 years of subsistence mortality (Towell 2019). NMFS does not expect this is a likely subsistence scenario, because it is unlikely that the full quota of 5- or 6- year old male fur seals will be taken for subsistence, and some proportion of those taken during harvests would range from pups through 4-year-olds, which have a higher natural level of mortality. The same modeling of Alternative 1 with 25 years of subsistence mortality of 2,000 males less than 124.5 cm would result in a reduction of between 5.2 and 7.5 percent of the male portion of the population (Towell 2019). The highest reduction of males under the No Action Alternative (Alternative 1) was 7.5 percent and the highest reduction of males under Alternative 2 was 9.8 percent, a difference of only 2 percent. Since the worst case scenario under Alternative 2 is not likely to occur (i.e., some portion of younger seals including pups will be used for subsistence) the 2 percent difference in male abundance is unlikely to occur or 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). In addition, Alternative 2 allows younger generations to participate in subsistence activities and helps ensure that cultural and traditional practices are shared and passed on within the community.

- **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 the hunting season and during the traditional harvest season 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 harvests in Alternative 2. Under Alternative 2, take of juvenile male fur seals with firearms could occur from January 1 to May31 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 and the FSA (see Chapter 2.2.2 for details on monitoring under the petitioned alternative). Hunting with firearms is considered an acceptable, humane method of subsistence take 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 (during the hunting season - January 1 to May 31). 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, we do not estimate that the occurrence of animals being struck and lost will increase the impact above minor.

- **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. Pup harvests are prohibited by regulation at small breeding areas and on St. George that has resulted in the prohibition of harvests at Staraya Artil Rookery since 2014. The prohibition of pup harvests by regulation and sub-adult male harvests (under co-management) has not resulted in any measurable improvement of the population at Staraya Artil rookery since 2014. Results from studies on the short-term effects of pup harvests on St. George have not identified evidence of predicted effects (Ream and Sterling 2019; Merrill 2019). 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 seven 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 and 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). NMFS and ACSPI via the Co-management Council will evaluate the sustainability of subsistence use at all locations proposed to be used to hunt or harvest fur seals.

- **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 (2016) and Towell (2019) modeled a range of increase female mortality (*i.e.*, mortality of 0, 5, 20, and 200 females). The model results indicate that if 20 juvenile females are killed accidentally for 25 years there would be less than a 0.2 percent reduction in the female population (Towell 2019). Due to the later timing of arrival of younger males (Bigg 1986), extending the harvest after August 8 would also result in a higher proportion of two-year-old and yearling male seals being available for subsistence use. Alternative 2 would authorize the Co-Management Council to consider and implement any guidance on the handling of pups to confirm the sex of pups prior to harvest, which could be modeled on the best practices implemented on St. George Island.

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 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 will 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 (Bigg 1986). 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 that 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 4.2-2, 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 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. Overall, if a maximum of 2,000 juveniles (26% 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, and 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 (2016) and Towell (2019) modeled the effects of the mortality of 2,000 male pups, the mortality of 2,000 seals less than 124.5 cm (Alternative 1), and the 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 outcomes of alternatives considered (5.0% reduction for both models), while the mortality of 2,000 6-year-old males resulted in as much as a 9.8% reduction in the male population than the mortality of 2,000 male pups. Under Alternative 1, the reduction in the male population was between 5.3% and 7.5%. In other words, Alternative 1 would have a greater effect on male mortality than Alternative 2 based on the harvest of all pups under Alternative 2. Because Alternative 2 could theoretically result in the mortality of 2,000 6-year-old males, there could be about a 2% greater population effect than Alternative 1. The likely actual effect of Alternative 2 is similar to or less than Alternative 1 because of the use of pups. While the modeling by Towell (2019) is a more specific quantitative analysis of the population effects of the Alternatives, the use of PBR is an effective tool for evaluating human-caused mortality. Thus, the specific modeling by Towell and Williams (2016) and Towell (2019) 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. Under Alternative 2 Option B, the St. Paul Co-Management Council has authority to co-manage impacts on female fur seals, such as interim thresholds of mortality below the regulatory limit, to reduce or prevent additional accidental female mortalities during the year. 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. This information indicates 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. Under 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 subsistence use would be terminated for the remainder of the year.

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 and additional subsistence use would be terminated for the remainder of the year. 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 2019) to ensure that an independent and alternative analysis supported the use of PBR to evaluate the Alternatives. Towell (2019) found that up to 20 female mortalities would result in less than a 0.2 percent 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 (0.2 percent 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 non-regulatory limit of eight accidental female mortalities under the Co-management Agreement). 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. Under Alternative 2 it is expected that 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 pup harvest harassment, see Ream and Sterling 2019; Merrill 2019).

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 the ages of fur seal used for subsistence. Alternative 3 would designate the St. Paul Co-Management Council to provide improvements to the subsistence use process beyond those defined in the regulations. 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. The AA would continue to make all suspensions and terminations of subsistence use activities under Alternative 3 the same as with Alternative 1.

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 at 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 use 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 use 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 (26% 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 (2019) modeled the mortality of 1,500 male pups and 500 six-year-old males (*i.e.*, all greater than 124.5 cm). It is unlikely that subsistence users would kill all 6-year-old seals, and 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 reduce the male portion of the population after 25 years of harvest between 4.9% to 6.2%. When compared to the modeling results of Alternative 1 (5.3% to 7.5% reduction), Alternative 3 would have lesser effects on the male portion of the population by about 1% on the upper and lower estimate of the range. 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 rookeries, 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 the rookeries called Vostochni and Morjovi), 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 and the FSA (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 female fur seals 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. We do not estimate that the occurrence of animals being struck and lost will increase the impact above minor.

- **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 the Co-Management Council would then provide advice to the AA regarding the decision to remove the 2-day suspension of subsistence use that would follow after three female fur seals are killed.

- **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 of pup harvests (Ream and Sterling 2019; Merrill 2019). Pup harvests are prohibited by regulation at small breeding areas and on St. George that has resulted in the prohibition of harvests at Staraya Artil Rookery since 2014. The prohibition of pup harvests by regulation and sub-adult male harvests (under co-management) has not resulted in any measurable improvement of the population at Staraya Artil rookery since 2014. Results from studies on the short-term effects of pup harvests on St. George have not identified evidence of predicted effects (Ream and Sterling 2019; Merrill 2019). 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 under Alternative 2 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 of small and declining breeding areas (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 (2016) and Towell (2019) 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 is 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 authorizes harvest at any breeding and hauling ground, and authorizes hunting at only two locations (the Vostochni and Morjovi hauling and breeding grounds). The Co-Management Council can limit subsistence use at locations determined to be at a high risk of becoming incapable of sustaining a harvest and/or hunt (see section 3.2.3.1 for further details on site fidelity). 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 seven of the thirteen available 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 upper 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 (26% of PBR). Alternative 3 apportions the total harvest level through federal regulations of not more than 1,500 male pups (19% of PBR) and 500 juvenile males (7% of PBR).

4.3.6.2.1. Juvenile Male Mortality

Alternative 3 authorizes the hunting of up to 500 juvenile males (and 1,500 male pups). Alternative 1 authorizes up to 2,000 sub-adult males 124.5 cm or less in length to be harvested. Towell and Williams (2016) and Towell (2019) modeled the specific population loss of 500 6-year-old males and 1,500 male pups for 25 years and found that the harvests of 2,000 sub-adult males for 25 years under Alternative 1 would have up to a 2% greater population loss than Alternative 3 (4.9% to 6.2% reduction). Alternative 2 would likely have similar effects compared to Alternative 3 depending on whether similar numbers of juveniles are killed.

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 4.2-2, 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 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. 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 (7% of PBR), this effect on the population even if those seals were all age 6 would not increase above the minor impact threshold in our analysis.

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 during the hunting season.

The rate of illicit hunting and harvesting is unknown, but it is reasonable to assume that it would be similar or slightly greater than Alternative 2 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. The rate of illicit hunting and harvesting under Alternative 3 would be less than Alternative 1 (due to authorization of pup harvests), and have less of an impact. 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.

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 19% of PBR, and would result in a minor effect on the seal population.

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 after three female mortalities 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.

The effects of female mortality of Alternative 3 would be negligible (0.06 percent of PBR), but total mortality would still remain a minor effect at 26 percent 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; Muto et al. 2019).

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 Vostochni and Morjovi. 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., similar age composition to Alternative 1) 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 0.2% 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 23 to August 8:
    - 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, and number of female fur seals killed.

- Suspend the harvest if five females have been killed during any 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 (26% 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 sub-adult 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. During pup harvests on St. George since 2014, there have been no indications or observations that pups are susceptible to hyperthermia during the harvest season. Due to the colder ambient temperatures after September 15, and pup behavior during subsistence harvest round-ups on St. George Island, the concern about overheating pups does not appear warranted. NMFS and ACSPI will evaluate this concern on St. Paul Island, given that harvester behavior and terrain on St. Paul are different than St. George Island. 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, but this is occurring on St. George for each seal pup harvested and has not resulted in overheating or detectable lethal or sub-lethal effects on non-targeted seals (Ream and Sterling 2019; Merrill 2019). 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 during all three harvest seasons 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 on pup production 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 would not increase about the minor threshold 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 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 harvest would be terminated if twenty female fur seals are killed during the harvest of male seals; in addition, the AA would retain authority to terminate subsistence use harvest annually if 2,000 seals have been harvested or if the conditions that led to harvests 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 similar to all other alternatives with suspension and termination provisions.

4.3.7.2 Male Mortality

Up to 2,000 (26% 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 under Alternative 4. 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 January 1 to May 31 and another from June 23 to August 8. This portion of the mortality would represent 7 percent of PBR, but when included with male pup mortality (4.3.7.2.2.) the total mortality would be 26 percent of PBR. 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 during the spring 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, but it is assumed that the age composition of the harvest at this time would be similar to Alternative 1. Because Alternative 4 prohibits the use of firearms there would be no additional or unaccounted mortality due to animals struck and lost. Towell (2019) modeled the effects on the male population of the harvest of juvenile males and pups and reported the possible reduction of between 5.0% and 5.6% in the male population. The maximum effect of Alternative 4 (i.e., 5.6% reduction) is about 2 percent lower than the maximum effect of Alternative 2, within 1 percent of maximum effect of Alternative 3. The maximum effect of Alternative 4 is about 2 percent lower than the maximum effect of Alternative 1 (Towell 2019). The minimum modeled effect of Alternative 4 is less than one percent different than Alternative 1, 2, and 3 (Towell 2019).

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 Preferred or 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 (up to 500 juveniles) 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 minor because overall the harvest of 2,000 fur seals (i.e., 1,500 pups and 500 juveniles) would represent 26 percent 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 harvesters would be required by regulation to handle and sex all pups prior to harvest, which means 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 0.2 percent of PBR. Therefore, Alternative 4 would have greater effects on the population when compared to the Alternative 3, which includes a regulatory 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) than the non-regulatory limit (8) under Alternative 1, the harvest suspension provisions would the same (i.e.,

suspended if five females were killed). Overall, the potential effect of killing 20 females (0.2 percent PBR) would be considered a negligible effect 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. Alternative 4 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, see Ream and Sterling 2019; Merrill 2019). 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; and limit the harvest during August 9 to December 31 to male pups. Use of firearms would be prohibited. From 2019 to 2021, 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 7,726 seals (R. Towell, Pers. Comm. April 24, 2019); therefore, the upper limit of the subsistence harvest range would be 3,863 seals.

Beginning in 2022, the lower end of the 3-year harvest range (i.e., 2022 to 2024) would be set based on the average number of reported seals harvested over the 2019 to 2021 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 2.6% 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 3,863 seals (male pups or juveniles up to 7 years old) until 2022 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*. 2013a).
- 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.

Under Alternative 5, only experienced sealers using traditional, humane methods[89] including sexing pups prior to harvest would be authorized to participate in the 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 levels 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

[89] Round-up, stunning, and immediate exsanguination.

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 currently used under Alternative 1 (see preamble discussion 57 FR 22450, May 28, 1992).

- **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 percent of PBR, or 3,863 seals[90]. 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 2016-2018 is 253). 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.

- **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 sub-adult 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 (see discussion in Alternative 4). 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, but that has been occurring on St. George Island during their pup harvests since 2014 and has not resulted in a significant increase in the duration of the pup harvest versus the sub-adult harvest. 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.

[90] Based on R. Towell reanalysis, which is based on current (2018) stock assessment report (Muto et. al 2019).

- **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 determined by the process described in Johnson (2013) and set in regulation. 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 (2016) and Towell (2019) modeled the effect of the mortality of 200 juvenile females and the results indicate that there was about a 0.9% to 1.4% reduction in the female portion of the population versus a less than 0.2% reduction for Alternatives 1 through 4 after 25 years of harvesting consistent with each Alternative. 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 (Alternatives 3 and 4 limit pup harvest to 1,500 of 2,000 total). 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 (2016 to 2018 = 253) of subsistence harvest. Beginning in 2019, the lower end of the 3-year harvest range (*i.e.*, 2019 to 2021) would be set based on the average number of reported seals harvested over the 2018 to 2020 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 2.6% 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 216.72(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 of small and declining breeding areas (see also the discussion under Alternative 2, Sections 4.3.5.1).

4.3.8.2. Male Mortality

Up to 3,863 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 the 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 major since the limit of 3,863 seals that could be harvested represents 50 percent 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 3,863 (50 percent 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 limitations, the upper end of harvest level would be set higher than what ACSPI requested for the community's subsistence requirements, which will allow for the subsistence need to become evident through actual use in those first three years. 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 3,863 pups (4.8 percent 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 the pups' greater reproductive value, as discussed in Alternatives 2 through 4. For this analysis, it was assumed that of those 3,863 male pups selected for harvest, 3,151 (82 percent) would have died from natural causes prior to returning to the island as a 2-year-old seal. For comparative purposes, out of 3,863 2- and 3-year-old males, 1,126 (29 percent) 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 3,863 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 3,863 seals (juveniles or pups). Therefore, the effects of Alternative 5 in the future would likely be minor to major based on the percentage of PBR (11 to 50 percent) that would be killed and averaged into the limit during the subsequent 3-year period.

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 (2019) modeled the mortality of 200 juvenile females and found that direct mortality of females would result in about a 0.9 percent to 1.4 percent loss of the female portion of the population when compared to Alternatives 1 through 4. The mortality of 200 females is 2.6 percent of PBR and is greater than the other alternatives, representing an increase in the effects on the population.

When considering the effects of female pup mortality during the pup harvest under Alternative 5, the effects on the number of females and lost production after 25 years of harvest mortality are lower than similar mortality of older females (Towell 2019). The accidental lethal take of juvenile females would have more of an impact on productivity and coupled with cumulative environmental factors would be expected to have a greater impact on the population than other alternatives.

Impacts of Alternative 5 initially would be greater than all other alternatives, and are considered major because the harvest of 3,863 fur seals would be 50 percent 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 an intermediate threshold of 150 female mortalities 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 consistent with Johnson (2013). Alternative 5 would allow harvest at all sites, but would use the regulations similar to Alternative 4 to limit harvests from occurring at breeding areas not capable of sustaining a harvest. Alternative 5 includes a regulatory 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 (see Johnson 2013). 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 regulatory 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 NMFS would review recent pup production estimates by breeding area and model the trajectory of the population trend 5 years into the future based on criteria established in Johnson et al. (2013). The NMFS 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 be advised that harvesting is not authorized at those sites.

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 under the regulations. 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 minor with regard to PBR (Table 4.3-2). Alternative 5 total lethal take would be considered major for the first 3-year period. However, it is unlikely that harvest would be maintained at the proposed level under Alternative 5 (3,863), 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 likely decline to minor from major.

Table 4.3-2 Impacts of Lethal Take Relative to Potential Biological Removal

Alternative	Lethal Take (maximum)	% PBR	Impact
1 (No Action)	2,000	26	Minor
2, 3, and 4	2,000	26	Minor
5	3,863 (first 3 years)	50	Major (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. Also considered are those seals that are disturbed, but not captured in the round-up. 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 SEIS. 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 4.3-3 shows the maximum number of days that pups or juveniles would likely be harvested in the analysis. 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 27914 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 sealers" 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 4.3-3 Number of Assumed* Harvest Events Under Each Alternative

	Alternative 1	**Alternative 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
*It is assumed that for each week during the harvest season, approximately 5 of those days would be spent harvesting pups. **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 non-pup or male pup harvests were estimated as follows:

- Pups: two pups are disturbed for each pup harvested (these individuals are captured by the round-up method but are not harvested), 60 additional pups are disturbed for each harvest event (these individuals escape the round-up and enter the water). No pups are disturbed during the harvest of non-pups (due to habitat separation between pups and non-pups; see Section 3.2.6. for more information).

- Non-pups: 1.15 non-pups are disturbed for each pup harvested (these individuals are initially captured in the round-up but are allowed to escape the pup round-up), 50 additional older animals (i.e., non-pups) are disturbed for each harvest event (these individuals escape the round-up and enter the water).

- Non-pups: 4.9 non-pups are disturbed for every non-pup harvested (these individuals are captured in the round-up but are not harvested and allowed to escape based on the new analysis of subsistence harvest data), 50 additional non-pups are disturbed for each harvest event (these individuals escape the round-up and enter the water).

Therefore, to calculate potential mortality due to disturbance, analysts multiplied the number of harvest events by the number of animals (pups or non-pups) potentially exposed. This approach allows NMFS to estimate the range between the minimum and maximum level of disturbance of pups or non-pups that could result in sub-lethal effects under the proposed alternatives. The actual level of sub-lethal effects to pups and non-pups 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 4.3-4 to 4.3-14 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 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 harvests for each alternative are not separated by age group or gender. Therefore the assessments of sub-lethal effects related to disturbance during 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 (June 23 to August 8). Therefore, there is no assessment for sub-lethal effects to pups and females for Alternative 1. Sub-lethal effects of hunting under Alternative 2 are addressed in Section 4.3.11.

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 11,450 sub-adult males under Alternative 1 No Action (Table 4.3-4) based on the analysis of recent subsistence harvest disturbance data. The duration of sub-lethal effects is short-term because each harvest would last on average about two hours and would be relatively infrequent (on average 9 harvests per year over the last decade[91]). 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 (about 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, and 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 two hours) 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 estimated 1.95 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 may add up to two possible mortalities to the total mortality estimate, but would not increase the percentage of PBR from the minor to moderate category according to the criteria in Section 4.2.1.

[91] https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/northern-fur-seal-subsistence-harvest-estimates-and-reports

Table 4.3-4 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	11,450	Observed mortality during activity	n/a	n/a	0.00008	0.916	1.9465
			Alert response	1	11,450	0	0	
			Enter water	0.8	9,60	0.0001	0.916	
			Injured during disturbance	0.0005	5.725	0.02	0.1145	

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 (authorized in regulation), 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 11,450 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 continue disturbance at the same hauling grounds each year, but after a few years those seals exposed to harvests as 2-6 year-old males are no longer present on the hauling grounds.

Neither pups nor adult females would experience sub-lethal effects from the harvest of sub-adult males because pups and adult females 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 adult females for Alternative 1. 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 total number of females accidently taken during the subsistence harvest since 1985 is 71; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are unlikely.

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 small and undetectable 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. 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

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last on average about 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 for Alternative 1, 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 is expected to occur. Therefore there is no assessment for sub-lethal effects to pups and adult females for juvenile harvests under 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 but very small. We expect the number of juvenile females exposed to juvenile harvests under Alternative 2 to be similar to Alternative 1 due to the small numbers present on the hauling grounds. Therefore sub-lethal impacts to this demographic are unlikely.

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 2.83 additional theoretical mortalities, Table 4.3-5.

Table 4.3-5 Sub-lethal Effects of Alternative 2 (Option A)

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	16,650	Observed mortality during activity			0.00008	1.332	2.8305
			Alert response	1	16,650	0	0	
			Enter water	0.8	13,320	0.0001	1.332	
			Injured during disturbance	0.0005	8.325	0.02	0.1665	

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 theoretical 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 2.42 probable mortalities. The magnitude and intensity of indirect sub-lethal effects of an exclusive pup harvest is lower than estimated from the harvest of 2,000 juveniles, thus the estimate from Table 4.3-5 represents the largest potential effect from the Petitioned Alternative. The combination of the direct (26%) and indirect (less than 1%) effects would not result in a change in the percentage of PBR to greater than or equal to 31% of PBR thus are still considered 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).

More recently, NMFS used VHF and satellite tags on pups and adult females to test hypotheses related pup harvest disturbance events on St. George. Satellite tags were deployed on 20 adult female and 20 pup female northern fur seals in 2015 to test the following hypothesis in a before/after control/impact study design (See Ream and Sterling 2019): a) Adult female foraging trip duration at disturbance sites is the same as at control sites; b) Adult female duration of onshore attendance at disturbance sites is the same duration as at control sites.; c) Adult females at disturbance sites move (temporarily or permanently) to alternative sites at the same frequency as females at control sites; d) Adult female nearshore diving behavior at disturbance sites is the same as at control sites; and e) The mean date of departure on the winter migration by adult females at disturbance sites is the same as at control sites. For pups we tested a similar set of hypotheses: a) The duration of time spent during bouts in the water by pups at disturbance sites is the same as at control sites; b) The duration of time spent during bouts on land by pups at disturbance sites is the same as at control sites; c) Pups at disturbance sites move (temporarily or

permanently) to alternative sites at the same frequency as pups at control sites; and d) The mean date of departure on the winter migration by pups at disturbance sites is the same as at control sites.

Ream and Sterling (2019) found no differences (i.e., we could not reject the null hypotheses) in adult female foraging trip duration, on-shore attendance duration, and time of departure on the winter migration between experimental and control sites using the comparisons identified in either the original or the adjusted study design. We could not assess comparisons of near-shore diving behavior due to a lack of data recorded at the experimental site(s). Due to the resolution of the Argos location data, we were also unable to determine whether females were temporarily displaced or moved to sites immediately adjacent to the tag deployment sites. Adult female locations were not observed at the other sites (not found immediately adjacent to the deployment site), however, and no animals moved from their tag deployment site to any alternative site for long durations or permanently. For adult females, the results of these analyses imply that either there were no effects, or that we were simply unable to detect any effects, of human disturbance.

While most of the results for female pups were similar to those for adult females (no difference between experimental and control sites), there were a few exceptions. On-shore durations were shorter for the experimental sites using the original study design comparison (with Zapadni classified as an experimental site), but were only marginally shorter using the more appropriate, adjusted study design comparison (with East Reef as the lone experimental site; $p=0.053$). The one other finding of significance, also under the adjusted study design comparison, was the duration of bouts in the water. Interestingly, the duration of these “trips” were shorter at the experimental site. This finding is perhaps contrary to conventional wisdom which, at least for adult females, would suggest that the duration of time in water should increase in response to disturbance. It is possible that the result is simply an artifact of the small sample size at East Reef, driven by the random selection of a few individuals with a predilection for short in-water bouts. Shorter bouts could also be related to inherent differences in environmental exposure and shoreline characteristics found at East Reef that have an unidentified influence on aquatic behavior. Given the shorter duration of in-water bouts at East Reef, as well as some limited support for shorter on-land bouts there, we also calculated and compared the total proportion of time pups spent in the water at East Reef (0.24) and the control sites (0.26), and found that over the course of the season, experimental and control pups were spending a similar amount of time in the water (and, conversely, on shore). As with the adult females, there was no obvious (long duration) movements of pups from their tag deployment site to other sites, and we did not observe any pup locations at sites beyond immediately adjacent rookeries. Again, we were unable to determine if any pups moved temporarily to immediately adjacent sites due to the resolution of the Argos location data. For female pups, the results of the analyses are less conclusive than for adult females, but seem to suggest little, if any, detectable effects of human disturbance (or, again, that we were unable to detect effects as a result of the above identified shortcomings).

Due to limitations of this study, we initiated a follow-up project at St. George during the fall of 2016 to specifically examine the attendance behavior (including trip and shore durations, timing of departure on migration, and displacement to alternate sites) of adult females. Hypotheses tested included: 1) Adult female foraging trip duration over the entire breeding season who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities; 2) Adult female onshore stay duration who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities; and 3) the timing of departure on the winter migration of tagged females who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities. We tagged a total of 100 adult females at four different breeding sites on St. George Island in 2016, anticipating that two sites would be exposed to pup harvests and two sites would not be exposed to harvests due the location, access, and terrain at the sites. A total of 68 maternal females were included in the study which continued through 2018 (Merrill 2019). Merrill (2019) reports that 20 of the 27 pup

harvests on St. George from 2016 through 2018 occurred at times when tagged females were present on shore. Eighteen of the 68 (26 percent) tagged adult females were potentially exposed to pup harvests. Merrill (2019) was unable to detect departures from the rookery of less than 30 minutes, and of those 18 tagged females none showed any departures from their suckling site during or immediately after the times recorded for pup harvests at those sites. The duration of pup harvesters' presence within the breeding areas was on average less than 30 minutes. Thus it is possible the tagged females could have responded to the harvester presence and returned within less than 30 minutes thus appeared to have not responded to harvesters' presence. This result is important because it indicates that pup harvests on St. George Island are not resulting in responses longer than 30 minutes, and had longer duration absences from the rookeries occurred, this study had the power to detect differences. Merrill (2019) examined the date of departure on winter migration, as well as the duration of female foraging trips and onshore stays by comparing the mean duration of foraging trips and onshore stays of females exposed to pup harvests with those that were not exposed to pup harvests. Merrill (2019) found no difference ($P > 0.20$) in the mean day of departure of potentially disturbed females (East Reef = 316.52 and Zapadni = 313.59) versus undisturbed females (316.61 and 314.99, at East Reef and Zapadni). Merrill (2019) found no statistically significant differences between the duration of tagged female foraging trips ($P > 0.11$) or onshore stays ($P > 0.10$).

The reported examples suggest that harassments during the non-breeding season under the Preferred or 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 or Table 4.3-6). 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 4.3-6 Sub-lethal Effects of Alternative 2 (Option B)

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 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 about 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.

We would have expected to see some indication of sub-lethal effects to become apparent by 1965 after 10 years of the female culling program, but the pup production estimate in 1965 (after removing the direct effect of mortality) was actually higher by about 2,000 pups, rather than lower. NMFS does not anticipate that sub-lethal effects on females will be observed beyond the short term displacement as a result of harvesting male pups. 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 effects similar to that or less than estimated in Table 4.3-6.

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, the pup harvest is anticipated to occur beginning in late August or early September when ambient temperature have begun to cool, with the majority of the harvest expected to occur in September (mean temp 45ºF) or October (mean temp 39ºF). Average ambient temperature in July when the 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 unlikely. 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 were 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.

Sub-lethal effects under Alternative 2 would be considered moderate due to the fact that disturbance could be distributed across more rookeries and hauling grounds. 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. Because there is no authorized juvenile harvest season under Alternative 3, there is no estimate of potentially disturbed animals resulting from juvenile harvest under Alternative 3. Sub-lethal effects of hunting under Alternative 3 are addressed in Section 4.3.11.

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 4.3-7) 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 (2.83 probable mortalities) because of the potential harvest of 2,000 juveniles based on the analysis of new disturbance data (see Section 4.2.2). It is highly unlikely that sub-lethal effects on adult females and males of Alternative 3 would be detectable as a change in reproduction and relative to Alternative 2, Alternative 3 would have reduced effects due to fewer harvest events.

Table 4.3-7 Sub-lethal Effects of Pup Harvests in Alternatives 3

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 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, thereby incorporating measures designed such that proposed harvesting and hunting 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 to be implemented by the Co-management Council would ensure that the subsistence harvest and hunt do 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. Because the regulations only authorize hunting at Vostochni and Morjovi, the Co-management Council would have fewer alternative hunting 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, since no pups have been born during the January 1 to May 31 season, and the June 23 to August 8 season occurs on the hauling grounds where no pups are found at that time. The upper number of non-pups potentially disturbed under the Alternative 4 juvenile harvests would be: (4.9*500) + (50*140) = 2450 + 7,000 = 9,450 (see 4.3.10.4.1).

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 (January 1 to May 31 and June 23 to August 8). 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 total number of females accidently taken during the subsistence harvest since 1985 is 71; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are unlikely.

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last on average about 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 and subsistence 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 1.61 additional mortalities, Table 4.3-8.

Table 4.3-8 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	9,450	Observed mortality during activity			0.00008	0.756	1.6065
			Alert response	1	9,450	0	0	
			Enter water	0.8	7,560	0.0001	0.756	
			Injured during disturbance	0.0005	4.725	0.02	0.0945	

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 4.3-9) 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 juvenile harvest seasons (an extended season until May 31 and an additional season from June 23 to August 8) under Alternative 4. 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.

Table 4.3-9 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 1,500 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	6,925	0	0	
			Enter water	0.8	5,540	0.0001	0.554	
			Injured during disturbance	0.0005	3.4625	0.02	0.06925	

4.3.10.4.3. Geographic Extent of Sub-lethal Effects

As described for Alternatives 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 in regulation any subsistence harvest at breeding locations determined to be at risk of reaching unsustainable population levels, thereby 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 3,863 male pups and juveniles.

Both pups and juvenile fur seals would be harvested under Alternative 5. This assessment considers the two extremes: up to 3,863 male pup fur seals would be harvested over 104 days, or up to 3,863 juvenile males would be harvested over 33 days. The upper number of pups disturbed under a harvest of 3,863 pups: (2*3,863) + (60*104) = 7,726 + 6,240 = 13,966. If 3,863 pups are harvested, disturbance to juveniles attributed to the harvest of 3,863 pups under Alternative 5 would be: (1.15*3,863) + (50*104) = 4,442 + 5,200 = 9,642. No pups would be disturbed during the juvenile harvest. The upper number of

non-pups potentially disturbed under Alternative 5 would be: (4.9*3,863) + (50*33) = 18,929 + 1,650 = 20,579.

The mechanisms for sub-lethal effects under Alternative 5 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 (June 23 to August 8). 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 total number of females accidently taken during the subsistence harvest since 1985 is 71; very few juvenile females are thought to be present on the hauling grounds and therefore sub-lethal impacts to this demographic are unlikley.

The duration of sub-lethal effects on juvenile males would be short-term because each harvest would last on average about 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 and subsistence 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 3,863 juvenile males were harvested is estimated as the equivalent of 3.50 additional mortality equivalents, Table 4.3-10.

Table 4.3-10 Sub-lethal Effects of Alternative 5 (Harvest of 3,863 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 3863 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	20,579	Observed mortality during activity			0.00008	01.646	3.498
			Alert response	1	20579	0	0	
			Enter water	0.8	16463	0.0001	1.646	
			Injured during disturbance	0.0005	10.29	0.02	0.206	

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 3,863 pups would be about 2.62 additional fur seal mortalities (0.98 male pups and 1.64 non-pups) (Table 4.3-11). 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 (3,863; 50% PBR) and the short harvest period for the juvenile harvest (33 days).

Table 4.3-11 Sub-lethal Effects of Alternative 5 (Harvest of 3,863 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 3,863 male pups harvested during 104 harvests	Pups	13,966	Observed mortality during activity			0.00001	0.13966	0.97762
			Alert response	1	13966	0	0	
			Enter water	0.01	139.66	0.001	0.13966	
			Injured during disturbance	0.001	13.96	0.05	0.6983	
	Non-pups	9,642	Observed mortality during activity			0.00008	0.77139	1.6392
			Alert response	1	9642	0	0	
			Enter water	0.8	7713.9	0.0001	0.77139	
			Injured during disturbance	0.0005	4.821	0.02	0.0964	

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 3,863 juveniles were harvested. This would mean that greater numbers of 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 in regulation any subsistence harvest at breeding locations determined to be at risk of reaching unsustainable population levels, thereby 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 4.3-12). 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 is 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 depends 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 4.3-12 Number of Assumed* Hunting Events Under Each Alternative

	Alternative 1	**Alternative 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

*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.
** The analysis assumes hunting would occur between January 1 and May 31.
***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 4.3-13. The data are broken down by probability of sighting at each location by winter month (Table 4.3-14).

Table 4.3-13 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 4.3-14 Probability of Sighting a Single Fur Seal Each Day Between January and May

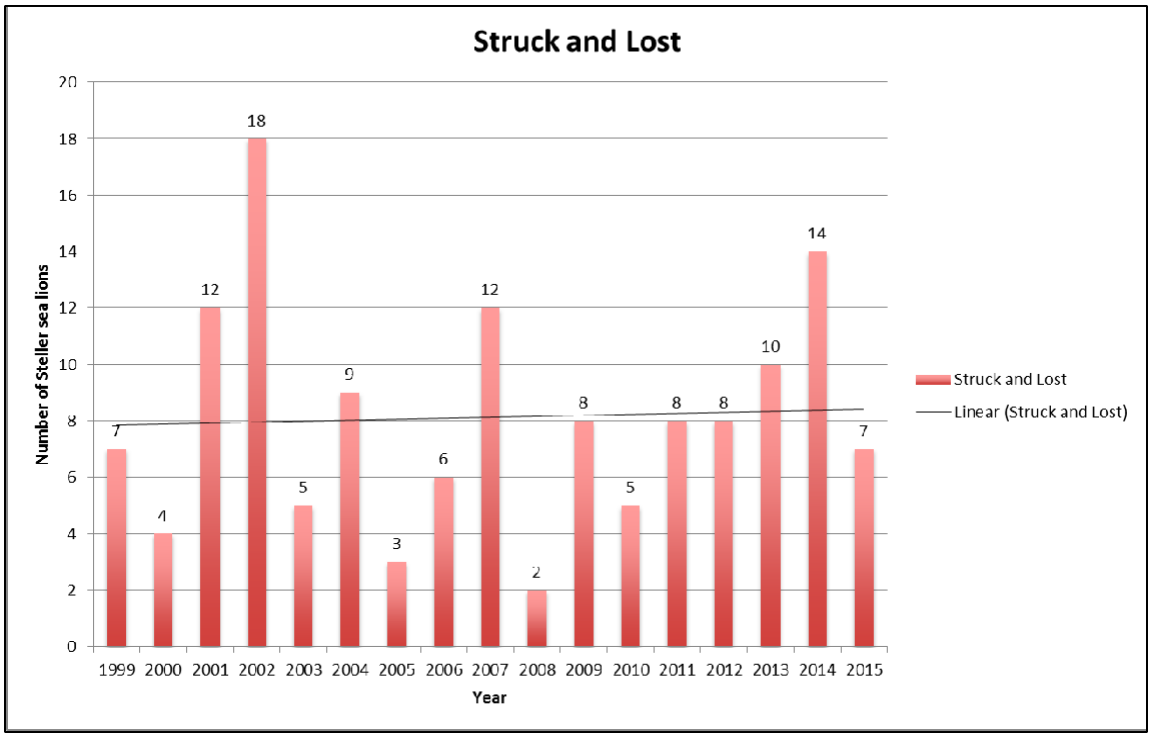
Location	January	February	March	April	May
Northeast Point	3%	--	<1%	--	51%
Reef	12%	11%	--	58%	33%
Tolstoi/Zapadni	47%	1%	--	3%	46%
Polovinas	--	--	<1%	<1%	4%
Southwest Point	--	--	--	--	1%
Village Cove	--	--	--	<1%	1%
Lukanin/Kitovi	--	--	--	--	4%

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 4.3-15 (P. Lestenkof Person Comm., February 2, 2016), and 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 female fur seals 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 4.3-15 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 4.3-5 St. Paul Steller Sea Lion Struck / Lost Estimates 1999 - 2015



4.3.11.1. Sub-lethal Effects Due to Hunting Under Alternative 2 (Preferred or 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 January 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 one 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 (16 U.S.C. 1155(a)) is applicable to the subsistence use regulations of northern fur seals, and NMFS uses a definition of subsistence use by Pribilovians in the resulting regulations (50 CFR 216.73) that only permits handicraft articles to be transferred or sold if the fur seals 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 Section 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) (16 U.S.C. 1371(b)) if the taking of marine mammals is: by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or Arctic Ocean (1) for subsistence purposes, 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 (16 U.S.C. 1388(a)) to cooperatively conserve marine mammals and co-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 subsistence uses 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 requires methods that ensure the capture, killing, and a reasonable effort at retrieval. A "wasteful manner" as defined by NMFS (50 CFR 216.3) 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 annually through 2014, who has been able to assess visually if the harvest is conducted humanely and not in a wasteful manner. In 2015, the tribal government began collecting the same data as the NMFS observer to make those determinations, and NMFS representatives have observed a random number of harvests annually as practical to confirm those reported determinations.

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's 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.[92] 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://www.fisheries.noaa.gov/alaska/marine-mammal-protection/northern-fur-seal-subsistence-harvest-estimates-and-reports) 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, and 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

[92] *Humane Soc'y of the United States v. Mosbacher*, Civ. A. No. 91-1915, 1991 WL 166653 (D.D.C. Aug. 5, 1991).

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 since 2014, the subsistence harvest of pups occurred from September 16 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 includes both male and female pups and may include a few yearling and two-year-olds seals based on experience from St. George Island.. Pups can also occur exclusively with only pups. Sub-adult males are found exclusively with other males from June through August, but comingle with females in September 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, for Alternative 2, and the January 1 – March 15, for Alternative 3) 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 that subsistence use 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's 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 hunted and/or harvested each year, the age and sex composition of those taken, and the condition of animals taken no matter what method of take. The Annual Action Plans also include an assessment of take levels, composition of take, and harvest practices and their influence on population health, and 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 hunt and harvest review process to be overseen by ACSPI to develop harvest monitoring and allocation plans intended to minimize sub-lethal effects to seals not taken, maximize detection and avoidance of females, prevent wasteful taking, and make in-season allocations among the age groups and locations to be hunted or harvested. Under Alternative 2 (Preferred/Petitioned Alternative), the 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 (50 CFR 216.3) 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 authorization of the hunting season.

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 from hunting and harvest under Alternatives 2-5 would be accomplished by the development, implementation, and adaptive refinement of best hunting and harvest practices with the hunters / harvesters.

ACSPI would develop best subsistence use practices to include such things as a description of field measures intended to: 1) reduce impacts to lactating females; 2) ensure the detection of females; 3) distribute the subsistence use proportionally among areas occupied by fur seals; 4) ensure full utilization of seals, and 5) describe opportunities for coordination of sampling and measuring seals taken for subsistence use. The best practices would also consider communication methods to specify an expected harvest schedule, which would minimize repetitive disturbances at breeding or resting areas and allow for NMFS to schedule monitoring during and after the harvest. Because of the independent nature of hunting with firearms, NMFS and ACPSI will determine the most likely hunting periods to ensure proper monitoring and sampling. Jointly agreed-upon measures for the subsistence use would include criteria such as: reducing human presence at locations where adult females are present; choosing a location where adult females are not present; or minimizing harassment or disturbance of seals downwind of subsistence use locations.

To effectively address the detection of female pups during the harvest season, 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 culture 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 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 conservation of marine mammals and 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 in 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 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 a 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 number of males harvested) 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 by an independent veterinary review during the commercial harvest period to be the most humane and least disruptive methods possible. In 1991, the court[93] found that NMFS's 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.

[93] Humane Soc'y of the United States v. Mosbacher, Civ. A. No. 91-1915, 1991 WL 166653 (D.D.C. Aug. 5, 1991); Martin Robards & Julie Lurman Joly, Interpretation of "Wasteful Manner" Within the Marine Mammal Protection Act and Its Role in Management of the Pacific Walrus, 13 Ocean & Coastal L.J. 171, 183-84 n.59 (2008) ("Regulation of [the fur seal subsistence] 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.").

The upper end of the harvest range 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. 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 on St. Paul Island, 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, which is an historic tradition dating back to at 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(e)(3). 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 NMFS's 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 in regulation, limiting the flexibility of the community to meet their subsistence need to those specific areas of the island. Under Alternative 1, the suspension and termination of the harvest based on female mortality would continue to be managed by the Co-management Council, and under the current Co-management Agreement, 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 and Preferred Alternative)

Alternative 2 (Preferred and Petitioned Alternative) directly addresses the subsistence need of the St. Paul community expressed in their 2014 petition and is NMFS's 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 June 23 to December 31. 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 124.5 cm 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 non-breeding population of male 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 subsistence use at an interim threshold or terminating subsistence use if 20 female seals have been killed. Under Alternative 2 Option B, the regulations would authorize incidental mortality of up to 20 females and terminate subsistence use for the remainder of the year if 20 females are killed. Alternative 2 Option A directly addresses ACSPI's petition to have more responsibility for managing subsistence use and could result in more timely response to changing conditions during the year than Alternative 2 Option B or Alternative 1. On the other hand, Alternative 2 Option B would provide more assurance that subsistence use would be 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 twenty 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 harvest 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 hunting 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 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:

1. Committed to scientific quality, incorporating scientific input and review at various levels (i.e., programmatic, protocols, sampling design, analysis, and reporting);

2. Responsive to management needs, co-management principles, and traditional knowledge;

3. Require stakeholders the opportunity for meaningful input into the process; and

4. 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. The intent is for the Co-management Council to develop non-regulatory measures and other interim thresholds that would incentivize avoiding the incidental take and mortality of female fur seals to reduce the likelihood of reaching the annual limit of 20 female mortalities. Delegating this authority to the Co-management Council is an efficient mechanism to provide for in-season adjustments to subsistence use practices, and supports co-management of subsistence use as envisioned by Section 119 of the Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1388). NMFS could prescribe the allowable female mortality rigidly in regulation, with no means for in-season adjustments, but empowering the Co-management Council to manage female mortality under a maximum allowable annual level would be much more effective and would likely result in lower levels of female mortality. 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, access, utilization, and stability.

4.4.1.3. Alternative 3

Alternative 3 incorporates elements of Alternative 2, but also includes certain regulatory controls to monitor subsistence use 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, subsistence use would be suspended if three female seals were killed; subsistence use would be terminated for the remainder of the year 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 subsistence use reporting system to ensure non-wasteful use, 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 would continue 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 of a role for 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 3,863 seals (i.e., 50% of the 2018 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 would prohibit the intentional (but not accidental) taking of sub-adult (juvenile) female fur seals. Alternative 5 would include suspension and termination provisions within the regulations rather than through co-management. Harvest would be terminated if needs have been met or wasteful taking was not remedied or if 200 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 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 FSEIS, 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 remain 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 associated with subsistence use, 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 use of seals compared to Alternative 1 (No Action). While these alternatives vary in terms of harvest/hunting seasons and 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 3,863 male fur seals, up to 7 years for 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 26% of PBR = minor effect Pup mortality = negligible effect (no harvest) Female mortality 1% of PBR = negligible effect	Portion of Juvenile male mortality up to 26% of PBR Portion of Pup mortality up to 26% of PBR Total mortality not to exceed 26% of PBR = minor effect Female mortality 0.3% of PBR = negligible effect	Juvenile male mortality 6% of PBR = negligible effect Pup mortality 19% of PBR = minor effect Female mortality 0.06% of PBR = negligible effect	Juvenile male mortality 6% of PBR = negligible effect Pup mortality 19% of PBR = minor effect Female mortality 0.3% of PBR = negligible effect	Juvenile male mortality 50% of PBR = major effect for the first 3 years then to be determined based on harvest setting process Pup mortality a portion of total juvenile male mortality not to exceed 50% of PBR = major effect Female mortality 3% of 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	Negligible effect, up to 11,450 non-pup fur seals exposed to effects	Negligible effect, Up to 12,220 pups or up to 16,650 non-pup fur seals exposed to effects	Negligible effect, Up to 9,240 pups or up to 6,925 non-pup fur seals exposed to effects	Negligible effect, Up to 9,240 pups or up to 9,450 non-pup fur seals exposed to effects	Negligible effect for the first 3 years, up to 13,966 pups or up to 20,579 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 inferences 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 controlled experimental 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), such that averaging trends across an island or stock obscures the effect on a smaller unit.

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 FSEIS, 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 to 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 present-day 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.

- Page Intentionally Left Blank

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.	-

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
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).	-
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: 71 females accidentally harvested (0.23% 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.	+

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
Scientific Research			
Northern Fur Seal Research	Education Disturbance Mortality Injury	1909: documented research on Pribilof Island northern fur seal populations begins. 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 issued for 2016-2021.	+
Natural Events			
Predation	Mortality Injury	Springer et al. (2003) hypothesized that sequential declines were due to increased predation by killer whales though 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).	-
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.	- / +

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
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 (50 CFR 216.81). 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. Aleutian and St. George Basin oil and gas development: proposed for 2023 in the 2019-2024 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 (1958-1974) (York and Hartley 1981). Concurrently, 30,000 to 96,000 juvenile males were harvested per year (Lander and Kajimura 1982).	-

Northern Fur Seal Cumulative Actions and Events			
Action / Event	**Type of Potential Effects**	**General Description/Example**	**Net Effect**
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.	+
Marine Mammal Protection Act (16 U.S.C. 1361-1407; 50 CFR Part 216)	Overall protection	1972: ecosystem approach to natural resource management and conservation of marine mammals. 1988: northern fur seal Pribilof Island 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” (designed as depleted) 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.	+

Page Intentionally Left Blank -

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	Major 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 due 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	Negligible to Moderate adverse effect due to uncertain mortality and injury in large vs small debris		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.

	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**
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 declining in recent years, but is estimated to include about 400,000 seals, with annually about 81,000 pups born on St. Paul Island (Chapter 3). Human and natural actions are interacting to produce negative cumulative effect (i.e., population decline) on the St. Paul population of northern fur seals. 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 negative cumulative effects of unreliable sources of income, unstable store-bought food supply, uncertain access to available subsistence resources, and loss of cultural identity.

The socio-cultural tension between NMFS and St. Paul Island subsistence users will be reduced by greater use of co-management from Alternative 2. The flexibility and local involvement within the NMFS and ACSPI co-management system will oversee and encourage local responsibility for their own subsistence activities with general regulatory limits. 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 and management of northern fur seals with the nutritional and cultural relationships of the community of St. Paul. The survival of the St. Paul Island 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 or influence on the system. The mere existence of northern fur seals is valuable regardless of the extent of their influence on the system. 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 that human influences are well managed, is worth the donations they make to such

environmental groups. While subsistence use of northern fur seals does affect the existence of individual seals that would be killed, none of the alternatives are projected or predicted to have long-term or detectable negative population consequences. The legalization of subsistence harvests of northern fur seal pups on St. George Island since 2014 has not resulted in any detectable negative population consequence, and NMFS anticipates a similar population response with implementation of the preferred alternative on St. Paul Island.

5. LITERATURE CITED

Alaska Sea Grant. 1993. "Is it food?" Alaska Sea Grant Report, 93-1, Alaska Sea Grant Program, 304 Eielson Building, University of Alaska Fairbanks, AK. 99775. 59 pages.

Allen, B., and R. Angliss. 2015. Alaska marine mammal stock assessments, 2014. Pages 27-35 *in*. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-AFSC-301. 304 pages.

Allen, J. A. 1880. History of North American Pinnipeds: a Monograph of the Walruses, Sea-Lions, Sea-Bears and Seals of North America. Government Printing Office, Washington, D.C. 785 pages.

Anas, R. E. 1974. Heavy metals in the northern fur seal, *Callorhinus ursinus*, and harbor seal, *Phoca vitulina richardi*. Fishery Bulletin 72(1):133-137.

Anderson, P. J., and J. F. Piatt. 1999. Community reorganization in the Gulf of Alaska following ocean climate regime shift. Marine Ecology Progress Series 189:117-123.

Angliss, R. P., and K. L. Lodge. 2002. Alaska marine mammal stock assessments, 2002. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-133, 224 pages.

Antonelis, G. A. 1992. Northern fur seal research techniques manual. U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-214, 47 pages.

Antonelis, G. A., A. E. York, and C. W. Fowler. 1994. Population assessment, Pribilof Islands, Alaska. Pages 29-47 *in* E. H. Sinclair, editor. Fur seal investigations, 1992, U. S. Department of Commerce, NOAA Technical Memorandum, NMFS-AFSC-45.

Antonelis, G. A., and R. L. Delong. 1985. Population and behavioral studies, San Miguel Island, California (Adams Cove and Castle Rock). Pages 32-41 *in* P. Kozloff, editor. Fur seal investigations, 1983. U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-78.

Antonelis, G. A., E. H. Sinclair, R. R. Ream, and B. W. Robson. 1997. Inter-island variation in the diet of female northern fur seals (*Callorhinus ursinus*) in the Bering Sea. Journal of Zoology 242(3):435-451.

Arctic Climate Impact Assessment (ACIA). 2004. Impacts of a Warming Arctic - Arctic Climate Impact Assessment. Cambridge University Press, United Kingdom. 144 pages.

Baker, J. 2007. Post-weaning migration of northern fur seal *Callorhinus ursinus* pups from the Pribilof Islands, Alaska. Marine Ecology Progress Series 341:243-255.

Baker, J. D., and C. W. Fowler. 1992. Pup weight and survival of northern fur seals *Callorhinus ursinus*. Journal of Zoology 227(2):231-238.

Baker, J. D., and M. J. Donohue. 2000. Ontogeny of swimming and diving in northern fur seal (*Callorhinus ursinus*) pups Journal of Zoology 78(1):100-109.

Baker, J. D., G. A. Antonelis, C. W. Fowler, and A. E. York. 1995. Natal site fidelity in northern fur seals, (*Callorhinus ursinus*). Animal Behaviour 50(1):237-247.

Bartholomew, G. A., and L. G. Hoel. 1953. Reproductive behavior of the Alaska fur seal, *Callorhinus ursinus*. Journal of Mammalogy 34(4):417-436.

Beamish, R. J., and D. Bouillon. 1993. Pacific salmon production trends in relation to climate. Canadian Journal of Fisheries and Aquatic Sciences 50(5):1002-1016.

Beckmen, K. B., G. M. Ylitalo, R. G. Towell, M. M. Krahn, T. M. O'Hara, and J. E. Blake. 1999. Factors affecting organochlorine contaminant concentrations in milk and blood of northern fur seal (*Callorhinus ursinus*) dams and pups from St. George Island, Alaska. Science of the Total Environment 231(2-3):183-200.

Beckmen, K. B., L. R. Duffy, X. Zhang, and K. W. Pitcher. 2002. Mercury concentrations in the fur of Steller sea lions and northern fur seals from Alaska. Marine Pollution Bulletin 44(10):1130-1135.

Benoit-Bird, K. J., B. C. Battaile, C. A. Nordstrom, and A. W. Trites. 2013. Foraging behavior of northern fur seals closely matches the hierarchical patch scales of prey. Marine Ecology Progress Series 479:283-302.

Benoit-Bird, K. J., B. C. Battaile, S. A. Heppell, B. Hoover, D. Irons, N. Jones, K. J. Kuletz, C. A. Nordstrom, R. Paredes, R. M. Suryan, C. M. Waluk, and A. W. Trites. 2013. Prey patch patterns predict habitat use by top marine predators with diverse foraging strategies. Plos One 8(1):e53348.

Benson, A. J., and A. W. Trites. 2002. Ecological effects of regime shifts in the Bering Sea and eastern North Pacific Ocean. Fish and Fisheries 3(2):95-113.

Bigg, M. A. 1990. Migration of northern fur seals (*Callorhinus ursinus*) off western North America. Canadian Technical Report of Fisheries and Aquatic Sciences (1764):64.

Bonnell, M. L., M. O. Pierson, and G. D. Farrens. 1983. Pinnipeds and sea otters of central and northern California, 1980-1983: status, abundance, and distribution. Pages 112-124 in Final Report for contract AA551-CT933. U.S. Department of the Interior, Minerals Management Service Center for Marine Studies University of California, Santa Cruz.

Borrini-Feyerabend, G., M. Pimbert, M. Taghi Farvar, A. Kothari, and Y. Renard. 2007. Sharing power: learning-by-doing in co-management of natural resources throughout the world. Earthscan, Sterling, VA. 473 pages.

Boveng, P. L., J. L. Bengtson, T. W. Buckley, M. F. Cameron, S. P. Dahle, B. P. Kelly, B. A. Megrey, J. E. Overland, and N. J. Williamson 2009. Status review of the spotted seal (*Phoca largha*). U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-200, Seattle, WA. 153 pages.

Bowen, W. D., J. Harwood, D. Goodman, and G. L. Swartzman. 2001. Review of the November 2000 Biological Opinion and Incidental Take Statement with Respect to the Western Stock of the Steller Sea Lion, with Comments on the Draft August 2001 Biological Opinion. Final Report. North Pacific Fishery Management Council, Anchorage, AK. 49 pages.

Braham, H. W. 1984. Habitat partitioning by ice-associated pinnipeds: distribution and density of seals and walruses in the Bering Sea, April 1976. Soviet-American Cooperative Research on Marine Mammals: Pinnipeds 1:25-47.

Brooks, J. W. 1954. A Contribution to the Life History and Ecology of the Pacific Walrus, Volume 1 of Alaska Cooperative Wildlife Research Unit. Special Report. University of Alaska, Anchorage. 206 pages.

Burns, J. J. 1965. The walrus in Alaska: its ecology and management Federal Aid Wildlife Restoration Project Report 5. Page 48 *in* Alaska Department of Fish and Game.

Burns, J. J. 1967. The Pacific Bearded Seal. State of Alaska Department of Fish and Game, Juneau, AK. 71 pages.

Burns, J. J. 1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas. Journal of Mammalogy 51(3):445-454.

Burns, J. J. 1981. "Bearded seal, *Erignathus barbatus* (Erxleben 1777) Pages 145-170 *in* S. H. Ridgway, and R. J. Harrison, editors. Handbook of marine mammals. Academic Press, New York.

Burns, J. J. 1981. "Ribbon seal *Phoca fasciata"*. Pages 89-109 *in* S. H. Ridgeway, and R. J. Harrison, editors. Handbook of marine mammals. Academic Press, New York.

Burns, J. J. 1981. Ice as marine mammal habitat in the Bering Sea. Pages 781-797 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf oceanography and resources, volume 2. University of Washington Press, Seattle.

Burns, J. J., and K. J. Frost. 1983. Natural History and Ecology of the Bearded Seal, *Erignathus barbatus*. Alaska Department of Fish and Game, Fairbanks, AK. 71 pages.

Busch, B. C. 1985. The War Against the Seals: A History of the North American Seal Fishery. McGill-Queen's University Press, Kingston, Ontario, CA. 374 pages.

Byrd, G. V., J. A. Schmutz, and H. M. Renner. 2008. Contrasting population trends of piscivorous seabirds in the Pribilof Islands: a 30-year perspective. Deep Sea Research Part II: Topical Studies in Oceanography 55(16-17):1846-1855.

Calkins, D. G., and E. Goodwin. 1988. Investigation of the declining sea lion population in the Gulf of Alaska. Alaska Department of Fish and Game (unpublished report).

Calkins, D. G., K. W. Pitcher, K. B. Schneider, and N. Murray. 1982. Population assessment, ecology and trophic relationships of Steller sea lions in the Gulf of Alaska. Final Report - Outer Continental Shelf Environmental Assessment Program Report Number 03-5-022-69. Alaska Department of Fish and Game. 445 pages.

Call, K. A., and R. R. Ream. 2012. Prey selection of subadult male northern fur seals (*Callorhinus ursinus*). Marine Mammal Science 28(1):1-15.

Call, K. A., R. R. Ream, D. Johnson, J. T. Sterling, and R. G. Towell. 2008. Foraging route tactics and site fidelity of adult female northern fur seal (*Callorhinus ursinus*) around the Pribilof Islands. Deep-Sea Research Part II: Topical Studies in Oceanography 55(16-17):1883-1896.

Carretta, J. V., M. M. Muto, S. Wilken, J. Greenman, K. Wilkinson, M. DeAngelis, J. Viezbicke, D. Lawson, J. Rusin, and J. Janot. 2015. Sources of human-related injury and mortality for U.S. Pacific west

coast marine mammal stock assessments, 2009-2013. Southwest Fisheries Science Center, NOAA Technical Memorandum. NMFS-SWFSC-548. 108 pages.

Castellini, M. A., Davis, R. W., Loughlin, T. R., and Williams, T. M. 1993. Blood Chemistries and Body Condition of Steller Sea Lion Pups at Marmot Island, Alaska. Marine Mammal Science 9(2):202-208.

Christensen, V. 1990. The ECOPATH II software or how we can gain from working together. Naga, the ICLARM Quarterly 13(2):9-10.

Christensen, V. 1994. Energy-based ascendency. Ecological Modelling 72(1-2):129-144.

Christensen, V. 1995. A model of trophic interactions in the North Sea in 1981, the year of the stomach. Dana (Denmark) 11(1):1-19.

Christensen, V., and D. Pauly. 1992. ECOPATH II- a software for balancing steady-state ecosystem models and calculating network characteristics. Ecological Modelling 61(3-4):169-185.

Coachman, L. K. 1986. Circulation, water masses, and fluxes on the southeastern Bering Sea shelf. Continental Shelf Research 5(1-2):23-108.

Coachman, L. K., and Aagaard, K. 1981. Re-evaluation of water transports in the vicinity of Bering Strait. Pages 95-110 *in* D. W. Hood, and J. A. Calder, editors. In the Eastern Bering Sea Shelf: Oceanography and Resources, Volume 1, NOAA, Washington, D.C.

Colt, S. 2001. The Economic Importance of Healthy Alaska Ecosystems. Institute of Social and Economic Research, University of Alaska Anchorage, 61 pages.

Conn, P. B., J. M. ver Hoef, B. T. McClintock, E. E. Moreland, J. M. London, M. F. Cameron, S. P. Dahle, and P. L. Boveng. 2014. Estimating multispecies abundance using automated detection systems: ice-associated seals in the Bering Sea. Methods in Ecology and Evolution 5(1280-1293).

Conners, M. E., A. B. Hollowed, and E. Brown 2002. Retrospective analysis of Bering Sea bottom trawl surveys: regime shift and ecosystem reorganization. Progress in Oceanography 55(1-2):209-222.

Costa, D. P., and R. L. Gentry. 1986. Free-ranging energetics of northern fur seals. Pages 79-81 *in* R. L. Gentry, and G. L. Kooyman, editors. Fur seals: maternal strategies on land and at sea. Princeton University Press, NJ.

Costa, D. P., and R. L. Gentry. 1986. Reproductive energetics of the northern fur seal. Pages 79-101 *in* R. L. Gentry, and G. L. Kooyman, editors. Fur seals: maternal strategies on land and at sea. Princeton University Press, NJ.

Cumming, D. H. M. 2015. Seal Range State Policy and Management Review. Gland, Switzerland: IUCN SSC/CEESP Sustainable Use and Livelihoods Specialist Group. xiv + 94pp. accessed 3/1/2019, https://portals.iucn.org/library/sites/library/files/documents/SSC-OP-055.pdf

Danielson, S., T. Weingartner, K. Aagaard, J. L. Zhang, and R. Woodgate. 2012. Circulation on the central Bering Sea shelf, July 2008 to July 2010. Journal of Geophysical Research: Oceans 117(C10).

DeLong, R. L. 1982. Population biology of northern fur seals of San Miguel Island, California. Ph.D. dissertation. University of California, Berkeley. 185 pages.

DeLong, R. L., and G. A. Antonelis. 1991. Impact of the 1982-1983 El Niño on the northern fur seal population at San Miguel Island, California. Pages 75-83 *in* F. Trillmich, and K. A. Ono, editors. Pinnipeds and El Niño. Ecological studies (analysis and synthesis), Volume 88. Springer, Berlin, Germany.

DeLong, R. L., P. Dawson, and P.J. Gearin. 1988. Incidence and impact of entanglement in netting debris on northern fur seal pups and adult females, St. Paul Island, Alaska. . Pages 58-68 *in* P. Kozloff, and H. Kajimura, editors. Fur seal investigations, 1985. U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-146, Seattle, WA.

Delong, R. L., W. G. Gilmartin, and J. G. Simpson. 1973. Premature births in California sea lions: association with high organochlorine pollutant residue levels. Science 181(4105):1168-1170.

DeMaster, D. P. 1981. Incorporation of density dependence and harvest into a general population model for seals. Pages 389-401 *in* C. W. Fowler, and T. D. Smith, editors. Dynamics of Large Mammal Populations. John Wiley & Sons, Inc., NY.

DeMaster, D. P. 1998. Minutes from sixth meeting of the Alaska Scientific Review Group, 21-23 October 1997, Seattle, Washington. 40 pages. (available upon request – Marine Mammal Laboratory 7600 Sand Point Way, NE, Seattle, WA. 98115).

DeMaster, D. P. 1999. Report on the 3-15 May 1999 meeting of the Scientific Committee of the International Whaling Committee. Marine Mammal Society Newsletter 7(2):1-3.

Dickerson, B. R., R. R. Ream, S. N. Vignieri, and Bentzen P. 2010. Population structure as revealed by mtDNA and microsatellites in northern fur seals, *Callorhinus ursinus*, throughout their range. Plos One 5(5):p.e10671.

Dizon, A. E., C. Lockyer, W. F. Perrin, D. P. DeMaster, and J. Sisson. 1992. Rethinking the stock concept: a phylogeographic approach. Conservation Biology 6(1):24-36.

Drinkwater, K. F., F. Mueter, K. D. Friedland, M. Taylor, G. L. Hunt Jr., J. Hare, and W. Melle. 2009. Recent climate forcing and physical oceanographic changes in Northern Hemisphere regions: A review and comparison of four marine ecosystems. Progress in Oceanography 81(1-4):10-28.

Duncan, C., B. Dickerson, K. Pabilonia, A. Miller, and T. Gelatt. 2014. Prevalence of *Coxiella burnetii* and *Brucella spp*. in tissues from subsistence harvested northern fur seals (*Callorhinus ursinus*) of St. Paul Island, Alaska. Acta Veterinaria Scandinavica 56(67).

Duncan, C., K. Savage, M. Williams, B. Dickerson, A. V. Kondas, K. A. Fitzpatrick, J. L. Guerrero, T. Spraker, and G. J. Kersh. 2013. Multiple strains of *Coxiella burnetii* are present in the environment of St. Paul Island, Alaska. Transboundary and Emerging Diseases 60(4):345-350.

Eberhardt, L. L., D. B. Siniff. 1977. Population dynamics and marine mammal management policies. Journal of the Fisheries Board of Canada 34(2):183-190.

Elliott, H. W. 1875. Upon the Condition of Affairs in the Territory of Alaska. U.S. Government Printing Office, Washington, D.C. 277 pages.

Elliott, H. W. 1881. A monograph of the Pribilov Group, or the seal-islands of Alaska. U.S. Commission of Fish and Fisheries Special Bulletin, U.S. Government Printing Office, 176 pages.

European Food Safety Authority. 2007. Scientific Opinion of the Panel on Animal Health and Welfare on a request from the Commission on the Animal Welfare aspects of the killing and skinning of seals. The European Food Safety Authority Journal (2007) 610, 1-122. Accessed 3/1/2019, https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2007.610

Fall, J. A., and D. Koster. 2010. Subsistence harvests of Pacific halibut in Alaska, 2008. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 342, Anchorage, Alaska, 220 pages.

Fall, J. A., and D. Koster. 2012. Subsistence harvests of Pacific halibut in Alaska, 2010. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 367, Anchorage, AK. 188 pages.

Fall, J. A., and D. Koster. 2013. Subsistence harvests of Pacific halibut in Alaska, 2011. Alaska Department of Fish and Game, Division of Subsistence Technical Report No. 378, Anchorage, AK. 184 pages.

Fall, J. A., and D. Koster. 2014. Subsistence harvests of Pacific halibut in Alaska, 2012. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 388, Anchorage, Alaska, 178 pages.

Fay, F. H. 1955. The Pacific Walrus (*Odobenus rosmarus divergens*): spatial ecology, life history, and population. Ph.D. dissertation, University of British Columbia. Vancouver, CA. 174 pages.

Fay, F. H. 1981. Marine Mammals of the Eastern Bering Sea Shelf: An Overview. Pages 807-817 *in* D. W. Hood, and J. Calder, editors. The Eastern Bering Sea Shelf: 1981. University of Washington Press, Seattle.

Fay, F. H. 1982. Ecology and biology of the Pacific walrus, *Odobenus rosmarus divergens* Illiger. North American Fauna 74:279.

Fay, F. H., Kelly, B. P., Gehnrich, P. H., Sease, J. L., and Hoover, A. A. 1984. "Modern populations, migrations, demography, trophics, and historical status of the Pacific walrus." Pages 231-376. OCSEAP Final Report No. 37.

Fazzino, D. V., and P. A. Loring. 2009. From crisis to cumulative effects: food security challenges in Alaska. National Association for the Practice of Anthropology Bulletin 32(1):152-177.

Fiscus, C. H. 1978 Northern fur seal. Pages 152-159 *in* D. Haley, editor. Marine mammals of the eastern North Pacific and arctic waters. Pacific Search Press, Seattle, WA.

Fiscus, C. H. 1983. Fur seals. *in* Background papers submitted by the United States to the 26th annual meeting of the. Standing Scientific Committee of the North Pacific Fur Seal Commission, Washington,

D.C., March 28-5 April 1983. (available upon request - Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA. 98115).

Fiscus, C. H., H. W. Braham, R. W. Mercer, R. D. Everitt, B. D. Krogman, P. D. McGuire, C. E. Peterson, R. M. Sonntag, and D. Withrow. 1976. Seasonal distribution and relative abundance of marine mammals in the Gulf of Alaska. NWFC Processed Report. Northwest Fishery Center, NMFS, NOAA. 7600 Sand Point Way NE, Seattle, WA. 98115-0070. 238 pages.

Fowler, C. W. 1981. Density dependence as related to life history strategy. Ecology 62(3):602-610.

Fowler, C. W. 1985. Status review: northern fur seals (*Callorhinus ursinus*) of the Pribilof Islands, Alaska. Presented at 28th Meeting of the Standing Scientific Committee of the North Pacific Fur Seal Commission, March-April, 1985, Tokyo, Japan

Fowler, C. W. 1987. A review of density dependence in populations of large mammals. Pages 401-441 *in* H. H. Genoways, editor. Current Mammalogy, Volume 1. Plenum Publication Corporation, New York, NY.

Fowler, C. W. 1987. Marine debris and northern fur seals: a case study. Marine Pollution Bulletin 18(6B):326-335.

Fowler, C. W. 1988. Population dynamics as related to rate of increase per generation. Evolutionary Ecology 2(3):197-204.

Fowler, C. W. 1998. Northern fur seals on Pribilov Islands. Pages 450-498 *in* V. E. Sokolov, A. A. Aristov, and T. Y. Lisitzina, editors. The northern fur seal: systematics, morphology, ecology, behavior, Part 2. Russian Academy of sciences, Moscow. (Species of Fauna of Russia and Contiguous Countries) Part 2:406-940. In Russian.

Fowler, C. W. 2000. Ecological effects of marine debris: the example of northern fur seals. Pages 40-58 *in* Proceedings of the International Conference on Derelict Fishing Gear and the Ocean Environment, August 6-11, 2000, Honolulu, HI.

Fowler, C. W. 2002. Sustainability. Pages 1205-1208 *in* W. F. Perrin, B. Wusig, and J. G. M. Thewissen, editors. Encyclopedia of marine mammals. Academic Press, San Diego, CA.

Fowler, C. W., and L. Hobbs. 2002. Limits to natural variation: implications for systemic management. Animal Biodiversity and Conservation 25(2):7-45.

Fowler, C. W., and T. D. Smith. 1981. Dynamics of large mammal populations. Wiley, New York.

Fowler, C. W., J. D. Baker, R. R. Ream, B. W. Robson, and M. Kiyota. 1994. Entanglement studies on juvenile male northern fur seals, St. Paul Island. Pages 100-136 *in* E. H. Sinclair, editor. Fur seal investigations, 1992. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-45, Seattle, WA.

Fowler, C. W., R. Merrick, and J. D. Baker. 1990. Studies of the population level effects of entanglement on northern fur seals. Pages 453-474 *in* R. S. Shomura, and M. L. Godfrey, editors. Proceedings of the Second International Conference on Marine Debris, April 2-7, 1989, Honolulu, Hawaii. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-154.

Fowler, C. W., R. Ream, B. Robson, and M. Kiyota. 1992. Entanglement studies, St. Paul Island, 1991 juvenile male northern fur seals. U.S. Department of Commerce, NOAA AFSC Processed Report 92-07, Seattle, WA. 45 pages.

Francis, R. C., and S. R. Hare. 1994. Decadal-scale regime shifts in the large marine ecosystems of the Northeast Pacific: a case for historical science. Fisheries Oceanography 3(4):279-291.

Francis, R. C., and S. R. Hare. 1994. Decadal-scale regime shifts in the large marine ecosystems of the Northeast Pacific: a case for historical science. Fisheries Oceanography 3(4):279-291.

Francis, R. C., R. L. Merrick, and S. Bollens. 1999. "Modeling and management of the Bering Sea ecosystem." Pages 409-433 *in* T. R. Loughlin, and K. Ohtani, editors. Dynamics of the Bering Sea. University of Alaska, Fairbanks.

Francis, R. C., R. L. Merrick, and S. Bollens. 1999. Modeling and management of the Bering Sea ecosystem. Pages 409-433 *in* T. R. Loughlin, and K. Ohtani, editors. Dynamics of the Bering Sea. University of Alaska, Fairbanks.

Francis, R. C., S. R. Hare, A. B. Hollowed, and W. S. Wooster. 1998. Effects of interdecadal climate variability on the oceanic ecosystems of the NE Pacific. Fisheries Oceanography 7(1):1-21.

Fritz, L. W. 1996. Juvenile walleye pollock, *Theragra chalcogramm*a, bycatch in commercial groundfish fisheries in Alaskan waters. Pages 179-195 *in* R. D. Brodeur, P. A. Livingston, T. R. Loughlin, and A. B. Hollowed, editors. Ecology of walleye pollock, *Theragra chalcogramma*. U.S. Department of Commerce, NOAA Technical Report NMFS-126.

Fritz, L. W., and C. Stinchcomb. 2005. Aerial, ship, and land-based surveys of Steller sea lions (*Eumetopias jubatus*) in the western stock in Alaska, June and July 2003 and 2004. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-AFSC-153, 56 pages.

Fritz, L. W., and S. Hinckley. 2005. A critical review of the regime shift-"junk food"-nutritional stress hypothesis for the decline of the western stock of Steller sea lion. Marine Mammal Science 21:476-518.

Frost, K. J., and L. F. Lowry. 1981. "Foods and tropic relationships of cetaceans in the Bering Sea." D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: oceanography and resources. University of Washington Press, Seattle, WA.

Gadamus, L. 2013. Linkages between human health and ocean health: a participatory climate change vulnerability assessment for marine mammal harvesters. International Journal of Circumpolar health 72(1):20715.

Gaichas, S. K., K. Y. Aydin, and R. C. Francis. 2011. What drives dynamics in the Gulf of Alaska? Integrating hypotheses of species, fishing, and climate relationships using ecosystem modeling. Canadian Journal of Fisheries and Aquatic Sciences 68(9):1553-1578.

Ganachaud, A., and C. Wunsch. 2000. Improved estimates of global ocean circulation, heat transport and mixing from hydrographic data. Nature 408:453-457.

Gearin, P. J., B. S. Stewart, and R. L. DeLong. 1989. Late-season surveys for entangled northern fur seal females and pups, St. Paul Island, Alaska. Pages 63-65 *in* H. Kajimura, editor. Fur seal investigations, 1986. U.S. Department of Commerce, NOAA technical Memorandum NMFS F/NWC-174, Seattle, WA.

Gentry, R. L. 1981. Land-sea movements of northern fur seals relative to commercial harvesting. Pages 1328-1359 *in* J. A. Chapman, and D. Pursley, editors. Proceedings of the Worldwide Furbearers Conference, Volume 2, August 3-11, 1980, Frostburg, MD.

Gentry, R. L. 1991. El Niño effects on adult northern fur seals at the Pribilof Islands. Pages 84-93 *in* F. Trillmich, and K. A. Ono, editors. Pinnipeds and El Niño. Ecological studies (analysis and synthesis). Springer, Belin, Heidelberg, Germany.

Gentry, R. L. 1998. Behavior and Ecology of the Northern Fur Seal. Princeton University Press, NJ. 392 pages.

Gentry, R. L. 2009. Northern fur seal. Pages 718-816 *in* W. F. Perrin, B. Wursig, and H. G. M. Thewissen, editors. Encyclopedia of marine mammals. Academic Press, San Diego, CA.

Gentry, R. L., and J. H. Johnson. 1981. Predation by sea lions on northern fur seal neonates. Mammalia 45(4):423-430.

Gentry, R. L., and J. R. Holt. 1986. Attendance behavior of northern fur seals. Pages 41-60 *in* R. L. Gentry, and G. L. Kooyman, editors. Fur seals: maternal strategies on land and at sea. Princeton University Press, NJ.

Gerrodette, T., D. Goodman, J. Barlow. 1985. Confidence-limits for population projections when vital-rates vary randomly. Fishery Bulletin 83(3):207-217.

Gilmartin, W. G., R. L. DeLong, A. W. Smith, J. C. Sweeney, B. W. De Lappe, R. W. Risebrough, L. A. Griner, M. D. Dailey, and D. B. Peakall. 1976. Premature parturition in the California sea lion. Journal of Wildlife Diseases 12(1):104-115.

Goebel, M. E. 2002. Northern fur seal lactation, attendance and reproductive success in two years of contrasting oceanography. Ph.D. dissertation. University of California, Santa Cruz. 213 pages.

Goebel, M. E., J. L. Bengtson, R. L. Delong, R. L. Gentry, and T. R. Loughlin. 1991. Diving patterns and foraging locations of female northern fur seals. Fishery Bulletin 89(2):171-179.

Gudmundson, C. J., T. K. Zeppelin, and R. R. Ream. 2006. Application of two methods for determining diet of northern fur seals (*Callorhinus ursinus*). Fishery Bulletin 104:445-455.

Hanna, D. G. 1923. "Rare mammals of the Pribilof Islands, Alaska". Journal of Mammalogy 4(4):209-215.

Hanna, D. G., and J. A. Lindsay. 2008. The Alaska Fur-Seal Islands. U.S. Department of Commerce, NOAA Technical Memorandum NOA ORR 16, Seattle, WA. 295 pages.

Hare, S. R., and N. J. Mantua. 2000. Empirical evidence for North Pacific regime shifts in 1977 and 1989. Progress in Oceanography 47(2-4):103-145.

Harry, G. Y., and J. R. Hartley. 1981. Northern fur seals in the Bering Sea. Pages 847-867 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: Oceanography and resources, volume 2. Office of Marine Pollution Assessment, Washington, D.C.

Hattori, A. 1986. Preliminary Report of the Hakuho Maru Cruise KH-86-3: June 3-August 1, 1986: The Bering Sea and the Northern North Pacific. University of Tokyo, Japan, Ocean Research Institute.

Hattori, A., and J. J. Goering. 1981. Nutrient distributions and dynamics in the eastern Bering Sea. Pages 975-992 *in* D. W. Hood, and J. A. Calder, editors. The Eastern Bering Sea shelf: oceanography and resources, volume 2. University of Washington Press, Seattle.

Haynes, T. L., and C. Mishler. 1991. The subsistence harvest and use of Steller sea lions in Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 198, Juneau, Alaska, 45 pages.

Helker, V. T., B. M. Allen, and L. A. Jemison. 2015. Human-caused injury and mortality of NMFS-managed Alaska marine mammal stocks, 2009-2013. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-AFSC-300, 94 pages.

Hobbs, R. C., and L. L. Jones. 1993. Impacts of high seas driftnet fisheries on marine mammal populations in the North Pacific. Pages 409-434 *in* J. Ito, W. Shaw, and R. L. Burgner, editors. Symposium on biology, distribution, and stock assessment of species caught in the high seas driftnet fisheries in the North Pacific Ocean, International Fishery Commission Bulletin, Volume 53.

Hollowed, A. B., and W. S. Wooster. 1995. Decadal-scale variations in the eastern subarctic Pacific:II. Response of Northeast Pacific fish stocks. Pages 373-385 in Climate change and northern fish populations. Canadian Special Publication of Fisheries and Aquatic Sciences, Victoria, British Columbia, CA. October 19th to 24th, 1992.

Hollowed, A. B., M. Barange, R. J. Beamish, K. Brander, K. Cochrane, K. Drinkwater, M. G. Foreman, J. A. Hare, J. Holt, S. Ito, S. Kim, J. R. King, H. Loeng, B. R. MacKenzie, F. J. Mueter, T. A. Okey, M. A. Peck, V. I. Radchenko, J. C. Rice, M. J. Schirripa, A. Yatsu, and Y. Yamanaka. 2013. Projected impacts of climate change on marine fish and fisheries. Ices Journal of Marine Science 70(5):1023-1037.

Hollowed, A. B., S. R. Hare, and W. S. Wooster. 1998. Pacific basin climate variability on the oceanic ecosystems of the NE pacific. Pages 89-108 *in* G. Holloway, P. Muller, and D. Henderson, editors. Proceedings 'Aha Huliko'a (biotic impacts of extratropical climate variability in the Pacific), January 25-29, 1998, University of Hawaii.

Hollowed, A. B., S. R. Hare, and W. S. Wooster. 2001. Pacific-basin climate variability and patterns of Northeast Pacific marine fish production. Progress in Oceanography 49:257-282.

Holsapple, M. P., N. K. Snyder, S. C. Wood, and D. L. Morris. 1991. 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin-induced changes in immunocompetence: possible mechanisms. Annual Review of Pharmacology and Toxicology 31:73-100.

Hood, D. W., and J. A. Calder. 1981. The Eastern Bering Sea Shelf: Oceanography and Resources. Volumes 1 and 2. University of Washington Press, Seattle, 656 pages.

Hunt Jr, G. L., and G. V. Byrd. 1999. Marine bird populations and the carrying capacity of the eastern Bering Sea T. R. Loughlin, and K. Ohtani, editors. The Bering Sea: physical, chemical, and biological dynamics. Alaskan Sea Grant Program, University of Alaska, Fairbanks.

Hunt Jr, G. L., Z. Eppley, B. Burgeson, and R. Squibb. 1981. Reproductive ecology, foods, and foraging areas of seabirds nesting on the Pribilof Islands, 1975-79. Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators, RU-83. U.S. Department of Commerce, NOAA, OCEAP, Boulder, CO.

Hunt Jr., G. L., B. Burgeson, and G. A. Sanger. 1981. Feeding ecology of seabirds of the eastern Bering Sea. Pages 629-647 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: oceanography and resources. University of Washington Press, Seattle.

Hunt Jr., G.L., K. o. Coyle, L. B. Eisner, E. V. Farley, R. A. Heintz, F. Mueter, J. M. Napp, J. E. Overland, P. H. Ressler, S. Salo, and P. J. Stabeno. 2011. Climate impacts on eastern Bering Sea foodwebs: a synthesis of new data and an assessment of the oscillating control hypothesis. Ices Journal of Marine Science 68(6):1230-1243.

Hunt, G. L., D. M. Gould, D. J. Forsell, and H. Peterson, Jr. 1981. Pelagic distribution of marine birds in the eastern Bering Sea. Pages 689-718 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: Oceanography and resources. University of Washington Press.

Huntington, H. P., S. A. Kruse, and A. J. Scholz. 2009. Demographic and environmental conditions are uncoupled in the social-ecological system of the Pribilof Islands. Polar Research 28(1):119-128.

Insley, S. J. 2000. Long-term vocal recognition in the northern fur seal. Nature 406(6794):404-5.

Jochelson, W. 1966. History, Ethnology, and Anthropology of the Aleut. Anthropological Publications, Oosterhout, The Netherlands. 91 pages.

Johnson, A. M. 1968. Annual mortality of territorial male fur seals and its management significance. The Journal of Wildlife Management 32(1):94-99.

Johnson, D. S., M. B. Hooten, and C. E. Kuhn. 2013. Estimating animal resource selection from telemetry data using point process models. Journal of Animal Ecology 82(6):1155-1164.

Johnson, D. S., R. R. Ream, R. G. Towell, M. T. Williams, and J. D. Leon Guerrero. 2013. Bayesian clustering of animal abundance trends for inference and dimension reduction. Journal of Agricultural Biological and Environmental Statistics 18(3):299-313.

Johnson, M. L., C. H. Fiscus, B. T. Ostenson, and M. L. Barbour. 1966. Marine Mammals. Pages 897-924 *in* N. J. Wilimovsky, and J. N. Wolfe, editors. Environment of the Cape Thompson Region, Alaska. U.S. Atomic Energy Commission, Oak Ridge, TN.

Jordan, D. S. 1898. The fur seals and fur-seal islands of the North Pacific Ocean. Part I. U.S. Government Printing Office, Washington, D.C. 256 pages.

Joy, R., M. G. Dowd, B. C. Battaile, P. M. Lestenkof, J. T. Sterling, A. W. Trites, and R. D. Routledge. 2015. Linking northern fur seal dive behavior to environmental variables in the eastern Bering Sea. Ecosphere 6(5):75.

Kajimura, H. 1980. Distribution and migration of northern fur seals in the eastern Pacific. Pages 4-43 *in* H. Kajimura, R. H. Lander, M. A. Perez, A. E. York, and M. A. Bigg, editors. Further analysis of pelagic fur seal data collected by the United States and Canada during 1958-1974, Part I. U.S. National Marine Fishery Service, Northwest and Alaska Fishery Center, National Marine Mammal Laboratory, Seattle, WA.

Kajimura, H. 1984. Opportunistic feeding of the northern fur seal, *Callorhinus ursinus*, in the eastern North Pacific Ocean and eastern Bering Sea. U.S. Department of Commerce, NOAA Technical Report NMFS SSRF-779, 49 pages.

Kajimura, H., and T. Loughlin. 1988. Marine mammals in the oceanic food web of the eastern subarctic Pacific. T. Nemoto, and W. Pearcy, editors. The biology of the subarctic Pacific, Proceedings of the Japan-United States of America Seminar on the Biology of the Micronekton of the Subarctic Pacific. Bulletin of the Ocean Research Institute, University of Tokyo 26 (II):187:223.

Kelly, B. P. 1988. "Bearded seal, *Erignathus barbatus.*". Pages 77-94 *in* J. W. Lentfer, editor. Selected marine mammals of Alaska species accounts with research and management. Marine Mammal Commission, Washington, D.C.

Kelly, B. P. 1988. "Ribbon seal, *Phoca fasciata.".* Pages 95-106 *in* J. W. Lentfer, editor. Selected marine mammal species of Alaska: species accounts with research and management recommendations. Marine Mammal Commission, Washington, D.C.

Kenney, L. A., F. A. von Hippel, J. J. Willacker, and T. M. O'Hara. 2012. Mercury concentrations of a resident freshwater forage fish at Adak Island, Aleutian Archipelago, Alaska. Environmental Toxicology and Chemistry 31(11):2647-2652.

Kenyon, K. W. 1962. History of the Steller sea lion at the Pribilof Islands, Alaska. Journal of Mammalogy 43(1):68-75.

Kenyon, K. W., and D. W. Rice. 1961. Abundance and distribution of the Steller sea lion. Journal of Mammalogy 42(2):223-234.

Kenyon, K. W., V. B. Scheffer, and D. G. Chapman. 1954. A Population Study of the Alaska Fur-Seal Herd. U.S. Fish and Wildlife Service, Washington, D.C. 77 pages.

Keyes, M. C. 1965. Pathology of the northern fur seal. Journal of American Veterinary Medicine Association 147:1090-1095.

Kim, K. C., R. C. Chu, and G. P. Barron. 1974. Mercury in tissues and lice of Northern fur seals. Bulletin of environmental contamination and toxicology 11(3):281-284.

Kinder, T. H., and J. D. Schumacher. 1981. Hydographic Structure Over the Continental Shelf of the Southeastern Bering Sea. Pages 31-52 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: Oceanography and resources. University of Washington Press, Seattle.

Kinder, T. H., and L. K. Coachman. 1978. The front overlaying the continental slope in the eastern Bering Sea. Journal of Geophysical Research-Oceans and Atmospheres 83(C9):4551-4559.

Kitaysky, A. S., E. V. Kitaiskaia, J. F. Piatt, and J. C. Wingfield. 2006. A mechanistic link between chick diet and decline in seabirds? Proceedings of the Royal Society B: Biological Sciences 273(1585):445-450.

Kiyota, M., and N. Baba. 2001. Entanglement in marine debris among adult female northern fur seals at St. Paul Island, Alaska in 1991-1999. Bulletin of the National Research Institute of Far Seas Fisheries No. 38:13-20.

Kohlhoff, D. 1995. When the Wind was a River: Aleut Evacuation in World War II. University of Washington Press, Seattle, 234 pages.

Kooyman, G. L., R. L. Gentry, and D. L. Urquhart. 1976. Northern fur seal diving behavior: a new approach to its study. Science 193(4251):411-412.

Krahn, M. M., P. R. Becker, K. L. Tilbury, and J. E. Stein. 1997. Organochlorine contaminants in blubber of four seal species: integrating biomonitoring and specimen banking. Chemosphere 34(9-10):2109-2121.

Kuhn, C. E., J. D. Baker, R. G. Towell, and R. R. Ream. 2014a. Evidence of localized resource depletion following a natural colonization event by a large marine predator. Journal of Animal Ecology 83:1169-1177.

Kuhn, C. E., R. R. Ream, J. T. Sterling, and R. G. Towell. 2014. Spatial segregation and the influence of habitat on the foraging behavior of northern fur seals (*Callorhinus ursinus*). Canadian Journal of Zoology 92(10):861-873.

Kuhn, C. E., Y. Tremblay, R. R. Ream, and T. Gelatt. 2010. Coupling GPS tracking with dive behavior to examine the relationship between foraging strategy and fine-scale movements of northern fur seals. Endangered Species Research 12:125-139.

Kuzin, A. E. 2010. The intrapopulation structure of the northern fur seal (*Callorhinus ursinus* L.) on Tyuleniy Island during the post-depression years (1993-2009). Russian Journal of Marine Biology 36(7):507-517.

Kuzmina, T. A., E. T. Lyons, and T. R. Spraker. 2014. Anisakids (Nematoda: Anisakidae) from stomachs of northern fur seals (*Callorhinus ursinus*) on St. Paul Island, Alaska: parasitological and pathological analysis. Parasitol Research 113(12):4463-70.

Kuzmina, T. A., J. S. Hernandez-Orts, E. T. Lyons, T. R. Spraker, V. V. Kornyushyn, and R. Kuchta. 2015. The cestode community in northern fur seals (*Callorhinus ursinus*) on St. Paul Island, Alaska. International Journal for Parasitology: Parasites and Wildlife 4(2):256-263.

Kuzmina, T. A., O. I. Lisitsyna, E. T. Lyons, T. R. Spraker, and S. C. Tolliver. 2012. Acanthocephalans in northern fur seals (*Callorhinus ursinus*) and a harbor seal (*Phoca vitulina)* on St. Paul Island, Alaska: species, prevalence, and biodiversity in four fur seal subpopulations. Parasitology Research 111(3):1049-1058.

Lander, R. H. 1980. Summary of northern fur seal data and collection procedures, Volume 1: land data of the United States and Soviet Union (excluding tag and recovery records). U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-3, 315 pages.

Lander, R. H. 1981. A life table and biomass estimate for Alaskan fur seals. Fisheries Research 1:55-70.

Lander, R. H., and H. Kajimura. 1982. Status of northern fur seals. Pages 319-345 *in* Mammals in the seas, Volume 4, small cetaceans, seals, sireians, and otters: selected papers of the Scientific Consultation on the Conservation and Management of Marine Mammals and their Environment, Bergen, Norway, 1976. Food & Agriculture Organization of the United Nations Rome.

Larntz, K., and R. Garrott. 1993. Analysis of 1991 bycatch of selected marine mammal species in the North Pacific neon squid driftnet fishery.

Laughlin, W. S. 1980. Aleuts: survivors of the Bering land bridge. Holt, Reinhart, and Winston, New York. 151 pages.

Lea, M. A., D. Johnson, R. Ream, J. Sterling, S. Melin, and T. Gelatt. 2009. Extreme weather events influence dispersal of naive northern fur seals. Biology Letters 5:252-257.

Lestenkof, A. D., P. A. Zavadil, A. Malavansky, and M. Malavansky. 2006. The subsistence harvest of northern fur seals on the Pribilof Islands in 2005. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Division, Pribilof Islands, Alaska 99660. 24 pages.

Lestenkof, P. M., P. I. Melovidov, and M. Rukovishnikoff. 2014. The susbsistence harvest of subadult northern fur seals on St. Paul Island, Alaska, in 2013 Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Division., Pribilof Islands, Alaska 99660. 45 pages.

Lestenkof, P. M., P. I. Melovidov, D. V. Roberts, and P. A. Zavadil. 2012. The subsistence harvest of subadult northern fur seals on St. Paul Island, Alaska, in 2011. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Division, Pribilof Islands, Alaska 99660. 24 pages.

Lestenkof, P. M., P. I. Melovidov, M. Rukovishnikoff, Sr., and P. A. Zavadil. 2013. The subsistence harvest of subadult northern fur seals on St. Paul Island, Alaska in 2012. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Division, Pribilof Islands, Alaska 99660. 36 pages.

Lippold, L. K. 1966. Chaluka: the economic base. Arctic Anthropology 3(2):125-131.

Lloyd, D. L., C. P. McRoy, and R. H. Day. 1981. Discovery of northern fur seals (*Callorhinus-ursinus*) breeding on Bogoslof Island, Southeastern Bering Sea. Arctic 34(4):318-320.

Loring, P. A., and S. C. Gerlach. 2015. Searching for progress on food security in the North American North: a research synthesis and meta-analysis of the peer-reviewed literature. Arctic 68(3):380-392.

Loring, P. A., C. Gerlach, D. E. Atkinson, and M. S. Murray. 2011. Ways to help and ways to hinder: governance for effective adaptation to an uncertain climate. Arctic 64(1):73-88.

Loughlin, T. R., and R. V. Miller. 1989. Growth of the northern fur seal colony on Bogoslof Island, Alaska. Arctic 42(4):368-372.

Loughlin, T. R., D. J. Rugh, and C. H. Fiscus. 1984. Northern sea lion distribution and abundance - 1956-80. Journal of Wildlife Management 48(3):729-740.

Loughlin, T. R., E. H. Sinclair, P. J. Stabeno, and W. G. Pearcy. 1999. Dynamical processes influencing the distribution and biomass or mesopelagic fishes and cephalopods in the southeastern Bering Sea. Pages 18-21 *in* NOAA's Artic Research Initiative - the first three years. U.S. Department of Commerce, NOAA, Arctic Research Office, Silver Spring, MD.

Loughlin, T. R., G. A. Antonelis, J. D. Baker, A. E. York, C. W. Fowler, R. L. Delong, and H. W. Braham. 1994. Status of the northern fur seal population in the United States during 1992. Pages 9-28 *in* E. H. Sinclair, editor. Fur seal investigations, 1992. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-45, Seattle, Washington.

Loughlin, T. R., J. L. Bengtson, and R. L. Merrick. 1987. Characteristics of feeding trips of female fur seals. Canadian Journal of Zoology 65(8):2079-2084.

Loughlin, T. R., L. Consiglieri, R. L. Delong, and A. T. Actor. 1983. Incidental catch of marine mammals by foreign fishing vessels, 1978-81. Marine Fisheries Review 45(7-9):44-49.

Loughlin, T. R., M. A. Castellini, and G. Ylitalo. 2002. Spatial aspects of organochlorine contamination in northern fur seal tissues. Marine Pollution Bulletin 44(10):1024-1034.

Lowry, L. F. 1982. Documentation and assessment of marine mammal-fishery interactions in the Bering Sea [natural resources, Alaska]. Pages 300-311 *in* In Transactions of the 47th North American Wildlife and Natural Resources Conferences, Portland, OR.

Lowry, L. F., and K. J. Frost. 1985. Biological interactions between marine mammals and commercial fisheries in the Bering Sea. Pages 41-61 *in* J. R. Beddington, R. J. H. Beverton, and D. Lavigne, editors. Marine Mammals and Fisheries. George Allen and Unwin, London, England.

Lowry, L. F., K. J. Frost, and T. R. Loughlin. 1989. Importance of walleye pollock in the diets of marine mammals in the Gulf of Alaska and Bering Sea, and implications for fishery management, pages 701-726. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, Nov. 14-16, 1988, University of Alaska, Fairbanks, Sea Grant Report AK-SG-89-01.

Lowry, L. F., K. J. Frost, D. G. Calkins, G. L. Swartzman, and S. Hills. 1982. Feeding habits, food requirements, and status of Bering Sea marine mammals. Contract 81- 4- Final Report to the North Pacific Fishery Management Council, P.O. Box 3136, Anchorage, AK. 99510.

Lucas, F. A. 1899. The food of the northern fur seals. Pages 59-68 *in* D. S. Jordan, editor. The fur seals and fur-seal islands of the North Pacific Ocean, Part 3. U.S. Treasury Department Document 2017.

Lyons, E. T., S. R. Melin, R. L. Delong, A. J. Orr, F. M. Gulland, and S. C. Tolliver. 2001. Current prevalence of adult *Uncinaria spp*. in northern fur seal (*Callorhinus ursinus*) and California sea lion (*Zalophus californianus*) pups on San Miguel Island, California, with notes on the biology of these hookworms. Veterinary Parasitology 97(4):309-318.

Magdanz, J. S., N. S. Braem, B. C. Robbins, and D. S. Koster. 2007. Subsistence harvests in Northwest Alaska, Kivalina and Noatak, 2007. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 354 Kotzebue, 121 pages.

Manly, B. F. J. 2007. Incidental take and interactions of marine mammals and birds in the Kodiak Island salmon set gillnet fishery, 2002 and 2005. Final Report to Alaska Marine Mammal Observer Program, NMFS Alaska Region. 221 p.

Mantua, N. J., and S. R. Hare. 2002. The Pacific decadal oscillation. Journal of Oceanography 58(1):35-44.

McCollum, D. W., and S. M. Miller. 1994. Alaska voters, Alaska hunters, and Alaska nonresident hunters: their wildlife related trip characteristics and economics. Alaska Department of Fish and Game, Anchorage.

McLaren, I. A. 1958. The biology of the ringed seal (*Phoca hispida*) in the Eastern Canadian Arctic. Fisheries Research Board of Canada 118:97.

McRoy, C. P., and J. J. Goering. 1974. Nutrient transfer between the seagrass Zostera marina and its epiphytes. Nature 248(5444):173-174.

Melin, S. R., R. L. Delong, and A. J. Orr. 2005. The status of the northern fur seal population at San Miguel Island, California, 2002-2003. Pages 44-52 *in* J. W. Testa, editor. Fur seal investigations, 2002-2003. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-151.

Merrick, R. L., and D. G. Calkins. 1995. "Importance of juvenile walleye Pollock in the diet of Gulf of Alaska sea lions." (Unpublished manuscript). NMFS, National Marine Mammal Laboratory, 7600 sand Point Way, NE. Seattle, WA. 98115. 35 pages.

Merrick, R. L., and T. R. Loughlin. 1997. Foraging behavior of adult female and young-of-the-year Steller sea lions in Alaskan waters. Canadian Journal of Zoology 75(5):776-786.

Merrick, R. L., T. R. Loughlin, and D. G. Calkins. 1987. Decline in abundance of the northern sea lion, *Eumetopias-jubatus*, in Alaska, 1956-86. Fishery Bulletin 85(2):351-365.

Merrill, G.B. 2019. Does subsistence harvest of male pups on St. George Island, AK impact maternal northern fur seal attendance behaviors? June 2019, report from University of Alaska Anchorage, available from NMFS, Alaska Region, Protected Resources Division, P.O. Box 21688, Juneau, AK. 99801-1668, 12 pages.

Minobe, S. 2000. Spatio-temporal structure of the pentadecadal variability over the North Pacific. Progress in Oceanography 47(2-4):381-408.

Minobe, S. 2002. Interannual to interdecadal changes in the Bering Sea and concurrent 1998/99 changes over the North Pacific. Progress in Oceanography 55(1-2):45-64.

Muench, R. D., and J. D. Schumacher. 1985. On the Bering Sea ice edge front. Journal of Geophysical Research-Oceans 90(C2):3185-3197.

Muto, M. M., V. T. Helker, R. P. Angliss, B. A. Allen, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadley, M. C. Ferguson, L. W. fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2016. Alaska marine mammal stock

assessments, 2015. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-AFSC-323, 300 pages.

Muto, M. M., V. T. Helker, R. P. Angliss, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, K. L. Sweeney, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2019. Alaska marine mammal stock assessments, 2018. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-XXX.

National Advisory Committee on Oceans and Atmosphere. 1985. North Pacific Fur Seals: Current Problems and Opportunities Concerning Conservation and Management, at http://babel.hathitrust.org.

National Marine Fisheries Service. 1992. Final Recovery Plan for Stellar Sea Lions *Eumetopias jubatus*. U.S. Department of Commerce, Office of Protected Resources, Silver Spring, Maryland. December 1992.

National Marine Fisheries Service. 1993. Final Conservation Plan: Northern Fur Seal, (*Callorhinus ursinus*). Prepared by the National Marine Mammal Laboratory/Alaska Fisheries Science Center, Seattle, Washington, and the Office of Protected Resources/National Marine Fisheries Service, Silver Spring, MD. 80 pages.

National Marine Fisheries Service. 1998. "Revised Reasonable and Prudent Alternative for the 1998 Biological Opinion on NMFS' Authorization of a Pollock Fishery Under the BSAI Groundfish Fishery Management Plan, and Authorization of a Pollock Fishery Under the Gulf of Alaska Groundfish Fishery Management Plan." U.S. Department of Commerce, NOAA, NMFS, 1315 East West Highway, Silver Spring, MD 20910.

National Marine Fisheries Service. 1998. "Revised Reasonable and Prudent Alternative for the 1998 Biological Opinion on NMFS' Authorization of a Pollock Fishery Under the BSAI Groundfish Fishery Management Plan, and Authorization of a Pollock Fishery Under the Gulf of Alaska Groundfish Fishery Management Plan." U.S. Department of Commerce, NOAA, NMFS, 1315 East West Highway, Silver Spring, MD. 20910

National Marine Fisheries Service. 1998. “endangered Species Act Section 7 Biological Opinion: fisheries management Plan for the Bering Sea and Aleutian Islands and Gulf of Alaska Groundfish Fisheries and the 1999 Total Allowable Catch Specification and Its effects to Steller Sea Lions.” U.S. Department of Commerce, NOAA, NMFS. P.O. Box 21668, Juneau, AK. 99802-1668.

National Marine Fisheries Service. 2000. Endangered Species Act - Section 7 Consultation Biological Opinion and Incidental Take Statement, Authorization of Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish Fisheries on the Fishery Management Plan for the Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish. U.S. Department of Commerce, NOAA, NMFS, Alaska Region Sustainable Fisheries Division and Protected resources Division, 591 pages.

National Marine Fisheries Service. 2001. Endangered Species Act - Section 7 Consultation Biological Opinion and Incidental Take, Authorization of Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish Fisheries based on the Fishery Management Plan for the Bering Sea/Aleutian Islands and Gulf of Alaska Groundfish as modified by Amendments 61 and 70. NMFS, Alaska Region Sustainable Fisheries Division and Protected Resources Division, 206 pages.

National Marine Fisheries Service. 2003. Draft 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, P.O. Box 21668, Juneau, Alaska 99801 (unpublished).

National Marine Fisheries Service. 2004. Final Alaska Groundfish Fisheries Draft Programmatic Supplemental Environmental Impact Statement. U.S. Department of Commerce, NOAA Fisheries, Alaska Region, P.O. Box 21668. Juneau, Alaska 99801-1668.

National Marine Fisheries Service. 2005. Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands. Final Environmental Impact Statement U.S. Department of Commerce, NOAA, NMFS Alaska Region, P.O. Box 21668, Juneau, AK. 99801, 208 pages.

National Marine Fisheries Service. 2007. Conservation Plan for the Eastern Pacific stock of the northern fur seal (*Callorhinus ursinus*) 2007. U. S. Department of Commerce, NOAA, NMFS, Alaska Region Juneau, Alaska, Protected Resources Division, P. O. Box 21688, Juneau, Alaska 99801.

National Marine Fisheries Service. 2007. Conservation Plan for the Eastern Pacific stock of the northern fur seal (*Callorhinus ursinus*) 2007. U.S. Department of Commerce, NOAA, NMFS Alaska Region, Protected Resources Division, P.O. Box 21688, Juneau, AK. 99801-1668, 137 pages.

National Marine Fisheries Service. 2007. Steller Sea Lion and Northern Fur Seal Research Final Programmatic Environmental Impact Statement, June 2007. NOAA, Office of Protected Resources, Permits, Conservation and Education Division, Silver Spring, Maryland 20910.

National Marine Fisheries Service. 2007a. Conservation Plan for the Eastern Pacific Stock of the Northern Fur Seal (*Callorhinus ursinus*) 2007. U.S. Department of Commerce, NOAA, NMFS Alaska Region, Protected Resources Division, P.O. Box 21688, Juneau, AK. 99801-1668, 137 pages.

National Marine Fisheries Service. 2008. Recovery Plan for the Stellar Sea Lion, Eastern and Western Distinct Population Segments (*Eumetopias jubatus*)-Revision, March 2008. U.S. Department of Commerce, Office of Protected Resources, Permits, Conservation, and Education Division, Silver Spring, MD.20910.

National Marine Fisheries Service. 2009. Bering Sea Chinook Salmon bycatch management. Environmental Impact Statement/Regulatory Impact Review NMFS, Alaska Region, Juneau, AK. 99802-1668.

National Marine Fisheries Service. 2014. Authorization of the Alaska Groundfish Fisheries under the proposed revised Steller Sea Lion Protection Measures. Endangered Species Act - Section 7 Consultation Biological Opinion, April 2014. U.S. Department of Commerce, NOAA, NMFS, Alaska Region, Protected Resources Division, P.O. Box 21668, Juneau, AK. 99801-1668.

National Marine Fisheries Service. 2014. Final Supplemental Environmental Impact Statement on the Management of the Subsistence Harvest of Northern Fur Seals on St. George Island, Pribilofs. August 2014. U.S. Department of Commerce, NOAA, NMFS Alaska Region, Protected Resources Division, P.O. Box 21668, Juneau, AK. 99801-1668, 132 pages.

National Marine Fisheries Service. 2014. Final Supplemental Environmental Impact Statement on the Management of the Subsistence Harvest of Northern Fur Seals on St. George Island, Pribilofs. August

2014. U.S. Department of Commerce, NOAA, NMFS, Alaska Region Juneau, Alaska, Protected Resources Division, P.O. Box 21668, Juneau, Alaska 99801-1668.

National Marine Fisheries Service. 2016. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendment 111 to the Fishery Management Plan for Groundfish of the Bering Sea/Aleutian Islands Mangement Area. Revis Bering Sea/Aleutian Islands Halibut Prohibited Species Catch Limits. January 2016. Prepared by NMFS, Alaska Regional Office P.O. Box 21668 Juneau, AK. 99802 and NPFMC, 605 W. 4th Ave, Suite 306, Anchorage, AK. 99501. 815 pages.

National Oceanic and Atmospheric Administration. 1994. Guidelines and Principles for Social Impact Assessment. Prepared by The Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, NOAA Technical Memorandum NMFS-F/SPO-16. 34 pages.

National Research Council (NRC). 1996. "The Bering Sea Ecosystem". Committee on the Bering Sea Ecosystem, Polar Research Board, Commission on Geosciences, Environment and Resources and the National Research Council, National Academy Press, Washington, D.C., 306 pages.

National Research Council (NRC). 2003. The Decline of the Steller Sea Lion in Alaskan Waters: Untangling Food Webs and Fishing Nets. National Academies Press, Washington, D.C. 216 pages.

Naumenko, E. A. 1996. Distribution, biological condition, and abundance of capelin (*Mallotus villosus sociais*) in the Bering Sea. Pages 237-256 *in* Ecology of the Bering Sea: a Review of Russian literature. Alaska Sea Grant College Program Report 96-01.

Neiland, K. A. 1961. Suspected role of parasites in non-rookery mortality of fur seals (*Callorhinus ursinus*). Journal of Parasitology 47(5):732.

Newsome, S. D., M. A. Etnier, D. Gifford-Gonzalez, D. L. Phillips, M. Tuinen, E. A. Hadly, D. P. Costa, D. J. Kennett, T. P. Guilderson, and P. L. Koch. 2007. The shifting baseline of northern fur seal ecology in the northeast Pacific Ocean. PNAS 104(23):9709-9714.

Niebauer, H. J. 1981. Recent fluctuations in sea ice distribution in the eastern Bering Sea. Pages 133-140 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: oceanography and resources, volume 1. Washington Press, Seattle.

Niebauer, H. J. 1988. Effect of El Nino Southern Oscillation and North Pacific Weather Patterns on Interannual Variability in the Subarctic Bering Sea. Journal of Geophysical Research-Oceans 93(C5):5051-5068.

Niebauer, H. J. 1998. Variability in Bering Sea ice cover as affected by a regime shift in the North Pacific in the period 1947-1996. Journal of Geophysical Research-Oceans 103(C12):27,717-27,737.

Niebauer, H. J., and R. H. Day. 1989. Causes of interannual variability in the sea ice cover of the eastern Bering Sea. GeoJournal 18(1):45-59.

Niebauer, H. J., V. Alexander, and R. T. Cooney. 1981. Primary production at the Eastern Bering Sea ice edge: the physical and biological regimes. Pages 763-772 *in* D. W. Hood, and J. A. Calder, editors. The eastern Bering Sea shelf: oceanography and resources, Volume 2. Washington Press, Seattle.

Niebauer, H. J., V. Alexander, and S. Henrichs. 1990. Physical and biological oceanographic interaction in the spring bloom at the Bering Sea marginal ice edge zone. Journal of Geophysical Research-Oceans 95(C12):22,229-22,241.

Noda, K., H. Ichihashi, T. R. Loughlin, N. Baba, M. Kiyota, R. Tatsukawa. 1995. Distribution of heavy metals in muscle, liver and kidney of northern fur seal *(Callorhinus ursinus*) caught off Sanriku, Japan and from the Pribilof Islands, Alaska. Environmental Pollution 90(1):51-59.

Nordstrom, C. A. 2012. Habitat selection by foraging northern fur seals: assessing-in-situ ocean temperature and links to oceanographic features in the eastern Bering Sea. University of British Columbia, Vancouver, CA. 102 pages.

Nordstrom, C. A., B. C. Battaile, C. Cotte, and A. W. Trites. 2012. Foraging habitats of lactating northern fur seals are structured by thermocline depths and submesoscale fronts in the eastern Bering Sea. Deep Sea Research Part II: Topical Studies in Oceanography 88:78-96.

North Pacific Fur Seal Commission. 1962. North Pacific Fur Seal Commission report on Investigations from 1958 through 1961. Washington, D.C. 183 pp.

North Pacific Fur Seal Commission. 1969. North Pacific Fur Seal Commission report on Investigations from 1964 through 1966. Washington, D.C. 161 pp.

North Pacific Fur Seal Commission. 1971. North Pacific Fur Seal Commission report on Investigations from 1962 through 1963. Washington, D.C. 96 pp.

North Pacific Fur Seal Commission. 1975. North Pacific Fur Seal Commission report on Investigations from 1967 through 1972. Washington, D.C. 212 pp.

O'Corry-Crowe, G. M., K. K. Martien, and B. L. Taylor. 2003. The analysis of population genetic structure in Alaskan harbor seals, *Phoca vitulina*, as a framework for the identification of management stocks. Pages 1-54 *in*. U.S. Department of Commerce, NOAA, Southwest Fisheries Science Center Administrative Report LJ-03-08, La Jolla, CA. 54 pages.

Ohtani, K. 1970. Relative transport in the Alaskan Stream in winter. Journal of Oceanographical Society of Japan 26(5):271-282.

Orbach, M. K., and B. Holmes. 1983. Aleuts of the Seal Islands. Department of Sociology, Anthropology and Economics, East Carolina University, Greenville, N.C.

Osgood, W. H., E. A. Preble, and G. H. Parker. 1915. The Fur Seals and Other Life of the Pribilof Islands, Alaska in 1914. U.S. Government Printing Office, Washington, D.C. 273 pages.

Overland, J. E., M. Wang, K. R. Wood, D. B. Percival, and N. A. Bond. 2012. Recent Bering Sea warm and cold events in a 95-year context. Deep-Sea Research Part Ii-Topical Studies in Oceanography 65-70:6-13.

Parker, P., J. T. Harvey, J. M. Maniscalo, and S. Atkinson. 2008. Pupping-site fidelity among individual Steller sea lions (*Eumetopias jubatus*) at Chiswell Island, Alaska. Canadian Journal of Zoology 88(6):826-833.

Pauly, D., and V. Christensen. 1995. Primary production required to sustain global fisheries. Nature 374:255-257.

Pelland, N. A., J. T. Sterling, M. A. Lea, N. A. Bond, R. R. Ream, C. M. Lee, and C. C. Eriksen 2014. Fortuitous Encounters between Seagliders and Adult Female Northern Fur Seals (*Callorhinus ursinus*) off the Washington (USA) Coast: Upper Ocean Varibility and Links to Top Prdator Behavior. Plos One 9(8):e101268.

Perez, M. A. 1990. Review of marine mammal population and prey information for Bering Sea ecosystem studies. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS F/NWC-186, 81 pages.

Perez, M. A. 2003. Compilation of marine mammal incidental take data from the domestic and joint venture groundfish fisheries in the U.S. EEZ of the North Pacific, 1989-2001. U.S. Department of Commerce NOAA Technical Memorandum NMFS-AFSC-138, 145 pages.

Perez, M. A., and M. A. Bigg. 1986. Diet of northern fur seals, *Callorhinus ursinus*, off western North America. Fishery Bulletin 84(4):957-971.

Perez, M. A., and T. R. Loughlin. 1991. Incidental catch of marine mammals by foreign and joint venture trawl vessels in the U.S. EEZ of the North Pacific, 1973-88. U.S. Department of Commerce, NOAA Technical Report NMFS-104, 57 pages.

Peterson, R. S. 1968. Social behavior of pinnipeds with particular reference to the northern fur seal. Pages 3-53 *in* R. J. Harrison, R. C. Hubbard, R. S. Peterson, C. E. Rice, and R. J. Schusterman, editors. The behavior and physiology of pinnipeds. Appleton-Century-Crofts, New York, NY.

Popov, L. A. 1976. Status of main ice forms of seals inhabiting waters of the USSR and adjacent to the country marine areas. Advisory Committee on Marine Resources Research. Scientific Consultation on Marine Mammals, 31 August 1976, Bergen, Norway.

Poppel, B. 2015. Living conditions and perceived quality of life among indigenous Peoples in the Arctic. Pages 715-742 *in* W. Glatzer, L. Camfield, V. Møller, and M. Rojas, editors. Global handbook of quality of life exploration of well-being of nations and continents. Springer, Dordrecht, Netherlands.

Preble, E. A., and W. L. McAtee. 1923. I. BIRDS AND MAMMALS. North American Fauna: 1-128.

Ragen, T. J., G. A. Antonelis, and M. Kiyota. 1995. Early migration of northern fur seal pups from St. Paul Island, Alaska. Journal of Mammalogy 76(4).

Ray, C. E. 1971. Polar bear and mammoth on the Pribilof Islands. Arctic 24(1):9-18.

Ream, R. R. 2002. Molecular ecology of North Pacific otariids: genetic assessment of northern fur seal and Steller sea lion distributions. Ph.D. dissertation. University of Washington. 135 pages.

Ream, R. R., J. D. Baker, and R. G. Towell. 1999. Bogoslof Island studies, 1997. Pages 81-103 *in* E. H. Sinclair, and B. W. Robson, editors. Fur seal investigations, 1997. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-AFSC-106, Seattle, WA.

Ream, R. R., J. T. Sterling, and T. R. Loughlin. 2005. Oceanographic features related to northern fur seal migratory movements. Deep Sea Research Part II: Topical Studies in Oceanography 52(5-6):823-843.

Ream, R., and J. Sterling. 2019. Effects of human disturbance on the northern fur seal population at St. George Island, AK, during 2015. Memo for the Record from the Marine Mammal Laboratory to the Alaska Region, March 22, 2019. 18pp.

Reijnders, P. J. H. 1986. Reproductive failure in common seals feeding on fish from polluted coastal waters. Nature 324(6096):456-457.

Rice, D. W. 1998. Marine Mammals of the World Volume 4. Allen Press, Inc., Lawrence, KS. 234 pages.

Rist, J., E. J. Milner-Gulland, G. Cowlishaw, and M. Rowcliffe. 2010. Hunter reporting of catch per unit effort as a monitoring tool in a bushmeat-harvesting system. Conservation Biology 24(2):489-499.

Robson, B. W. 2001. Fur seal investigations, 1999. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-123, 52 pages.

Robson, B. W. 2001. The relationship between foraging areas and breeding sites of lactating northern fur seals, *Callorhinus ursinus*, in the eastern Bering Sea. M.S. thesis. University of Washington, Seattle, WA. 67 pages.

Robson, B. W., M. E. Goebel, J. D. Baker, R. R. Ream, T. R. Loughlin, R. C. Francis, G. A. Antonelis, and D. P. Costa. 2004. Separation of foraging habitat among breeding sites of a colonial marine predator, the northern fur seal (*Callorhinus ursinus*). Canadian Journal of Zoology 82(1):20-29.

Robson, B. W., R. G. Towell, M. Kiyota, C. M. Stepetin, and G. E. Merculief. 1999. Northern fur seal entanglement studies: St. Paul and St. George Islands, 1997. Pages 33-54 *in* E. H. Sinclair, and B. W. Robson, editors. Fur seal investigations, 1997. U.S. Department of Commerce, NOAA Technical memorandum NMFS-AFSC-106, Seattle, WA. 111 pages.

Roppel, A. Y. 1984. Management of northern fur seals on the Pribilof Islands, Alaska, 1786-1981. U.S. Department of Commerce, NOAA Technical Report NMFS 4, Washington, D.C., 32 pages.

Roppel, A. Y., and S. P. Davey. 1965. Evolution of fur seal management on the Pribilof Islands. Journal of Wildlife Management 29:448-463.

Ruedig, E., C. Duncan, B. Dickerson, M. Williams, T. Gelatt, J. Bell, and T. E. Johnson 2016. Fukushima derived radiocesium in subsistence-consumed northern fur seal and wild celery. Journal of Environmental Radioactivity 152:1-7.

Scheffer, V. B. 1950. Growth of the testes and baculum in the fur seal, *Callorhinus ursinus*. Journal of Mammalogy 31(4):384-394.

Scheffer, V. B. 1950. The food of the Alaskan fur seal. U.S. Department of the Interior, Wildlife Leaflet No. 329, Washington, D.C., 16 pages.

Scheffer, V. B. 1951. The rise and fall of a reindeer herd. The Scientific Monthly 73(6):356-362.

Scheffer, V. B. 1962. Pelage and the surface topography of the northern fur seal. North American Fauna 64:1-206.

Scheffer, V. B., and F. Wilke. 1953. Relative growth in the northern fur seal. Growth 17(3):129-145.

Scheffer, V. B., C. H. Fiscus, and E. I. Todd. 1984. History of scientific study and management of the Alaskan fur seal, *Callorhinus ursinus*, 1786-1964. Pages 70 *in* U.S. Department of Commerce, NOAA Technical Report NMFS-SSRF-780, Washington, D.C. 70 pages.

Scheffer, V. B., C. H. Fiscus, and E. I. Todd. 1984. History of scientific study and management of the Alaskan fur seal, *Callorhinus ursinus*, 1786-1964. Pages 70 *in*. U.S. Department of Commerce, NOAA Technical Report NMFS SSRF-780, Washington, D.C., pages 70.

Scheuhammer, A. M., Michael W. Meyer, Mark B. Sandheinrich, and Michael W. Murray. 2007. Effects of environmental methylmercury on the health of wild birds, mammals, and fish. AMBIO: a Journal of the Human Environment 36(1):12-19.

Scordino, J., and R. Fisher. 1983. Investigations on fur seal entanglement in net fragments, plastic bands and other debris in 1981 and 1982, St. Paul Island, Alaska. . Background paper submitted to the 26th Annual Meeting Standing Scientific Committee of the North Pacific Fur Seal Commission.

Shaughnessy, P. D., and F. H. Fay. 1977. A review of taxonomy and nomenclature of North Pacific harbor seals. Journal of Zoology 182:385-419.

Sigler, M., A. Hollowed, K. Holsman, S. Zador, A. Haynie, A. Himes-Cornell, P. Mundy, S. Davis, J. Duffy-Anderson, T. Gelatt, B. Gerke, and P. Stabeno. 2016. Alaska regional action plan for the Southeaster Bering Sea, NOAA Fisheries Climate Science Strategy, NOAA Technical Memorandum, NMFS-AFSC-336, 58 pages.

Sinclair, E. H. 1988. Feeding habits of northern fur seals (*Callorhinus ursinus*) in the eastern Bering Sea. M.S. thesis. Oregon State University, Corvallis, OR. 94 pages.

Sinclair, E. H. 1991. Review of the biology and distribution of the neon flying squid (*Ommastrephes bartrami*) in the North Pacific Ocean. Pages 57-67 *in* J. A. Wetherall, editor. Biology, oceanography, and fisheries of the North Pacific transition zone and subarctic frontal zone. U. S. Department of Commerce, NOAA Technical Report NMFS-105.

Sinclair, E. H., and P. J. Stabeno. 2002. Mesopelagic nekton and associated physics of the southeastern Bering Sea. Deep Sea Research II: Topical studies in Oceanography 49:6127-6145.

Sinclair, E. H., G. A. Antonelis, B. W. Robson, R. R. Ream, and T. R. Loughlin. 1996. Northern fur seal, *Callorhinus ursinus*, predation on juvenile walleye pollock, *Theragra chalcogramma*. Pages 167-178 *in* R. D. Brodeur, P. A. Livingston, T. R. Loughlin, and A. B. Hollowed, editors. Ecology of walleye pollock, *Theragra chalcogramma*. U.S. Department of Commerce, NOAA Technical Report NMFS-126.

Sinclair, E. H., G. Antonelis, and A. E. York. 2000. Biases in pinniped diet analysis based on stomachs and scats. Pices Proceedings, Hakodate, Japan.

Sinclair, E. H., T. Loughlin, and W. Pearcy. 1994. Prey selection by northern fur seals (*Callorhinus ursinus*) in the eastern Bering Sea. Fishery Bulletin 92(1):144-156.

Skinner, J. P., Y. Mitani, V. N. Burkanov, and R. D. Andrews. 2014. Proxies of food intake and energy expenditure for estimating the time-energy budgets of lactating northern fur seals Callorhinus ursinus. Journal of Experimental Marine Biology and Ecology 461:107-115.

Smith, A. W., R. J. Brown, D. E. Skilling, H. L. Bray, M. A. Keyes. 1977. Naturally-Occurring Leptospirosis in Northern Fur Seals (*Callorhinus ursinus*). Journal of Wildlife Diseases 13(2):144-148.

Smith, T. D., and T. Polacheck. 1984. The population dynamics of the Alaska fur seal: what do we really know? NOAA Northwest and Alaska Fisheries Center, NWAFC Processed Report 84-15, Seattle, WA. 122 pages.

Smith, T., and T. Polacheck. 1981. Reexamination of the life table for northern fur seals with implications about population regulatory mechanisms. Pages 99-120 *in* C. W. Fowler, and T. D. Smith, editors. Dynamics of large mammal populations. John Wiley and Sons, New York, NY.

Spraker, T. R., and M. E. Lander 2010. Causes of mortality in northern fur seals (Callorhinus ursinus), ST. Paul Island, Pribilof Islands, Alaska, 1986–2006. Journal of Wildlife Diseases 46(2):450-473.

Spraker, T. R., and M. E. Lander. 2010. Causes and mortality in northern fur seals (*Callorhinus ursinus*), St. Paul Island, Pribilof Islands, Alaska, 1986-2006. Journal of Wildlife Diseases 46(2):450-473.

Springer, A. M., J. A. Estes, G. B. van Vilet, T. M. Williams, D. F. Doak, E. M. Danner, K. A. Forney, and B. Pfister. 2003. Sequential megafaunal collapse in the North Pacific Ocean: An ongoing legacy of industrial whaling? Proceedings of the National Academy of Sciences of the United States of America 100(21):12223-12228.

Springer, A. M., J. F. Piatt, V. P. Shuntov, G. B. Van Vliet, V. L. Vladimirov, A. E. Kuzin, and A. S. Perlov. 1999. Marine birds and mammals of the Pacific Subarctic Gyres. Progress in Oceanography 43(2-4):443-487.

Stabeno, P. J., C. Ladd, and R. K. Reed. 2009. Observations of the Aleutian North Slope current, Bering Sea, 1996-2001. Journal of Geophysical Research 114(C5):C05015.

Stabeno, P. J., D. G. Kachel, N. B. Kachel, and M. E. Sullivan. 2005. Observations from mooring in the Aleutian Passes: temperature, salinity and transport. Fisheries Oceanography 14(s1):39-54.

Stabeno, P. J., G. L. Hunt Jr., J. M. Napp, and J. D. Schumacher. 2006. Physical forcing of ecosystem dynamics on the Bering Sea shelf. Pages 1177-1212 *in* A. R. Robinson, and K. Brink, editors. The sea, volume 14A; the global coastal ocean: interdisciplinary regional studies and syntheses. Harvard University Press, Cambridge, MA.

Stabeno, P. J., Kachel, N. B., Sullivan, M., and Whitledge, T. E. 2002. Variability of physical and chemical characteristics along the 70-m isobath of the southeastern Bering Sea. Deep-Sea Research Part II -Topical Studies in Oceanography 49(26):5931-5943.

Stabeno, P. J., N. A. Bond, and S. Salo. 2007. On the recent warming of the southeastern Bering Sea shelf. Deep-Sea Research Part II-tropical Studies in Oceanography 54(23-26):2599-2618.

Stabeno, P. J., N. B. Kachel, J. M. Napp, J. E. Overland, and M. Sigler. 2012. Comparison between the northeastern and southeastern Bering Sea shelf. Deep-Sea Research Part II-Topical Studies in Oceanography:65-70, 14-30.

Stabeno, P. J., N. B. Kachel, S. E. Moore, J. M. Napp, M. Sigler, A. Yamaguchi, and A. N. Zerbini. 2012. Comparison of warm and cold years on the southeastern Bering Sea shelf and some implications for the ecosystem. Deep Sea Research Part II: Topical Studies in Oceanography 65:31-45.

Stepetin, C. M., S. M. Zacharof, B. W. Robson, and M. Kiyota. 2000. Northern fur seal entanglement studies: St. Paul Island, 1998. Pages 53-63 *in* B. W. Robson, editor. Fur seal investigations, 1998, Seattle, WA.

Sterling, J. T. 2009. Northern fur seal foraging behaviors, food webs, and interactions with oceanographic features in the eastern Bering Sea. Ph.D. dissertation. University of Washington, Seattle, WA. 209 pages.

Sterling, J. T., A. M. Springer, S. J. Iverson, S. P. Johnson, N. A. Pelland, M. A. Lea, and N. A. Bond. 2014. The sun, moon, wind, and biological imperative-shaping contrasting wintertime migration and foraging strategies of adult male and female northern fur seals (*Callorhinus ursinus*). PLoS One 9:e93068

Sterling, J. T., and R. R. Ream. 2004. At-sea behavior of juvenile male northern fur seals (*Callorhinus ursinus*). Canadian Journal of Zoology 82(10):1621-1637.

Tabata, T. 1974. Movement and deformation of drift ice as observed with sea ice radar on the north coast of Alaska. Pages 373-382 *in* D. W. Hood, and E. J. Kelly, editors. Oceanography of the Bering Sea, Publication No. 2, Institute Marine Science. University of Alaska, Fairbanks.

Testa, J. W. 2012. Introduction. Pages 1-7 *in* J. W. Testa, editor. Fur seal investigations, 2010-2011. U.S. Department of Commerce, Seattle, WA.

Testa, J. W. 2016. Fur seal investigations, 2013-2014. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-316, Anchorage, AK. 124 pages.

Thompson, S. H. 1952. Pribilof Islands fur-seal industry. Pages 52-68 *in* S. H. Thompson, editor. Alaska fishery and fur-seal industries: 1952. Statistical Digest No. 33. United States Government Printing Office, Washington, D.C.

Tollit, D. J., S. G. Heaslip, T. K. Zeppelin, R. Joy, K. A. Call, and A. W. Trites. 2004. A method to improve size estimates of walleye pollock (*Theragra chalcogramma*) and Atka mackerel (*Pleurogrammus monopterygius*) consumed by pinnipeds: digestion correction factors applied to bones and otoliths recovered in scats. Fishery Bulletin 102(3):498-508.

Towell, R. 2019. Population effects of proposed subsistence mortality of northern fur seals on St. Paul Island, Alaska. Memo for the Record from the Marine Mammal Laboratory to the Alaska Region, June 10, 2019. 7pp.

Towell, R. G. 2007. Population dynamics of northern fur seals (*Callorhinus ursinus*) on the Pribilof Islands, Alaska, M.S. dissertation. University of Washington, Seattle.

Towell, R. G., R. R. Ream, and A. E. York. 2006. Decline in northern fur seal (*Callofhinus ursinus*) pup production on the Pribilof Islands. Marine Mammal Science 22(2):486-491.

Towell, R. T., and M. T. Williams. 2016. Modeling the Population Effects of a Northern Fur Seal Pup Harvest on the Pribilof Islands, Alaska. Pages 91-100 *in* J. W. Testa, editor. Fur seal investigations, 2013-

2014. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-316, Anchorage, AK.

Trenberth, K. E. 1990. Recent observed interdecadal climate changes in the Northern-Hemisphere. Bulletin of the American Meteorological Society 71(7):988-993.

Trenberth, K. E., and J. W. Hurrell. 1994. Decadal atmosphere-ocean variations in the Pacific. Climate Dynamics 9(6):303-319.

Trites, A. W. 1992. Northern fur seals: why have they declined? Aquatic Mammals 18:3-18.

Trites, A. W., and A. E. York. 1993. Unexpected changes in reproductive rates and mean age at first birth during the decline of the Pribilof northern fur seal (*Callorhinus ursinus*). Canadian Journal Fisheries and Aquatic Sciences 50(4):858-868.

Trites, A. W., and C. P. Donnelly. 2003. The decline of Steller sea lions *Eumetopias jubatus* in Alaska: a review of the nutritional stress hypothesis. Mammal Review 33(1):3-28.

Trites, A. W., and P. A. Larkin. 1989. The decline and fall of the Pribilof fur seal (*Callorhinus ursinus*): a simulation study. Canadian Journal of Fisheries and Aquatic Sciences 46(8):1437-1445.

Veltre, D. W., and M. J. Veltre. 1987. The northern fur seal: a subsistence and commercial resources for Aleuts of the Aleutian and Pribilof Islands, Alaska. Etudes/Inuit/Studies Vol. 11(no. 2):51-72.

Veltre, D. W., and M. J. Veltre. 1981. A preliminary baseline study of subsistence resource utilization in the Pribilof Islands. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 57, 216 pages.

Wade, P. R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. Marine Mammal Science 14(1):1-37.

Wade, P. R., and R. P. Angliss. 1997. Guidelines for assessing marine mammal stocks: report of the GAMMS workshop April 3-5, 1996, Seattle, Washington. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-OPR-12, 93 pages.

Wade, P. R., V. N. Burkanov, M. E. Dahlheim, N. A. Friday, L. W. Fritz, T. R. Loughlin, S. A. Mizroch, M. M. Muto, D. W. Rice, L. G. Barrett-Lennard, N. A. Black, A. M. Burdin, J. Calambokidis, S. Cerchio, J. K. B. Ford, J. K. Jacobsen, C. O. Matkin, D. R. Matkin, A. V. Mehta, R. J. Small, J. M. Straley, S. M. McCluskey, G. R. VanBlaricom, and P. J. Clapham. 2007. Killer whales and marine mammal trends in the North Pacific - A re-examination of evidence for sequential megafauna collapse and the prey-switching hypothesis. Marine Mammal Science 23(4):766-802.

Western Regional Climate Center. 2006. Western U.S. historical summaries, local climatological data annual summary with comparative data. Retrieved from http://www.wrcc.dri.edu/climsum.html

Westlake, R. L., and G. M. O'Corry-Crowe. 2002. Macrogeographic structure and patterns of genetic diversity in harbor seals (*Phoca vitulina*) from Alaska to Japan. Journal of Mammalogy 83(4)1111-1126.

Williams, M. T., J. Leon Guererro, and D. Johnson. 2010. Marine mammal monitoring of the replacement and repair of fur seal research observation towers and walkways on St. Paul Island, Alaska. NMFS Office of Protected Resources, Silver Spring, MD. 21 pages.

Williams, M. T., R. Rodrigues, S. A. MacLean, B. Williams, P. A. Zavadil, and A. D. Lestenkof. 2004. Assessment of fur seal entanglement in marine debris from 1995-2003. Report prepared for the Prescott Stranding Grant Program, Available from the Aleut Community of St. Paul Island, Box 86 AK. 99660. 12 pages.

Williams, M. T., R. Rodrigues, S. A. MacLean, B. Williams, P. A. Zavadil, and A. D. Lestenkof. 2004. Assessment of fur seal entanglement in marine debris from 1995-2003. Report prepared for the Prescott Stranding Grant Program. , Available from the Aleut Community of St. Paul Island, Box 86 AK. 99660. 12 pages.

Williams, M., J. Leon Guererro, and D. Johnson. 2010. Marine mammal monitoring of the replacement and repair of fur seal research observation towers and walkways on St. Paul Island, Alaska. NMFS Office of Protected Resources, Silver Spring, MD. 21 pages.

Withrow, D. E., and T. R. Loughlin. 1996. Abundance and distribution of harbor seals (*Phoca vitulina richardsi*) along the north side of the Alaska Peninsula and Bristol Bay during 1995. MMPA Assessment Program, Office of Protected Resources, NMFS, NOAA, 1335 East West Highway, Silver Spring, MD. 20910.

Wolfe, R. J., and C. Mishler. 1998. The subsistence harvest of harbor seals and sea lions by Alaska Natives in 1997. Alaska Department of Fish and Game, Subsistence Division. Technical Paper No. 246, 70 pages.

Wolfe, R. J., J. A. Fall, and M. Riedel. 2009. The subsistence harvest of harbor seals and sea lions by Alaska Natives in 2007. Alaska Department of Fish and Game, Subsistence Division. Technical Paper No. 345, 91 pages.

Wolfe, R. J., J. A. Fall, and R. T. Stanek. 2005. The subsistence harvest of harbor seals and sea lions by Alaska Natives in 2004. Alaska Department of Fish and Game, Division of Subsistence. Technical Paper No. 303, 89 pages.

Wolff, M. S., P. G. Toniolo, E. W. Lee, M. Rivera, and N. Dublin. 1993. Blood levels of organochlorine residues and risk of breast cancer. JNCI: Journal of the National Cancer Institute 85(8):648-652.

Wynne, K. M., D. Hicks, and N. Munro. 1991. 1991 Marine mammal observer program for the salmon driftnet fishery of Prince William Sound Alaska, Annual Report NMFS/NOAA Contract 50ABNF000036 Juneau, AK. 53 pages.

Wynne, K. M., D. Hicks, and N. Munro. 1992. The 1991 marine mammal observer program for the salmon driftnet fishery of Prince William Sound, Annual Report NMFS/NOAA Contract 50ABNF000036, Juneau, AK. 53 pages.

Yesner, D. R. 1977. Prehistoric subsistence and settlement in the Aleutian Islands. Ph.D. Thesis. University of Connecticut, 387 pages, Storrs.

Yonezaki, S., M. Kiyota, N. Baba, T. Koido, and A. Takemura. 2003. Size distribution of the hard remains of prey in the digestive tract of northern fur seal (*Callorhinus ursinus*) and related biases in diet estimation by scat analysis. Mammal Study 28(2):97-102.

Yonezaki, S., M. Kiyota, T. Koido, and A. Takemura. 2005. Effects of squid beak size on the route of egestion in northern fur seals (*Callorhinus ursinus*): Results from captive feeding trials. Marine Mammal Science 21(3):567-574.

York, A. E. 1983. Average age at first reproduction of the northern fur seal (*Callorhinus ursinus*). Canadian Journal of Fisheries and Aquatic Sciences 40(2):121-127.

York, A. E. 1985. Juvenile survival of fur seals. Pages 34-45 *in* P. Kozloff, editor. Fur seal investigations, 1982. U.S. Department Commerce, NOAA Technical Memorandum NMFS F/NWC-71.

York, A. E. 1987. Northern fur seal, (*Callorhinus ursinus*), eastern Pacific population (Pribilof Islands, Alaska and San Miguel Island, California). Pages 9-21 *in* J. P. Croxall, and R. L. Gentry, editors. Status, biology, and ecology of fur seals. Proceedings of an international symposium and workshop, Cambridge, England, 23-27 April 1984. NOAA Technical Report NMFS-51.

York, A. E. 1987. On comparing the population dynamics of fur seals. Pages 133-140 *in* J. P. Croxall, and R. L. Gentry, editors. Status, biology, and ecology of fur seals, Proceedings of an International symposium and workshop, Cambridge, England, 23-27 April 1984. NOAA Technical Report NMFS-51.

York, A. E., and C.W. Fowler. 1992. Population assessment, Pribilof Islands, Alaska Pages 9-26 *in* H. Kajimura, and E. Sinclair, editors. Fur seal investigations, 1990, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-2.

York, A. E., and J. R. Hartley. 1981. Pup production following harvest of female northern fur seal. Canadian Journal of Fisheries and Aquatic Sciences 38(1):84-90.

York, A. E., and P. Kozloff. 1987. On the estimation of numbers of northern fur seal, *Callorhinus ursinus*, pups born on St. Paul Island 1980-86 Fishery Bulletin 85(2):367-375.

York, A. E., and V. B. Scheffer. 1997. Timing of implantation in the northern fur seal, *Callorhinus ursinus*. Journal of Mammalogy 78(2):675-683.

York, A. E., J. D. Baker, R. G. Towell, and C. W. Fowler. 1997. Population assessment, Pribilof Islands, Alaska. Pages 9-28 *in* E. H. Sinclair, editor. Fur seal investigations, 1996. U.S. Department of Commerce, NOAA Techinal Memoradum NMFS-AFSC-87.

York, A. E., R. G. Towell, R. R. Ream, and C. W. Fowler. 2002. Population assessment, Pribilof Islands, Alaska. Pages 7-31 *in* B. W. Robson, editor. Fur seal investigations. 2000-2001. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-134, Seattle, WA.

York, A. E., R. G. Towell, R. R. Ream, J. D. Baker, and B. W. Robson. 2000. Population assessment, Pribilof Islands, Alaska. Pages 7-26 *in* B. W. Robson, editor. Fur seal investigations, 1998. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-113.

Young, R. C., A. S. Kitaysky, C. Carothers, and I. Dorresteijn. 2014. Seabirds as a subsistence and cultural resource in two remote Alaskan communities. Ecology and Society 19(4):40.

Yurakhno, M. V., and I. M. Taikov. 1986. Some preliminary results of parasitological autopsies of Commander seals in 1984–1985. Pages 435-436 *in* Study, protection and management of marine mammals. Proceedings of the 9th All-Union Conference, Arkhangelsk.

Yurakhno, M. V., and I. M. Taikov. 1998. Diseases and parasites. Pages 810-899 *in* V. E. Sokolov, A. A. Aristov, and T. U. Lisitzina, editors. The northern fur seal. systematic, morphology, ecology, behavior, Nauka, Moscow [in Russian].

Zavadil, P. A., A. D. Lestenkof, K. Holser, A. Malavansky, and B. W. Robson. 2007. Northern fur seal entanglement studies on the Pribilof Islands in 2005, 53 pages.

Zavadil, P. A., A. D. Lestenkof, M. T. Williams, and S. A. McLean. 2003. Assessment of northern fur seal entanglement in marine debris on St. Paul Island, Alaska in 2002. Unpublished report available from the Aleut Community of St. Paul Island, Ecosystem Conservation Office. 12 pages.

Zavadil, P. A., B. W. Robson, A D. Lestenkof, R. Holser, and A. Malavansky. 2007. Northern fur seal entanglement studies on the Pribilof Islands in 2006. 56 pages.

Zavadil, P. A., P. M. Lestenkof, S. M. Zacharof, and P. I. Melovidov. 2011. The subsistence harvest of sub-adult northern fur seals on St. Paul Island, Alaska, in 2010. Aleut Community of St. Paul Island, Ecosystem Conservation Division. 14 pages, St. Paul Island, Pribilof Islands, Alaska 99660.

Zeppelin, T. 2015. Stable Isotope Models Predict Foraging Habitat of Northern Fur Seals in Alaska. AFSC Quarterly Report (Winter Jan-Feb-Mar).

Zeppelin, T. K., and A. J. Orr. 2010. Stable isotope and scat analysis indicate diet and habitat partitioning in northern fur seals *Callorhinus ursinus* across the eastern pacific. Marine Ecology Progress Series 409:241-253.

Zeppelin, T. K., and R. R. Ream. 2006. Foraging habitats based on the diet of female northern fur seals (*Callorhinus ursinus*) on the Pribilof Islands, Alaska. Journal of Zoology 270:565-576.

Zeppelin, T. K., D. S. Johnson, C. E. Kuhn, S. J. Iverson, and R. R. Ream. 2015. Stable Isotope Models Predict Foraging Habitat of Northern Fur Seals (*Callorhinus ursinus*) in Alaska. Plos One 10(6).

Zhang, J. L., R. Woodgate, and R. Moritz. 2010. Sea ice response to atmospheric and oceanic forcing in the Bering Sea. Journal of Physical Oceanography 40(8):1729-1747.

Zheng, J., G. H. Kruse, and M. C. Murphy. 1998. "A length-based approach to estimate population abundance of Tanner crab, *Chionoecetes bairdi*, in Bristol Bay, Alaska." In Proceedings of the North Pacific Symposium on Invertebrate Stock Assessment and Management. Canadian Special Publication of Fisheries and Aquatic Sciences 125:97-105.

Zimmerman, S. T., and J. D. Letcher. 1986. The 1985 subsistence harvest of northern fur seals, *Callorhinus ursinus*, on St. Paul Island, Alaska. Marine Fisheries Review 48(1):10-14.

Zimmerman, S. T., and M. Melovidov. 1987. The 1986 subsistence harvest of northern fur seals, *Callorhinus ursinus*, on St. Paul, Island, Alaska. Marine Fisheries Review 49(3):70-72.

-- Page Intentionally Left Blank --

6. LIST OF PREPARERS AND PERSONS CONSULTED

Preparers

Michael Williams, Pribilof Islands Program Manager. NMFS, Alaska Region, Anchorage, Alaska. Michael received his M.Sc. degree in Zoology studying northern fur seals, from the University of Alaska Fairbanks in 1997 and has been working with NMFS Alaska Region since 2005.

Rodney Towell, Statistician. NMFS, National Marine Mammal Laboratory, Seattle, WA. Rodney received his M.Sc. degree studying northern fur seals from the University of Washington in 2007 and has been working for NMFS National Marine Mammal Laboratory since 1992.

Rolf Ream, Ph.D., Zoologist. NMFS, National Marine Mammal Laboratory, Seattle, WA. Dr. Ream received his doctoral degree studying northern fur seals from the University of Washington in 2002 and has been working for NMFS National Marine Mammal Laboratory since 1989.

Gretchen Anne Harrington, NEPA Coordinator. NMFS, Alaska Region, Juneau, Alaska. Gretchen received her M.M.A. from the University of Washington, School of Marine Affairs in 1997 and has been working with the NMFS Alaska Region since 1998.

Amal Ajmi, Biologist. Formerly ERM Alaska, Inc. Amal received her B.S. in Biology at Northland College in 1989 and her M.S. in Marine Biology at University of Alaska Fairbanks in 1996.

Anne Southam, NEPA Specialist. ECO49 Consulting, LLC, Anchorage, Alaska. Anne received her B.A. in environmental science and communication at Indiana University in 1998 and her M.S. in environmental science at University of North Texas in 2000.

P. Michael Payne, Senior Biologist. ECO49 Consulting, LLC, Bethesda, Maryland. Michael received his B.A. in liberal arts at Central College in Iowa in 1971 and his M.S. in Fisheries Biology from Iowa State University in 1975.

Persons Consulted

Jon Kurland, Assistant Regional Administrator. NMFS, Alaska Region, Juneau, Alaska.

Greg Balogh, Biologist. NMFS Alaska Region, Anchorage, Alaska.

Maura Sullivan, NOAA General Counsel, Alaska Section.

Molly Watson, NOAA General Counsel, Alaska Section.

- Page Intentionally Left Blank –

7. DISTRIBUTION LIST

NMFS sent the Final SEIS to the following organizations. NMFS also posted the Final SEIS for download on the NMFS Alaska Region web page at: https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/northern-fur-seal-subsistence-harvest-estimates-and-reports under Environmental Impact Statement.

- Aleut Community of St. Paul Island, Tribal Government
- Aleutian Pribilof Island Association, Inc.
- Central Bering Sea Fishermen's Association
- City of St. Paul
- Humane Society of the United States
- Indigenous People's Council for Marine Mammals
- Marine Mammal Commission
- Oceana
- Pribilof School District
- Tanadgusix Corporation
- United States Department of Interior, Fish and Wildlife Service
- United States Environmental Protection Agency, Region 10
- Nathan Berry
- Katiana Candyfire
- Lauren Divine
- Linnae Kozloff
- Aquilina D. Lestenkof
- Simon Parker
- Cynthia Reznick
- Eve Tuck

- Page Intentionally Left Blank -

8. APPENDIX A - DEFINITION OF TERMS

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 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) (16 U.S.C. 1371(b)) if the taking of marine mammals is: by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or Arctic Ocean (1) for subsistence purposes, 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 parts 1 - 560.

- Co-management – Generally, for purposes of this SEIS 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][94] 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. CEQ regulations state that context "means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action… Both short- and long-term effects are relevant" (40 CFR 1508.27(a)). 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 [the MMPA], 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. 1531-1544). 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.

[94] 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 [the MMPA], 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 [16 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. 1531-1544)."

- 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.
    - **Direct Effects** – caused by the action and occurring at the same time and place (40 CFR §1508.8(a)). 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 the action and are later in time or farther removed in distance , but are still reasonably foreseeable (40 CFR 1508.8(b)). 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 land 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. 1531-1544.
- 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[95].
    - **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 ….

[95] The full definitions can be found here: http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf.

  - **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)…"

- 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 (16 U.S.C. 1362(4)) states that "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. CEQ regulations state that intensity refers to the severity of the impact (40 CFR 1508.27(b)).

- 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 U.S.C. 1361-1407.

- 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" (50 CFR 216.3).

- Minimum Population Estimate - 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 (16 U.S.C. 1362(27)).

- 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) - The MMPA defines 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 carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element" (16 U.S.C.1362(9)). 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) (50 CFR 216.3). Historically, OSP 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

- 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 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" (16 U.S.C. 1362(20)). 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 in 2018, PBR = 11,295 animals (525,333 × 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 or equal to 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 11% and 30% of PBR to be “minor” and mortality equal to or more than 31% 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 (16 U.S.C. 1362(11)).

- Strategic Stock - The MMPA 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. 1531-1544] 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. 1531-1544), or is designated as depleted under this chapter (16 U.S.C. 1362(19)).

- 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). There is significant overlap in the length distribution of seals between 2 and 5 years old, such that the 124.5 cm restriction does not preclude the taking of 5-year-old males. The range of lengths from a sample of 5-year-old males killed was 107 – 150 cm (R. Towell pers comm.).

- 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 fur seals 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 (16 U.S.C. 1532) 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" (50 CFR 216.71). 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, NMFS defines a "wasteful manner" as: "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 and includes, without limitation, the employment of a method of taking which is not likely to assure the capture or killing of a marine mammal, or which is not immediately followed by a reasonable effort to retrieve the marine mammal" (50 CFR 216.3).

9. APPENDIX B - COMMENT ANALYSIS

Comment Analysis Report

for the Supplemental Environmental Impact Statement on

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

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

9.1 Introduction

The National Marine Fisheries Service (NMFS) prepared a Draft Supplemental Environmental Impact Statement (DSEIS) regarding the management of the subsistence use of northern fur seals on St. Paul Island, Alaska, and released the DSEIS for public comment (82 FR 4336; January 13, 2017). The DSEIS (NMFS 2017) analyzes the effects of the status quo, the petitioned alternative recommended by the Aleut Community of St. Paul Island (ACSPI), and alternative subsistence use management regimes. The DSEIS concludes that the subsistence use of up to 2,000 juvenile northern fur seals, of which up to 20 may be females killed during the subsistence use seasons, would have a minor effect on the population of about 424,531 fur seals residing seasonally on St. Paul Island and on the northern fur seal stock of about 620,660 animals total (Muto et al., 2019).

This Comment Analysis Report (CAR) provides summaries of the public comments NMFS received and presents the agency's responses.

NEPA requires government agencies to include or summarize in a Final EIS all the comments received on the DEIS (40 CFR § 1503.4(b)). The Final EIS must include responses to the comments, and must describe any changes made to the DEIS as a result of those comments (40 CFR § 1503.4(a)).

NMFS has undertaken a careful and deliberate approach to ensure that all substantive public comments are reviewed, considered, and responded to.

9.2 Analysis of Public Comments

The analysis of public comment on the DSEIS was a multi-stage process that included reviewing and summarizing the comments within each submission, preparing responses, and reviewing the responses. The process is explained in detail below.

NMFS received 21 submissions from the public commenting on the DSEIS. The NMFS Alaska Region staff compiled all incoming submissions of comment, maintaining a comprehensive list of all public comments. Staff assigned each submission a unique submission identification. The 21 submissions of comments, including any attachments, are accessible by a link through the Alaska Region website at https://www.fisheries.noaa.gov/species/northern-fur-seal#management under the section titled "Regulatory Actions & Documents." The submissions of comment and their attachments also are available directly at www.regulations.gov using the docket number NOAA-NMFS-2015-0073 in the search bar.

Each submission was reviewed by the preparers. The preparers divided each submission by its individual comments, each of which was assigned a comment ID number. The goal was to capture each sentence and paragraph in a comment letter containing substantive content pertinent to the DSEIS. Substantive content included assertions, suggested alternatives or actions, data, background information, or clarifications relating to the DSEIS document or its preparation. The substantive comments were summarized and organized by issue. Within the 21 submissions received by NMFS, the preparers identified 154 specific substantive comments. Of those 154 substantive comments there were numerous similarities among comments from different members of the public, which afforded NMFS the opportunity to consolidate those comments into 38 individual issues or statements of concern. The preparers then wrote the response for each issue. A number of comments referenced the preferred alternative, NMFS used the term

"preliminary preferred alternative" for Alternative 2B and "petitioned alternative" for Alternative 2A in the DSEIS. NMFS assumed public comments referencing the "preferred alternative" intended those comments to relate to the preliminary preferred alternative (Alternative 2B), and NMFS responses reference the preliminary preferred alternative. NMFS revised tables 4.3-4 through 4.3-11 that estimated sub-lethal effects to correct math errors, transposed digits, and updates based on new information discussed in the following responses.

The comment summaries and responses are presented in this report by subject area. During the process of identifying statements of concern, all comments were treated equally. The emphasis is on the content of the comments. They were not weighted by organizational affiliation or other status of commenters. No effort has been made to tabulate the number of people for or against a specific aspect of the proposed action or the analysis in the DSEIS. In the interests of producing a FSEIS that both meets the mission of NMFS and best serves all stakeholders, all comments will be considered equally on their merits.

9.3 Quality Control and Review

All comment summaries and responses were reviewed by the preparers and NOAA General Counsel-Alaska Section. Additionally, various procedures were established in the analysis process to prevent a submission or comment from being inadvertently omitted. Communication and cross-checking between the submissions and the comments have ensured that all submissions received during the comment period are included in the report.

9.4 Response to Comments

Comment 1: Multiple commenters indicated that the St. Paul Island Co-management Council (Co-management Council), which is comprised of three representatives each from NMFS and ACSPI, either should be or should not be authorized to manage female mortality that occurs incidentally during the subsistence use of male fur seals.

Response to Comment 1: Section 102 of the Fur Seal Act (FSA) prohibits all taking of northern fur seals for subsistence uses (16 U.S.C. § 1152), in the absence of regulations under Section 105 authorizing the taking of northern fur seals on the Pribilof Islands (16 U.S.C. § 1155(a)). The methods and timing of subsistence use under the preliminary preferred alternative would result in a low level of incidental female mortality. NMFS must authorize any mortality of fur seals that may occur during subsistence activities on the Pribilof Islands under FSA Section 105(a). The preliminary preferred alternative would provide additional opportunities for the community to meet its subsistence needs, and may increase incidental female mortalities. NMFS has determined that authorizing in regulation a maximum annual mortality of 20 females under FSA Section 105(a) will account for expected levels of incidental female mortality and will not have significant population consequences. The regulations would also include a provision to terminate the subsistence use on St. Paul if total female mortality reached 20 female fur seals at any point during the year. Under the preliminary preferred alternative, the Co-management Council would have the ability to further limit female mortalities through real-time local monitoring and reporting to prevent subsistence users from reaching the subsistence use termination threshold. The intent is for the Co-management Council to develop non-regulatory measures and other interim thresholds that would incentivize avoiding the incidental take and mortality of female fur seals to reduce the likelihood of reaching the annual limit of 20 female mortalities. Delegating this authority to the Co-management Council is an efficient mechanism to provide for in-season adjustments to subsistence use practices, and

supports co-management of subsistence use as envisioned by Section 119 of the Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1388). NMFS could prescribe the allowable female mortality rigidly in regulation, with no means for in-season adjustments, but we determined that empowering the Co-management Council to manage female mortality under a maximum allowable (regulatory) annual level would be much more effective and would likely result in lower levels of female mortality.

Comment 2: One commenter suggested the Co-management Council has the ability to create additional limitations (below the regulatory thresholds) to promote long-term conservation of fur seals while promoting subsistence use activities for the community to meet their subsistence needs.

Response to Comment 2: NMFS agrees with this comment. The intention of the preliminary preferred alternative is to have regulatory thresholds that minimize the consequences to levels that are not significant to the fur seal population while increasing the subsistence use opportunities for the community of St. Paul. By sharing in-season management decision-making with ACSPI via the Co-management Council, NMFS intends to provide meaningful participation of local subsistence users on St. Paul Island in co-management decisions to ensure food security of the entire community. The frequency and location of subsistence use activities on St. Paul Island will be managed consistent with regulatory provisions and with long-term conservation objectives identified in the northern fur seal conservation plan. The northern fur seal conservation plan's objectives are to identify and mitigate human related mortality of fur seals, assess and mitigate adverse effects of human activities on the Pribilof Islands, continue research and management, and coordinate implementation of the conservation plan. NMFS clarified the relevance and applicability of the conservation plan in the FSEIS.

Comment 3: One commenter expressed concern that the DSEIS (section 3.9.4.1) concludes that Section 119 of the MMPA would be the sole authority to govern subsistence taking of northern fur seals on the Pribilof Islands rather than the FSA.

Response Comment 3: NMFS did not intend to suggest the MMPA was the sole statutory authority governing the taking of northern fur seals on the Pribilof Islands. The FSA also governs and authorizes NMFS to promulgate regulations on the taking of northern fur seals on the Pribilof Islands (16 U.S.C. § 1155). We revised the text accordingly in the FSEIS to clarify that NMFS is utilizing the statutory authority of the FSA to authorize the taking of northern fur seals and to regulate the subsistence use of northern fur seals on the Pribilof Islands. We also clarified in the FSEIS that NMFS intends to use the authority under MMPA Section 119 for continued co-management under a revised agreement for the conservation of marine mammals and the co-management of the subsistence use of northern fur seals on the Pribilof Islands, consistent with the regulatory provisions established under the FSA. In other words, co-management under Section 119 of the MMPA would limit such things as the frequency, timing, locations, etc. of subsistence use while adhering to the regulatory thresholds authorized under the FSA.

Comment 4: Four commenters expressed concern that the process between NMFS and the Aleut Community of St. Paul Island to establish a revised co-management agreement under Section 119 of the MMPA is not sufficiently transparent. In addition, some of those comments indicated the need to prescribe in the regulations the goals of the co-management agreement or other in-season co-management details.

Response Comment 4: Co-management of subsistence use is authorized under Section 119 of the MMPA (16 U.S.C. 1388), therefore no implementing regulations under the FSA are necessary to allow for co-management between NMFS and ACSPI. The negotiation of a revised co-management agreement is a government-to-government process between NMFS and ACSPI. Once final, NMFS will post the

revised agreement on our website, as we have with all existing Section 119 agreements with Alaska Native organizations (see https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/co-management-marine-mammals-alaska#cooperative-agreements). As NMFS has explained in this SEIS and in the proposed rule, the regulations under the FSA authorize a total annual threshold of mortality, while NMFS and the ACSPI, through the co-management process, can develop flexible and responsive non-regulatory measures, consistent with the FSA and MMPA. The SEIS and the proposed rule both discussed the broad goals of co-management while identifying certain elements of subsistence use that would be determined through co-management, such as the location and frequency of hunting and harvesting events and who is authorized to participate in the subsistence use. The public has had an opportunity to comment on the SEIS (82 FR 4336; January 13, 2017) and the proposed rule (83 FR 40192; August 14, 2018). Because the MMPA authorizes NMFS and Alaska Native organizations (like ACSPI) to engage in a government-to-government process to develop co-management agreements to conserve marine mammals and to co-manage the subsistence use of marine mammals, the specifics of the co-management agreement do not need to be prescribed in regulation.

Comment 5: Several commenters indicated the need to create additional regulatory limits related to the frequency, location, methods, or timing of subsistence activities.

Response Comment 5: NMFS does not agree with the need to create additional regulatory limits on subsistence use beyond the items described in the proposed rule. There is no evidence that such limitations on the frequency or location of summer sub-adult harvests have provided any conservation benefit to fur seals on the Pribilof Islands, but have instead limited subsistence opportunities.

The subsistence harvest pressure under the regulations from 1986 to 2014 on St. George was twice as high (i.e., the regulations authorized harvests up to twice per week at Zapadni and Northeast hauling grounds) as that on St. Paul Island (once per week). If the frequency or location of male harvests resulted in a detectable population change we would have expected that on St. George Island the population at North or Zapadni breeding areas would have declined or changed at a rate different from the remaining population on St. George or different from that observed on St. Paul Island. This has not been observed, and in fact the population changes at individual breeding areas is independent of subsistence harvest levels (Johnson et al. 2013). A “harvest disturbance effect” should have been detected as an increase in pup production on St. Paul Island after the commercial to subsistence transition in the late 1980s, and it was not observed. In addition, there have never been any commercial or subsistence harvests on Sea Lion Rock on St. Paul and that breeding area has not increased as would be predicted under a “harvest disturbance effect” hypothesis. Therefore, instead of prescribing additional regulatory limits on subsistence use, NMFS has determined that the broad regulatory limitations of the total annual number of female and juvenile male mortalities and the hunting and harvesting seasons are sufficient to conserve and manage the northern fur seal population. Additional limitations on subsistence activities or use will be determined by consensus of the Co-management Council to be implemented and monitored to achieve positive conservation outcomes as described in the northern fur seal conservation plan.

Comment 6: One commenter suggested that the use of Potential Biological Removal (PBR) in the analysis supporting the proposed subsistence use levels is misguided because the population decline since the late 1990s indicates that human-caused removals are currently exceeding PBR.

Response to Comment 6: NMFS disagrees that the use of PBR is misguided. Recently Brandon et al. (2017) evaluated the use of PBR to manage limits of human caused mortality on marine mammals populations and found that age and sex-specific mortality were important factors when considering whether PBR is a precautionary approach. Brandon et al. (2017) showed that if human-caused mortality is

predominantly younger animals and males, PBR is a conservative approach to managing human-caused mortality in all marine mammal stocks. The preliminary preferred alternative's maximum level of subsistence-related mortality is predominantly (99 percent) non-breeding males. Furthermore the analysis in Towell and Williams (2016) and Towell (2019) shows that the level of mortality in the preliminary preferred alternative would not be sufficient to cause the observed decline on St. Paul Island or cause a detectable negative change in the slope of the population trend. The second portion of this comment suggests that human-caused mortality is the cause of the decline in pup production on St. Paul Island since 1998. The commenter provides no reference, and NMFS is unaware of any evidence to support that assertion. NMFS is not aware of any sources of human-related mortality causing or related to the four percent annual decline of northern fur seals on St. Paul Island since 1998. NMFS is not aware of any sources of human-cause mortality contributing to the stability of pup production on St. George Island since 1998, nor any human-caused explanation for the observed increase in pup production on Bogoslof Island as is noted in the annual stock assessment reports for the Eastern Pacific Stock. As noted in the FSEIS, the known sources of human-caused mortality (subsistence use, bycatch in commercial fisheries, and entanglement in marine debris) are estimated annually in the stock assessment report. The most recent annual average estimate of human-caused mortality from 2013 – 2017 is 399 (Muto et al. 2019), which is well below levels that could affect the observed differing trends in pup production at the various breeding areas of the stock.

Comment 7: The DSEIS assumes that it is acceptable to subdivide the PBR for the eastern stock of northern fur seals into a St. Paul specific PBR. However, current stock boundaries and the appropriate PBR have been calculated according to the Guidelines for Assessing Marine Mammal Stocks (GAMMS); whereas, this proposed novel approach has not. Any significant change to revise stock boundaries in order to facilitate sub-stock management and/or a calculation of a "sub-PBR" should be, but was not, subjected to review by the Scientific Review Group and according to the GAMMS.

Response to Comment 7: NMFS is not suggesting that the eastern Pacific stock should be sub-divided, and NMFS is not revising stock boundaries in order to facilitate sub-stock management and/or a calculation of a "sub-PBR." Rather, the FSEIS uses a more conservative approach to analyze effects of subsistence use by calculating a St. Paul specific PBR. NMFS disagrees that this is approach is novel or inconsistent with GAMMS. The comment assumes a subsistence harvest of non-breeding males on St. Paul or St. George would result in detectable changes across the entire stock. There is no evidence of this, and the DSEIS and FSEIS discussed the previous work conducted in the 1970s and 1980s indicating no population or stock-level effect from commercial harvests of non-breeding males. We provided the proportion of subsistence mortality when considering the entire eastern Pacific stock PBR compared to the St. Paul specific PBR, which is 11,295 for the entire stock versus 7,726 for St. Paul, to show the conservative nature of our approach. In addition, the calculation of PBR for a depleted stock uses a recovery factor of 0.5 which reduces the PBR by 50 percent. NMFS considered that the strong natal site fidelity of northern fur seals (Gentry 1998) was more likely to affect some smaller unit of the population, and a smaller unit is best represented by the St. Paul Island population and is more conservative as a percentage of PBR being attributable to human-caused mortality source (2000/11295 = 18 percent vs 2000/7727 = 26 percent). Under either approach the effects from subsistence use of up to 2000 seals for subsistence would result in minor effects based on the significance criteria used in the FSEIS.

Comment 8: The DSEIS relies on the conclusions of Towell and Williams regarding the effects of removing female seals without any discussion of the analyses behind those conclusions. The Literature Cited section of the DSEIS (section 7) omits any reference to publications by Towell and Williams, although two different citations are included in the text (Towell and Williams (2016) and Towel and Williams (NMFS unpublished)). It is unclear whether these are two different publications or inconsistent

citations for the same publication. This should be clarified and the relevant paper(s) made available to those reviewing and commenting on the SEIS and on the appropriate agency website. The lack of discussion of Towell and Williams is exacerbated by the confusion over what studies the agency is relying on and the associated difficulty that reviewers could have finding the source material. Because the potential effects of taking females on the fur seal population is an important issue, it warrants more than summary conclusions. Therefore, the FSEIS and any proposed rule should provide a sufficient rationale for conclusions regarding the effect of taking females on the fur seal population, as well as necessary context for evaluating such conclusions. In this regard, NMFS should summarize the analyses of Towell and Williams, the assumptions underlying those analyses, and any caveats noted by the authors, and relate those analyses directly to the alternatives being evaluated by the agency.

Response to comment 8: NMFS acknowledges the inadvertent mistakes in referencing the report by Towell and Williams (2016, replaces Towell and Williams 2014 or 2015) and the additional analysis applicable to St. Paul Island (Towell 2019, replaces Towell and Williams unpublished). First, NMFS made both references available on the web in 2018 when we made the proposed rule available for public comment (https://www.fisheries.noaa.gov/action/proposed-modification-subsistence-use-regulations-eastern-pacific-stock-northern-fur-seals). The correct reference: Towell and Williams (2016) is a chapter in the biennial NMFS Technical Memorandum series, Fur Seal Investigations and is available on the web (www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-316.pdf). The second reference is memorandum that uses the same modelling approach published in Towell and Williams (2016), but applies the method to the exact range of alternatives in the DSEIS (NMFS 2017). In summary, Towell and Williams (2016) and Towell (2019) used two different age- and sex-specific survival estimates (Lander 1981 and Towell 2007) and a single fecundity estimate (Lander 1981) to project the population composition after different levels of subsistence mortality (i.e., each alternative considered in the DSEIS) for 25 years. The authors noted that the survival and fecundity estimates are over 30 years old, but there are no more recent estimates available. The model projections from each of the proposed alternatives in the DSEIS (NMFS 2017) were compared to zero subsistence mortality (not an alternative considered in the DSEIS), because the differences among the model runs were very small. Towell (2019) modeled mortality of 20 female pups and 20 juvenile females (both possible outcomes of Alternative 2) and showed in either case there would be less than one-half of one percent reduction in the female portion of the population after 25 years. Female pup mortality would result in at least twice as many females still in the population after 25 years when compared to the same number of female mortalities. The mortality of 200 juvenile females (possible outcome of Alternative 5) would result in the loss of between 0.86 and 1.4 percent of the female portion of the population. The results of Towell and Williams (2016) and Towell (2019) are not the exclusive analysis used to confirm that the levels of subsistence related mortality are sustainable and not likely negatively contributing to the population status of northern fur seals. Fowler et al. (2009) used a systemic management approach to examine the sustainability of the proposed harvest of young of the year northern fur seals as envisioned on St. George and St. Paul Islands. Fowler et al. (2009) suggested that the proposed subsistence mortality rates were small enough that they would fall in the lower end of the spectrum of other large mammal consumption rates and were likely sustainable. Finally, NMFS used Potential Biological Removal as the significance criteria in the DSEIS (NMFS 2017), as has been used for other management actions considering the effects of human-caused mortality (NMFS 2014 and NMFS 2007). All these methods produce consistent results indicating that mortality associated with subsistence use at the levels in the preliminary preferred alternative do not represent a significant risk to the northern fur seal stock. This information and additional clarifying text were added to the FSEIS. In addition, the proposed rule cited Towell and Williams, as well as other sources noted above, and analyzed the effects of incidental female mortality on the northern fur population overall (83 FR 40192; August 14, 2018).

Comment 9: The DSEIS does not provide information about recent fur seal harvests on St. Paul in a user-friendly format. That information is included in Figure 4.3-1 but at a scale that makes it difficult to discern harvest patterns and trends since the inception of the subsistence harvest in the 1980s. Harvest data, including the numbers of female seals accidentally taken, should be presented in tabular form along the lines of those provided for pup harvests in the 1800s (Table 3.9-3) or subsistence takes of Steller sea lions (Table 4.2-3).

Response to Comment 9: NMFS prepared the following table (CAR-1) that is also included in the FSEIS. NMFS has included data from the last ten years of the commercial harvest as context for the reader to understand our ability to detect changes before and after the change to the subsistence regulatory regime. NMFS has added a new figure (CAR-2) to complement Figure 4.3-1. The new figure includes those years identified in the new table and both are in the FSEIS for the public to discern how changing harvest patterns may relate to population trends.

NMFS evaluated the rate of accidental female mortality during the last 10 years of the commercial harvest leading to subsistence harvest (Table 4.3-1). Due to the large number of seals killed during the commercial harvest, not all harvested seals were sampled and instead every fifth fur seal harvested was sampled to identify age and sex. From this sampling scheme the actual number of females accidentally killed from 1975 through 1984 would have been approximately 5 times greater than available from the sampled portion of the commercial harvest. For example, in 1975 twenty percent of the 29,093 male seals commercially harvested were sampled (about 5,800). Of that sample of the commercial harvest, 55 of 5,800 were females. Thus we must multiply 55 by five to estimate a total of 275 females were likely accidentally killed during the 1975 commercial harvest. Therefore about one (0.94) female was accidentally killed for every 100 male seals killed during the commercial harvest in 1975. Similarly, in 1984, 32 females were identified from the twenty percent sample of the commercial harvest; thus about 160 females may have been killed in 1984.

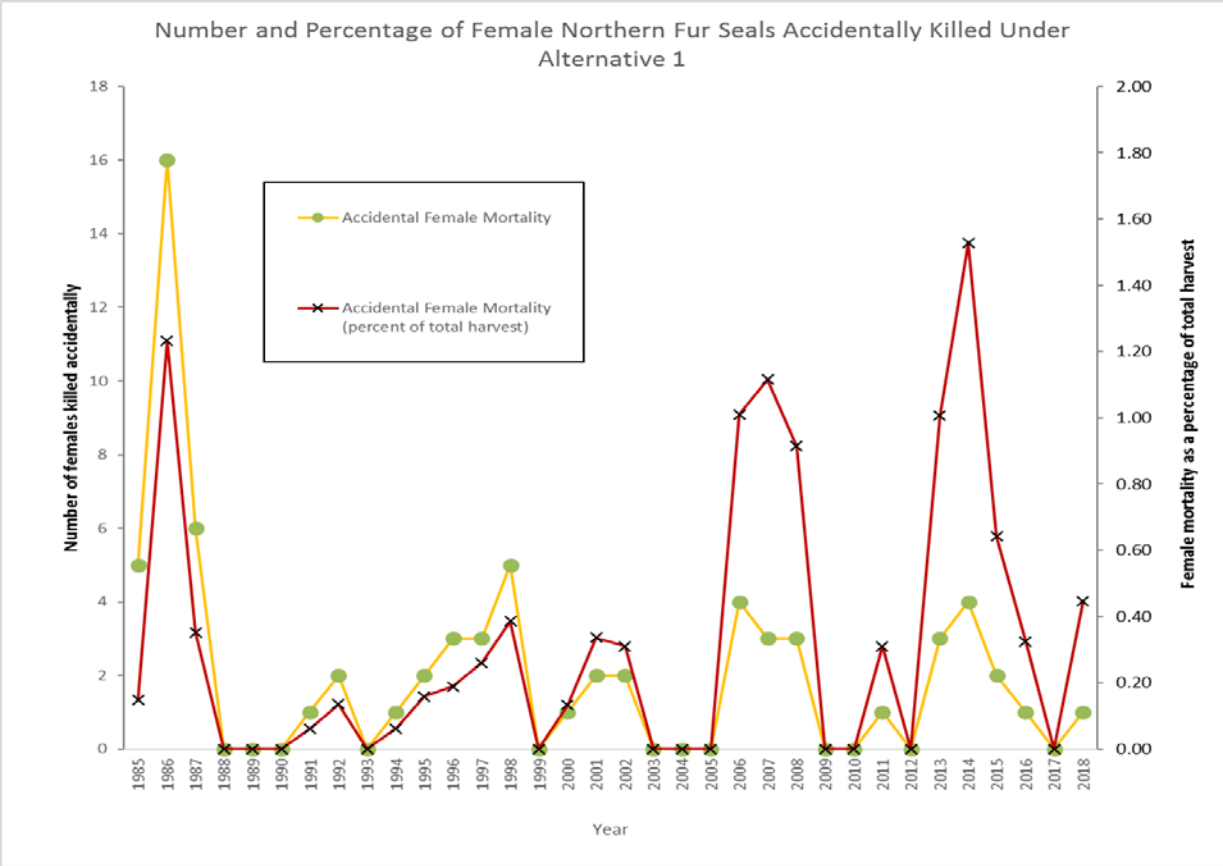
Because of the concerns over illegal selling of seal baculum from the 1985 subsistence harvest, every seal killed during the subsistence harvest was checked by the NMFS hired veterinarian so accidental female mortalities would have been detected in 1986 and afterwards. Therefore the number of female mortalities does not need to be corrected (i.e., multiplied by five) for sampling of the subsistence harvest (Table 4.3-1). From 1985-2018 (i.e., the entire subsistence period), 71 females have been accidently killed during the subsistence harvest of males. By comparison, the average rate of accidental female mortality under the subsistence harvest (0.32 females per 100 males killed) has been about three times lower than the rate during the last ten years of the commercial harvest (0.96 females per 100 males killed). There is no trend to the number or percentage of females killed during subsistence harvests and the rate is less than two percent of the total harvest of males.

Table CAR-1: The number of northern fur seals killed by sex and harvest type from 1975 to 2018 on St. Paul Island, Alaska. *

Year	Males Harvested: St. Paul Island	Females killed accidentally: St. Paul Island	Harvest Type
1975	29,093	55 (275)*	Commercial
1976	23,081	15 (75)*	Commercial
1977	28,396	48 (240)*	Commercial
1978	24,829	56 (280)*	Commercial
1979	25,702	60 (300)*	Commercial
1980	24,278	49 (245)*	Commercial
1981	23,892	36 (180)*	Commercial
1982	24,730	98 (490)*	Commercial
1983	25,728	40 (200)*	Commercial
1984	22,034	32 (160)*	Commercial
1985	3,379	5	Subsistence
1986	1,299	16	Subsistence
1987	1,704	6	Subsistence
1988	1,145	0	Subsistence
1989	1,340	0	Subsistence
1990	1,077	0	Subsistence
1991	1,644	1	Subsistence
1992	1,480	2	Subsistence
1993	1,518	0	Subsistence
1994	1,615	1	Subsistence
1995	1,263	2	Subsistence
1996	1,588	3	Subsistence
1997	1,153	3	Subsistence
1998	1,297	5	Subsistence
1999	1,000	0	Subsistence
2000	754	1	Subsistence

Year	Males Harvested: St. Paul Island	Females killed accidentally: St. Paul Island	Harvest Type
2001	595	2	Subsistence
2002	646	2	Subsistence
2003	522	0	Subsistence
2004	493	0	Subsistence
2005	466	0	Subsistence
2006	396	4	Subsistence
2007	269	3	Subsistence
2008	328	3	Subsistence
2009	341	0	Subsistence
2010	357	0	Subsistence
2011	322	1	Subsistence
2012	383	0	Subsistence
2013	298	3	Subsistence
2014	262	4	Subsistence
2015	312	2	Subsistence
2016	308	1	Subsistence
2017	227	0	Subsistence
2018	225	0	Subsistence

Figure CAR 2 The number and percentage of female northern fur seals killed during subsistence harvests from 1985 to 2018 on St. Paul Island, Alaska.



disturbance levels is also needed. Among other things, NMFS should explain what constitutes a harvest event and how it arrived at the estimates of disturbance associated with each event and with each harvested seal. It also is not clear how the "family-style" organization of the harvest factors into those estimates. More detail is needed as to how family-style harvests would be conducted—e.g., how many people/families are involved, would families act independently or coordinate their efforts, would different groups enter a rookery on the same day and, if so, would those be counted as single or multiple harvest events?

Response to Comment 11: NMFS disagrees that the proposed subsistence regulations could cause disturbance at "historically high levels." During the commercial harvest on St. Paul Island, NMFS harvested thousands of sub-adult male seals on a 5-day per week rotation during the six to eight week season. NMFS estimates the actual "historically high period of disturbance" occurred from 1956-1968 during the herd reduction and commercial harvest era. During this period some commercial harvest days included harvests at multiple hauling grounds, but on average there were 45 harvest days a year on St. Paul and 915 juvenile males were killed per harvest day (mean annual commercial harvest of 41,110 juvenile males). During this period there were additional round-ups from the rookeries to capture and kill adult females as part of the herd reduction program. On average there were 39 additional harvest days a year to kill 525 females per harvest day (mean annual kill of 20,619 females). Thus there were on average 84 actual "harvest events" killing 61,729 seals per year during the herd reduction era on St. Paul Island (NPFC 1962, NPFC 1969, NPFC 1971, NPFC 1975). When using the same approach to estimating disturbance as is used in the FSEIS, the estimate of seals exposed to disturbance based on the mean harvest levels would be 61,729 seals times 1.15 plus 84 harvest events times 50 seals that escape the round-up or 75,188 seals disturbed annually. The preliminary preferred alternative estimates 16,650 seals would be potentially disturbed, thus using the same methodology (described in detail below) about 60,000 more seals were disturbed during the commercial era than under the preliminary preferred alternative.

NMFS defined a harvest in the FSEIS as any entry by humans into habitat occupied by fur seals for the purpose of subsistence use. NMFS did not distinguish family-style harvests differently from other types of harvest, and NMFS presumes that all harvests will continue to be coordinated by the Aleut Community of St. Paul under co-management. NMFS will not be regulating the details of harvest styles, and will leave the development and details of alternative harvest styles to the tribe and community members. Those harvest styles will then be proposed and evaluated through the co-management process and approved by consensus decision-making by the Co-Management Council.

NMFS estimated every harvest event contributes to the overall estimate of disturbance. The number of people participating in a harvest is immaterial to our assessment of harassment because there are a minimum number of people required to safely round-up juvenile males or pups and herd them safely to the killing field, and at some point additional participants in the round-up results in a reduction in the ability to effectively communicate to the crew to herd and move seals. NMFS provides estimates and the associated rationale for the theoretical number of harvests of each Alternative in Table 4.2-1. NMFS also provides a detailed description of the three-step process to estimate the number of seals disturbed in section 4.2.2., Sub-lethal Effects Due to Harvesting of the DSEIS and FSEIS. Each alternative analysis includes an alternative-specific table that uses the maximum number of harvests based on Table 4.2-1, showing the calculation steps and summed estimate of the potential effect.

NMFS estimated the number of possible subsistence harvest events in the DSEIS as 137 for juvenile male and pup harvests combined. NMFS assumed 5 harvest events per week during the subsistence harvest season. NMFS's estimate of harvest events is a theoretical possibility, but the estimate is not likely to occur given that it is not practical from a community perspective. Community members cannot organize

and afford to spend over 30 percent of the year pursuing northern fur seals for subsistence. In addition, when those 137 theoretical harvest events are divided by 2,000 seals there would be 14 seals killed per harvest, this is significantly lower than the current number of seals taken per subsistence harvest in recent years. For example, while the community of St. Paul could subsistence harvest seals on 49 days under the current regulations they actually have had 8 subsistence harvests per year that killed 48 juvenile males per harvest on average during the past 15 years. We anticipate this amount of subsistence harvest effort (about 1 subsistence harvest per week during the season) to continue under the preliminary preferred alternative. Similarly, NMFS estimated that St. George would have more than one pup harvest per week, but in practice they have had on average 10 harvests during their first four full pup harvest seasons (10 week seasons with 1 harvest per week). NMFS expects similar subsistence pup harvest effort on St. Paul Island. Thus, NMFS overestimated in the DSEIS the possible number of subsistence harvests in the preliminary preferred alternative (i.e., 5 harvests per week to calculate that there would be up to 137 harvests to kill 2,000 seals) in order to provide a maximum and therefore conservative estimate of disturbance. Practically, it is more likely that there will be fewer harvests per week, with a similar number of seals harvested per past subsistence harvest, than was estimated in the DSEIS. NMFS added this additional information to our analysis (in section 4.2.2) in the FSEIS to clarify the effects of disturbance based on the number of harvest events and the number of seals harvested.

The number of harvest days or events represent one portion of the disturbance, but the number of individuals in a harvest must also be considered. The comments also identify the need to clarify how the number of seals disturbed per seal killed and per harvest was calculated. NMFS included in the DSEIS the same methodology that was used in the FSEIS analyzing the effects of the management of the subsistence harvest of northern fur seals on St. George (NMFS 2014). This methodology was an adaptation of the methodology used in the FEIS on Steller sea lion and northern fur seal research (NMFS 2007). This approach, which is described in the DSEIS, estimated that for every pup harvested both pups and non-pups would be disturbed. The method estimates that two pups would be disturbed for every pup harvested and that an additional 1.15 non-pups would be disturbed for every pup harvested. For example, a harvest of 100 pups would result in the disturbance of 200 pups (100 of those are killed for subsistence and are counted in the total for disturbance) and an additional 115 non-pups that were occupying similar habitat. The method also estimated that an additional 60 seals are disturbed per pup harvest. Therefore a single harvest event of 100 pups would result in 375 seals disturbed. This calculation was provided in the DSEIS and summed up in a table for each alternative in the analysis based on the estimated range of harvest events and number of seals to be killed for subsistence. The harvest of juvenile males has the potential to effect a smaller proportion of the population when compared to the pup harvest due the segregation of juvenile and non-breeding males on the hauling grounds. Therefore NMFS adapted the above approach in the DSEIS and estimated that for every juvenile seal killed an additional 1.15 non-pups are disturbed. In addition, each harvest event results in an additional 50 non-pup seals harassed on the hauling ground, and this per event estimate is lower than the pup harvest estimate (60 non-pups disturbed per pup harvest). The rationale for this difference is the hauling ground has a lower density of seals compared to the rookery. NMFS has re-evaluated the estimation process to determine the number of seals exposed to harassment during the juvenile male subsistence harvests. Data collected on St. Paul during the subsistence harvest indicates that greater than 1.15 seals are disturbed for each seal harvested. The 1.15 seals disturbed was derived from a combination of data collected during research round-ups and commercial harvest round-ups. The data from ACSPI for their juvenile male harvests in 2016, 2017, and 2018 are available. The ratio of seals not harvested to harvested was 3.9 in 2016, 4.5 in 2017, and 6.2 in 2018. The average of these three years is 4.9 juvenile seals disturbed for every juvenile seal harvested. NMFS revised the FSEIS analysis of the number of juvenile seals disturbed in Section 4.2.2. and all subsequent text and tables describing and evaluating the sub-lethal effects of harvesting. Thus NMFS assumes the comment reference to preferred alternative was intended to mean the preliminary preferred

alternative (Alternative 2B) if all 2,000 juvenile were killed during harvests the revised estimate of harassment may be as high as 9,800 seals captured in the harvest round-ups versus 2,300 estimated in the DSEIS [section 4.2.2]. The DSEIS also estimated 6,850 juveniles are disturbed during 137 harvest events, but are not directly captured in the round-up; this estimate is unchanged between the DSEIS and FSEIS. This estimate of disturbed seals during each harvest event, but that are not captured in the round-up, were revised in the FSEIS (section 4.2.2), even though as we described above the assumption of 137 harvest events is an overestimate of the likely number of subsistence harvests and the resultant effects. Therefore the revised total of seals that may be disturbed during 137 harvests to kill 2,000 seals would be 9,800 + 6,850 = 16,650 disturbed (see Table 4.3-5 in the FSEIS) versus 9,150 disturbed in the DSEIS.

In addition, the comment asks NMFS to provide details for monitoring the effects of the new harvest scheme. NMFS and ACSPI intend to develop revised annual management plan(s) to be implemented by both parties under the co-management agreement. This management plan will include methods for monitoring the subsistence harvest and subsistence hunt for compliance with the regulations to implement non-regulatory (co-management) provisions and to characterize the effects of the new subsistence use regulatory and management scheme. Under the current co-management agreement NMFS and ACSPI agreed that ACSPI would count the number of seals released from the harvest round-up as an alternative means to estimate disturbance, and that will be addressed in the appropriate management plan(s).

Comment 12: It appears from the information provided in the DSEIS, including Table 4.2.1, that NMFS anticipates that under the Preferred Alternative there would be 137 harvest events during the proposed harvest season. The accompanying analysis indicates that 2 pups and 1.15 non-pups would be disturbed for each pup harvested and that 60 additional pups and 50 additional older animals would be disturbed for each harvest event. These estimates of disturbance are likely low and the actual numbers could be considerably higher if round-ups are conducted at rookery areas where a large number of mothers and pups are adjacent to the harvest area and can see or smell the harvesters. In addition, experience from research activities conducted on St. Paul over the years indicates that, over time, repeated entries into rookeries make seals more wary and responsive to the mere scents and sight of humans. Thus, it seems that as the season progresses, more seals could be disturbed than predicted. If the projected number of harvest events were to occur during a lengthened season, there would be an unprecedented level of activity and disturbance of seals in those rookeries. Efforts should be taken to lower the allowed number of harvest events by consolidating harvest activities to the extent possible.

Response to Comment 12: See response to Comment 11. While NMFS does not anticipate 137 subsistence harvest events are likely to occur, NMFS used this number in the DSEIS and FSEIS as a maximum estimate of subsistence harvest events and to highlight that disturbance is a function of both the number of harvests and the number of seals authorized for subsistence harvest. As the number of harvests increases the number of seals per harvest has to decrease as the regulatory limit is approached. A subsistence harvest to obtain a small number of seals requires fewer people and fewer seals to meet that daily need, which is assumed to disturb fewer seals. The calculation of seals disturbed per event was not adjusted based on the number of seals rounded up, and in that manner is conservative when assessing the disturbance of 137 harvests to kill 2,000 seals. In NMFS's experience, disturbance responses associated with research activities on the rookeries are not an equivalent proxy for harvest disturbance, but at the time was the only source available. Research activities focused on pups or lactating females at any particular site enter the rookery and typically the work continues in the rookery, with human presence within the rookery for hours. Research activities attempt to collect a representative sample of all seals present at a site with their available staffing and time to implement the field research. Thus each research round-up is as large as practical to maximize their sample size and complete their research in as few field days as funding allows. Subsistence users on St. George (where a pup harvest is authorized) avoid

interactions with as many non-pups as practical, and pups are herded and moved away from the rookery. Thus the duration of human presence within the rookery is much shorter for subsistence users than researchers.

In addition, NMFS used VHF and satellite tags on pups and adult females to test hypotheses related pup harvest disturbance events on St. George Island. Satellite tags were deployed on 20 adult female and 20 pup female northern fur seals in 2015 to test the following hypothesis in a before/after control/impact study design (See Ream and Sterling 2019): a) Adult female foraging trip duration at disturbance sites is the same as at control sites; b) Adult female duration of onshore attendance at disturbance sites is the same duration as at control sites.; c) Adult females at disturbance sites move (temporarily or permanently) to alternative sites at the same frequency as females at control sites; d) Adult female nearshore diving behavior at disturbance sites is the same as at control sites; and e) The mean date of departure on the winter migration by adult females at disturbance sites is the same as at control sites. For pups we tested a similar set of hypotheses: a) The duration of time spent during bouts in the water by pups at disturbance sites is the same as at control sites; b) The duration of time spent during bouts on land by pups at disturbance sites is the same as at control sites; c) Pups at disturbance sites move (temporarily or permanently) to alternative sites at the same frequency as pups at control sites; and d) The mean date of departure on the winter migration by pups at disturbance sites is the same as at control sites.

Ream and Sterling (2019) found no differences (i.e., could not reject the null hypotheses) in adult female foraging trip duration, on-shore attendance duration, and time of departure on the winter migration between experimental and control sites using the comparisons identified. We could not assess comparisons of near-shore diving behavior due to a lack of data recorded at the experimental site(s). Due to the resolution of the Argos location data, we were also unable to determine whether females were temporarily displaced or moved to sites immediately adjacent to the tag deployment sites. Adult female locations were not observed at the other sites (not found immediately adjacent to the deployment site), however, and no animals moved from their tag deployment site to any alternative site for long durations or permanently. For adult females, the results of these analyses imply that either there were no effects, or that we were simply unable to detect any effects that might result in population consequences, of human disturbance associated with pup harvests on St. George Island.

While most of the results for female pups were similar to those for adult females (no difference between experimental and control sites), there were a few exceptions (Ream and Sterling 2019). On-shore durations were shorter for the experimental sites using the original study design comparison (with Zapadni classified as an experimental/harvested site), but were only marginally shorter using the more appropriate, adjusted study design comparison (with East Reef as the lone experimental/harvested site; $p=0.053$). The one other finding of significance, also under the adjusted study design comparison, was the duration of bouts in the water. Interestingly, the duration of these “trips” were shorter at the experimental site. This finding is perhaps contrary to conventional wisdom which, at least for adult females, would suggest that the duration of time in water should increase in response to disturbance. It is possible that the result is simply an artifact of the small sample size at East Reef, driven by the random selection of a few individuals with a predilection for short in-water bouts. Shorter bouts could also be related to inherent differences in environmental exposure and shoreline characteristics found at East Reef that have an unidentified influence on aquatic behavior. Given the shorter duration of in-water bouts at East Reef, as well as some limited support for shorter on-land bouts there, we also calculated and compared the total proportion of time pups spent in the water at East Reef (0.24) and the control sites (0.26), and found that over the course of the season, experimental and control pups were spending a similar amount of time in the water (and, conversely, on shore). As with the adult females, there was no obvious (long duration) movements of pups from their tag deployment site to other sites, and we did not observe any pup

locations at sites beyond immediately adjacent rookeries, which based on previous information occurs normally. Again, we were unable to determine if any pups moved temporarily to immediately adjacent sites due to the resolution of the Argos location data. For female pups, the results of the analyses are less conclusive than for adult females, but seem to suggest little, if any, detectable effects of human disturbance.

Due to limitations of this study, we initiated a follow-up project at St. George during the fall of 2016 to specifically examine the attendance behavior (including trip and shore durations, timing of departure on migration, and displacement to alternate sites) of adult females. Hypotheses tested included: 1) Adult female foraging trip duration over the entire breeding season who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities; 2) Adult female onshore stay duration who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities; and 3) the timing of departure on the winter migration of tagged females who were exposed to pup harvest activities is not different than those who were not exposed to pup harvest activities. We tagged a total of 100 adult females at four different breeding sites on St. George Island in 2016, anticipating that two sites would be exposed to pup harvests and two sites that would not be exposed to harvests due the location, access, and terrain at the sites. A total of 68 maternal females were included in the study which continued through 2018 (Merrill 2019). Merrill (2019) reports that 20 of the 27 pup harvests on St. George from 2016 through 2018 occurred at times when tagged females were present on shore. Eighteen of the 68 (26 percent) tagged adult females were potentially exposed to pup harvests. Merrill (2019) was unable to detect departures from the rookery of less than 30 minutes, and of those 18 tagged females none showed any departures from their suckling site during or immediately after the times recorded for pup harvests at those sites. The duration of pup harvesters' presence within the breeding areas was on average less than 30 minutes. Thus it is possible the tagged females could have responded to the harvester presence and returned within less than 30 minutes thus appeared to have not responded to harvesters' presence. This result is important because it indicates that pup harvests on St. George Island are not resulting in responses longer than 30 minutes, and had longer duration absences from the rookeries occurred this study had the power to detect differences. Merrill (2019) examined the date of departure on winter migration, and duration of female foraging trip and onshore stay by comparing the mean duration of foraging trips and onshore stays of females exposed to pup harvests with those that were not exposed to pup harvests. Merrill (2019) found no difference ($P > 0.20$) in the mean day of departure of potentially disturbed females (East Reef = 316.52 and Zapadni = 313.59) versus undisturbed females (316.61 and 314.99, at East Reef and Zapadni). Merrill (2019) found no statistically significant differences between the duration of tagged female foraging trips ($P > 0.11$) or onshore stays ($P > 0.10$). These details are included in the FSEIS in the sections referencing sub-lethal effects of harvests in section 4.3.10.2.2. If the proposed rule is finalized, NMFS will work within the co-management process to design a monitoring project to test additional hypotheses related to effects of subsistence use on northern fur seal behavior and productivity on St. Paul to build on these findings as appropriate.

Comment 13: The proposal to allow juvenile male seals (those up to 7 years old, excluding pups) to be harvested in addition to pups and sub-adult seals (those less than 124.5 cm – i.e., those between 2-5 years of age) is not adequately explained or analyzed in the DSEIS. There is no analysis of how expanding the age classes and sizes of seals that may be harvested would affect harvesting methods, disturbance to rookeries and haul outs, the humaneness of the hunt, or the risk of accidentally taking females, or have other possible effects. As noted in section 4.2.1 of the DSEIS, "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, before proceeding with a proposal to expand the age classes of seals that may be harvested, whose removal is more likely to have

more significant impacts on the population, NMFS should provide a detailed analysis of the reasons for and the potential consequences of such a change.

Response to Comment 13: NMFS thoroughly analyzed the ACSPI petition and numerous alternatives in the DSEIS and FSEIS to allow the subsistence use of juvenile male seals (up to seven years old) during an extended season. This included population modeling of male mortality of various numbers of multiple age classes, potential effects of disturbances during the subsistence hunt and subsistence harvest, the methods of hunting and harvesting, and the potential for differing levels of incidental female mortality. As the most extreme case of Alternative 2, NMFS modeled the effects of the mortality of 2,000 six year old males, and estimated a reduction of between 3.8 and 8.0 percent of the male population after 25 years of subsistence mortality (Towell and Williams 2016; Towell 2019). NMFS does not expect this is a likely subsistence scenario, because it is unlikely that the full quota of only 6- year old male fur seals will be taken for subsistence, and some proportion of those taken during harvests would range from pups through 5-year-olds, which have a higher natural level of mortality. The status quo alternative with 25 years of subsistence mortality of 2,000 males less than 124.5 cm would result in a reduction of between 4.4 and 6.1 percent of the male portion of the population (Towell and Williams 2016; Towell 2019). Although we cannot be certain, NMFS concluded that the actual population-level effects of the preliminary preferred alternative would be comparable to if not less than the effects of the status quo regulatory regime that harvested up to the maximum authorized level (2,000). ACSPI has indicated that their subsistence harvest of juveniles will continue to attempt to select two and three year-old seals, and the age data from the subsistence harvest support this preference for the smallest (i.e., youngest) of the seals available in the round-up. The concern about taking larger animals appears to be related to the proposed hunting season. Although the preliminary preferred alternative would allow hunters to take larger seals (because it is difficult from shooting distance to ensure only smaller seals are targeted), the subsistence hunters would generally select the smallest seals available in the winter and spring, recognizing that the seals found near the islands at this time are larger (and therefore likely older) than in the summer. NMFS added clarifying text to the FSEIS describing the detailed analysis in section 4.3.5.1.

Comment 14: One of the elements of “wasteful take” identified in the 1986 fur seal harvest regulations is employing harvest methods that are likely to ensure successful killing and retrieval of each selected fur seal. In comparison to the existing and proposed harvest methods, the proposed hunt is much more likely to result in killing seals that are not retrieved. On the other hand, the hunt appears to be the preferred method of securing fresh seal meat during this time of the year. However, this is an issue where additional limitations could further reduce the likelihood that seals will be struck and lost. The DSEIS notes that shooting marine mammals from vessels on the water, even in calm seas, can be unsteady, and that most if not all hunting would be done from land; still, Alternative 2 would allow the hunting of fur seals from vessels. NMFS and its co-management partners should assess whether retrieval rates for seals shot when in the water are significantly different than those for seals shot when hauled out and adjust hunting practices accordingly.

Response to Comment 14: NMFS disagrees that hunting is the preferred method to use for subsistence during the winter and spring, rather it is the only reliable method to obtain fur seals during the winter and spring. Fur seals are not known to haul out or rest on land at this time of year. Fur seal presence on land in the winter and spring rarely occurs, and in those cases where they do haul out on land they occupy land nearer to the water. NMFS and ACSPI have started discussions to develop monitoring plans under co-management to assess struck and loss rates of fur seals based on hunting methods. The intent of this monitoring, as suggested by the commenter(s), will be to assess the circumstance and locations that account for relatively higher struck and lost rates and to subsequently work with subsistence users to use methods that result in lower rates of struck and lost seals. If additional limitations are required to limit

high lost rates, NMFS and ACSPI could work through the co-management process to identify solutions and implement through co-management.

Comment 15: The number of animals likely to be struck and lost after being shot in the water does not seem to have been adequately weighed in the DSEIS. Struck and lost rates for seals reported in the DSEIS and by several studies (e.g., Butterworth et al., 2007; European Commission, 2007) indicate unacceptable loss rates. Given the statement in the DSEIS that "ACSPI has indicated that most if not all hunting will be based on land," and considering the long season proposed, the potential loss rate, and the difficulty in accurately accounting for struck and lost animals, the use of firearms to shoot animals in the water should not be permitted. This is one desirable aspect of Alternative 4 in the DSEIS, which would prohibit the use of firearms and retain the existing harvest provisions also included under Alternative 1. At the least, limiting hunting to taking seals on land, as was proposed under Alternative 3, would help minimize the probability of struck and lost seals.

As noted in the DSEIS, there is no direct experience of hunting fur seals with firearms on the Pribilof Islands from which to assess struck and lost rates or design measures aimed at reducing those rates. As such, it is particularly important that these hunts, if authorized, be monitored closely by NMFS, in collaboration with its co-management partners, at least at the outset, to collect information necessary to understand and reduce struck and lost incidents, including details concerning the conditions under which they occurred and the ages and distribution of animals available to hunters. The DSEIS stipulates, for example, under Alternative 2, Options A and B, that the monitoring of struck and lost seals 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. However, it is not clear from the DSEIS how this critical variable would be monitored or calculated.

A commenter expressed the opinion that struck and lost seals are not under-reported, as was suggested in the DSEIS. In contrast, two other commenters discussed concerns regarding the potential for under-reporting of such events.

Response to Comment 15: The Steller sea lion struck and lost rates provided in the DSEIS and FSEIS are the most applicable to subsistence hunting of fur seals on St. Paul, but no data are available to assess the claims of under- or over-reporting. As noted in our response to comment 14, hunting fur seals in the water from land during the winter and spring season is the only practical method for subsistence users to obtain fur seals. The suggestion that fur seals can be obtained for subsistence uses from January through May without the use of firearms is incorrect because the seals do not generally haul out at that time of year. The commercial harp seal harvest information cited by the commenter is not applicable to northern fur seals on St. Paul where most hunters will be on land shooting a fur seals swimming nearshore during the proposed hunting season. In addition, NMFS reviewed references of the fur seal harvests in Namibia (Cummings 2015; EFSA 2007). Neither the Namibia fur seal reports nor the harp seal hunt report includes struck and lost data comparable to the use of firearms to kill fur seals swimming nearshore or on land. Moreover, the Namibia fur seal report indicated that the use of firearms to kill fur seals on land does not ensure that seals will not be struck, escape to the water, and subsequently be lost. In Namibia firearms have been used to kill adult males on the rookeries during the breeding season and to kill pups, neither approach is being considered in any alternative considered in the DSEIS and FSEIS, as such we deem those references not pertinent.

As noted in our response to comment 14, NMFS will work with ACSPI within the co-management process to monitor struck and lost rates based on hunting from land of seals in the water or on land, and hunting from water of seals that are in water. Once data are available on hunting effort and performance,

NMFS and ACSPI will review the data to make co-management decisions to identify hunting methods or locations to reduce struck and lost rates as needed. Additionally, NMFS expects hunting to comprise a small proportion of ACSPI's overall effort to obtain seals for subsistence use, so even if struck and lost rates initially are higher than anticipated, we expect the number of seals lost to be small relative to the total take. In addition the number of seals struck and lost by hunters will be estimated from monitoring by both NMFS and ACSPI and those losses counted towards the total take.

Comment 16: A commenter expressed the view that allowing subsistence hunting of fur seals using firearms would reduce the illicit hunting of fur seals, allow for monitoring of this take, and reduce the continuing tension between subsistence users and NMFS. Another commenter noted that although the DSEIS suggested the Preferred Alternative would "reduce illicit taking," there do not appear to be any reports of violations or other indications in reports that NMFS is aware of such activity.

Response to Comment 16: NMFS does not report on on-going investigations of illicit taking, but in general, we agree that increasing opportunities for Pribilovians to take fur seals legally for subsistence use is likely to decrease any alleged illicit taking. Please note response to comment 39.

Comment 17: The DSEIS appears to have inappropriately concluded a "negligible impact" on pups for most of the alternatives. Negligible impact was defined as having a total human-related serious injury and mortality of less than 10 percent of PBR. However, under most action alternatives in the DSEIS, proposed impact on pups alone is greater than 10 percent of the PBR (i.e., the 1,500 pup deaths alone account for more than 10 percent of the PBR of 11,405). In addition, though the DSEIS proposes that it may subset PBR for St. Paul, the current mortality from harvests in St. George and Bogoslov must also be accounted for in the analysis. Given that the agency has acknowledged that impacts over 10 percent of PBR cannot be considered "negligible," NMFS must re-consider and correct its impact analysis relative to determination of "negligible" or "minor" impacts when the number affected would be greater than 10 percent of the PBR.

Response to Comment 17: As explained in the FSEIS, NMFS defined effects from mortality relative to PBR as negligible (10% or less), minor (11% to 30%), moderate (31% to 49%), and major (50% or more). Tables ES-7 and 4.3-1 of the FSEIS indicate a minor effect from direct mortality associated with Alternatives 1-4 and a major effect for Alternative 5. In each of those Alternatives NMFS identified that we were assessing male pup and male juvenile fur seal mortality together and all female fur seal mortality separate from male mortality. NMFS has reviewed the analysis and impact assessment for each alternative and throughout the text. NMFS noted that in some cases there were references to negligible effects from the male pup harvest as a percentage of the annual estimate of pup production which in some cases was less than 10%, but our NEPA significance criteria were based on PBR and not annual pup production. NMFS has revised those FSEIS references for male pup mortality as a percentage of PBR based on the significance criteria used in the FSEIS. NMFS noted general references to "negligible effects" on the population when discussing the relative contribution of effects of the mortality of male pups when compared to a similar number of juvenile male mortalities. We reviewed the text and edited as necessary to eliminate any use of the word "negligible" that may be confusing in light of the effects criteria used in the FSEIS. No harvests are authorized on Bogoslof Island.

Comment 18: NMFS states that future pup production in areas already experiencing reduced or unstable pup production is not expected to be affected by a pup harvest; however, the agency also stipulates that "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." There is no process or criteria described in the DSEIS for designating and exempting these rookeries, particularly if more

control over timing and location of hunts is delegated to the ACSPI. Given the ongoing decline in pup production on St. Paul Island, it would be risk-prone to err on the side of permissive harvests that will only increase the death toll in pups when there is little or no information to demonstrate that it will not result in adverse effects on the population growth.

Response to Comment 18: The FSEIS states that NMFS and ACSPI will develop management plans under the co-management process to address specific breeding areas or locations that may have additional restrictions, limitations, or prohibitions to ensure that subsistence activities are sustainable. NMFS will collect monitoring data with ASCPI collaboratively and independently, regularly evaluate the subsistence use data, and make co-management decisions with ACSPI to ensure sustainability of subsistence use of northern fur seals, such as avoiding harvests from certain rookeries or locations within rookeries. The co-management process and review of population information and subsistence use by the Co-management Council is intended to address such concerns as they arise to limit impacts to specific locations of concern. NMFS clarified in the FSEIS the intended co-management process of monitoring hunting and harvesting effort, seal presence, response, and seal population status for making non-regulatory decisions to alter hunting or harvesting by location or season in real-time. The non-regulatory decisions of the co-management process will be more flexible and timely than making a regulatory change to a situation that was not anticipated in the regulatory process and may have unintended consequences or simply not be effective to ensure both sustainability and subsistence use.

Comment 19: Based on the distribution of fur seals in the winter and spring months, there appears to be a low risk that females will be taken in the proposed hunting season during this time period. However, authorized hunting in these months is unprecedented, and there is limited information regarding the numbers, age classes, distribution, and sex of seals using St. Paul Island and nearshore waters in winter and spring. Therefore NMFS and its co-management partner, as part of such a hunt, should commit to continue monitoring migratory patterns of fur seals, collecting information on fur seals present on an around St. Paul Island during this period, and adjusting the winter-spring hunt accordingly. The proposed hunting methods are not particularly selective and, if female seals are more prevalent than believed or begin to show up in greater numbers during these months (e.g., in response to environmental changes), the winter-spring hunt will need to be re-assessed.

Response to Comment 19: NMFS agrees with this commenter and clarified in the FSEIS that this is the intention of the proposed monitoring plans and non-regulatory management measures developed through the co-management process. In addition, as noted elsewhere, the preliminary preferred alternative and associated proposed rule include a regulatory limit of 20 female fur seal mortalities per year, that if reached would result in the termination of subsistence use for the remainder of the year.

Comment 20: As noted in the DSEIS, closing the season for harvesting sub-adult males on August 8 has been fairly effective in minimizing the accidental taking of female seals. In the two instances when the harvest was extended beyond that date, unacceptably high numbers of female seals were taken, causing the harvest to be terminated for the remainder of the year. This prompted NMFS, in 1992, to amend the harvest regulations to eliminate the extension provision altogether. Despite this history, and the demonstrated difficulty of even experienced sealers to be able to differentiate between sub-adult males and females once they begin to comingle, the preliminary preferred alternative would allow sub-adult seals to be harvested any time between June 23 and December 31. Given the demonstrated risk of taking females after August 8, the likelihood that less experienced sealers (who would be participating in the harvest under the preliminary preferred alternative) would be less able to differentiate between male and female seals and given the implications for shutting down further harvests that year, allowance for sub-adult fur seals to be harvested after this date should be viewed as a “last resort” alternative to be pursued

only if subsistence needs cannot be met in any other way. In this regard, the separate seasons for taking sub-adult seals and pups (including some combination of the two) provided for under Alternatives 3 and 4 are preferable to Alternative 2.

Response to Comment 20: The preliminary preferred alternative would allow ACSPI and NMFS to adopt additional controls as needed via co-management, such as establishing separate seasons or limitations at specific locations or more strict limitations on female mortality, in addition to the regulatory limit on total annual female mortality. The preliminary preferred alternative also includes a regulatory limit of 20 female fur seal mortalities per year, that if reached would result in the termination of subsistence use for the remainder of the year. NMFS expects that together, these measures will create sufficient incentives and controls to minimize the accidental taking of female fur seals in the future. As the commenter correctly notes, the extension of the harvest in 1986 and 1987 resulted in higher absolute numbers of females killed, but as shown in the newly added figure (CAR-2) the percentage of females killed accidentally has never reached 2% of the total male subsistence harvest.

Comment 21: Restricting hunting to two areas on the far north end of the island as proposed under Alternative 3 would concentrate mortality such that there would be a moderate effect on the fur seal population in terms of geographic extent.

Response to Comment 21: NMFS agrees with the commenter(s). The DSEIS and FSEIS indicate both in Table ES-7 and on page 4-38 that under Alternative 3 moderate effects were estimated in terms of the geographic extent from hunting with firearms due to the concentration of hunting at a few site, but that harvesting effects would be minor because they were not concentrated at a few sites.

Comment 22: The NMFS SAR shows a decline in pup counts between 2012 and 2014 of over 5,000 animals. If 1,500 pups are also killed each year in the hunt as provided for under Alternatives 3 and 4, it would be the equivalent of adding 3,000 more animals to this decline in each two-year monitoring period (i.e., 8,000 would be lost to the population instead of the approximately 5,000 noted in the SAR). There is no apparent evidence that the added anthropogenic pup mortality would replace some fraction of the natural mortality, and could just exacerbate it. This would only accelerate an already problematic decline. The DSEIS did not clearly discuss this issue.

Response to Comment 22: NMFS disagrees with the commenter(s) regarding the effects of mortality associated with the pup harvest. When assessing the effects of anthropogenic mortality on a wild population there are two types of mortality to consider: compensatory and additive mortality. Harvest deaths that otherwise would have occurred naturally are considered compensatory mortality, whereas harvest deaths above that level are termed additive mortality because they add to the number of deaths that would have occurred naturally. The commenter misconstrues most pup mortality for subsistence take as additive mortality. Natural causes like predation, disease, starvation, or injuries caused by other seals cause less than 10 percent of pups born in any one year to die on land and most of that mortality occurs soon after birth (Spraker and Lander 2010). Therefore over 90 percent of all pups born in any year survive to weaning; however, after weaning between 50 and 80 percent of those pups die before they return to their island of birth at two years old. NMFS modeled the effects of subsistence use of pups and juveniles as compensatory mortality according to our best estimates of annual survival for each age class and both sexes and then projected that for 25 years to estimate the possible population differences (Towell and Williams 2016, Towell 2019). The results of the modeling indicate that about a two to four percent difference in the number of males in the population among alternatives 1-4 (Towell 2019). Subsistence use of a greater proportion of male pups from the overall limit of 2,000 males resulted in more males in the population after 25 years than subsistence use of exclusively older male seals. Most pups that would

be taken in a harvest would have died naturally at a young age, so killing pups has much less significance to the population than killing older seals.

Comment 23: Given the critical importance of females to this declining population, the female mortality limit proposed under Alternative 5 is unacceptably high. This alternative would clearly lead to an accelerated decline in the population, and as such should not be adopted.

Response to Comment 23: Alternative 5 was included as part of a reasonable range of alternatives consistent with the requirements of NEPA. NMFS agrees that high levels of female mortality would have adverse effects on the fur seal population.

Comment 24: Alternative 5 appears to be the environmentally preferable action alternative, primarily due to the incorporation of monitoring and data-based decision-making and management, as well as the regular assessment of harvest impacts.

Response to Comment 24: NMFS is not required to choose an environmentally preferred alternative and did not make such a determination in the DSEIS or FSEIS (40 CFR 1505.2(b)). Due to the higher thresholds of female mortality in Alternative 5, Alternative 5 would have greater impacts than other alternatives. NMFS notes that Alternative 2 allows for adaptive management through the co-management process, which is based on monitoring of the hunting and harvesting seasons to ascertain impacts from subsistence use and consensus decision-making through the Co-management Council to manage the hunting and harvesting seasons. NMFS has chosen Alternative 2B as the preferred alternative due to the ability to use the co-management process to make in-season restrictions on hunting and harvesting based on a variety of factors including incidental mortality of females at levels less than authorized in the regulations.

Comment 25: NMFS should select Alternative 2 as the final Preferred Alternative, with authority provided to the Co-Management Council to define an allowance for accidental female mortality of up to 20 females per year as a non-regulatory conservation control, and with the modifications requested by the ACSPI to retain the current regulatory provision under 50 CFR 216.72(e)(4) in which “the intentional taking of [subadult] female fur seals is prohibited.” This Alternative, with the requested modification, would best address the ACSPI’s petition for greater flexibility to meet the subsistence needs of the community and improve the conservation and management of fur seals on St. Paul Island. Only Alternative 2 in the DSEIS, with the modifications proposed by ACSPI, sufficiently improves access, availability, stability, and utilization of northern fur seals for St. Paul Natives and recognizes the community’s desire to designate authority to the St. Paul Co-Management Council and use the co-management process, rather than federal regulations, to shape subsistence practices.

Response to Comment 25: NMFS is retaining Alternative 2B as the preferred alternative in the FSEIS. Alternative 2B includes a regulatory limit on female fur seal mortality of 20 per year. NMFS agrees that co-management is the best mechanism to adjust the methods, times, and locations of subsistence use to minimize the mortality of female fur seals, but NMFS determined that a regulatory maximum level of female mortality is necessary as a backstop to ensure the conservation of the fur seal stock, given the outsized importance of reproductive females to the population. NMFS also determined that the existing prohibition on “the intentional taking of female fur seals” at 50 CFR 216.72(e)(4) is problematic from an enforcement standpoint because it requires discerning and proving the intent of the harvester or hunter. Instead, the preferred alternative in the FSEIS sets a hard limit on female mortality and envisions that the Co-management Council will prescribe appropriate measures, adjusted during the season as needed, to keep female mortality below that limit. Alternative 2B has almost all of the same advantages ACSPI is

seeking from Alternative 2A, with the principal exception that it sets a regulatory limit on female mortality that the Co-management Council would not have the flexibility to exceed.

Comment 26: A harvest time frame extension through December 31 still would not meet the winter subsistence needs of the St. Paul Community in terms of both quality and quantity. The addition of a winter hunt as proposed under Alternative 2 would enable the community to be able to obtain fresh fur seal meat virtually year-round.

Response to Comment 26: NMFS agrees that extending the harvest time frame without also allowing a hunting season would not fully meet ACSPI's subsistence needs, because fur seals are not available for harvest on land in the winter. NMFS included a number of aspects for the harvesting and hunting seasons in each of the alternatives in order to analyze a reasonable range of alternatives under NEPA. Under the preliminary preferred alternative, the subsistence hunt would include a hunting season from January 1 to May 31 to provide the St. Paul community a winter/spring season to meet subsistence needs during that time, in addition to the extension of the subsistence harvest season to December 31.

Comment 27: One commenter expressed the view that removal of the current requirement that sealers be experienced will advance learning of traditional harvesting and hunting practices by younger generations. Another commenter suggested that the desire to pass along traditions to less experienced youth could instead be addressed by instituting a form of apprenticeship program that pairs youth with experienced hunters.

Response to Comment 27: NMFS agrees with the commenter(s) suggestions that the preliminary preferred alternative's approach provides an improvement of socio-cultural opportunities and that is reflected in the analysis of alternatives that include such learning and training opportunities versus the current regulatory requirement that allows only experienced sealers to harvest fur seals. While one commenter seemed to suggest the regulatory requirement should be retained and an apprenticeship program developed instead, the preliminary preferred alternative would remove the regulatory requirement and would allow the St. Paul community to choose the best means to share and teach traditional harvesting and hunting practices, which could include an apprenticeship program. The proposed rule addressed the requirement for experienced sealers and noted that removal of this requirement would better facilitate the St. Paul community to meet its annual subsistence needs (83 FR 40192; August 14, 2018).

Comment 28: NMFS should not select Alternative 3 because the elimination of the summer harvest season, combined with the restrictions and regulations proposed, would reduce access to fresh fur seal meat to an unacceptable level and result in adverse health impacts on the St. Paul Island community. For example, the two hunting areas identified under Alternative 3 are sparsely occupied sites. Moreover, they are located on the far north end of the island and would be inaccessible or with limited access due to winter weather conditions. The Reef hauling ground, which was not included as a hunting area under this alternative, would be a hunting area of interest for community members without vehicle access.

Response to Comment 28: NMFS agrees with the commenter. NMFS included a number of aspects for the harvesting and hunting seasons in the alternatives in order to analyze a reasonable range of alternatives under NEPA.

Comment 29: Alternative 4 clearly would not address the subsistence needs of the community. For example, from 1985 to 2016 the average number of fur seals harvested per year was 912, yet this alternative would limit the harvest of juvenile males to 500 per year.

Response to Comment 29: NMFS agrees with the commenter, though the average number harvested from 1985 to 2016 was 924 fur seals per year according to NMFS data. NMFS included a number of aspects for the harvesting and hunting seasons in the alternatives in order to analyze a reasonable range of alternatives under NEPA.

Comment 30: Although Alternative 5 includes a greater mix of actions under the co-management framework, similar to Alternatives 3 and 4, it does not allow for flexibility in harvest time frames or structure, and increases federal oversight and management to an unacceptable level.

Response to Comment 30: NMFS agrees with the commenter, but would clarify that under Alternative 5 the federal oversight and management would increase relative to Alternative 2. NMFS included a number of aspects for the harvesting and hunting seasons in the alternatives in order to analyze a reasonable range of alternatives under NEPA.

Comment 31: The fur seal harvest has great historic and cultural significance for the Aleut Community of St. Paul Island. The Alaska Native residents of St. Paul rely on a traditional subsistence lifestyle, and fur seals are an important traditional source of nutrition. Current management described under Alternative 1 and other alternatives in the DSEIS that reflect the same emphasis on federal regulation are inconsistent with the co-management framework, needlessly increase federal oversight and enforcement, and undermine the unique, historic interdependent relationship between the Aleut residents of St. Paul Island and the northern fur seal. The fur seal harvest is currently limited to a short period of time during the summer that also overlaps with the local halibut fishing season that many community members rely on for their livelihood. Consequently, many community members must choose between earning income from fishing or obtaining fur seal meat. The regulations need to be changed to provide increased opportunities for community members to obtain fresh fur seal meat, and to also reflect customary traditional practices, including hunting of fur seals for subsistence during spring and winter, and harvest of fur seal pups during fall. Moreover, it is critical that fur seal regulations provide the flexibility needed for the community to continue to obtain traditional foods as other subsistence resources decline in availability and become increasingly unpredictable with the changing climate.

Response to Comment 31: NMFS agrees with the commenter. NMFS included a number of aspects for the harvesting and hunting seasons in the alternatives in order to analyze a reasonable range of alternatives under NEPA.

Comment 32: A commenter expressed the view that the range of alternatives presented in the DSEIS is adequate. In contrast, another commenter suggested that the alternatives considered are inappropriately risk prone relative to the goal of slowing or halting the ongoing population decline, and argued that an alternative should also be included that incorporates many of the provisions of Alternative 1 (e.g., regulatory season and dates), but caps the harvest quota at a level that is at or near the maximum harvest level over the past 5 or 10 years.

Response to Comment 32: NMFS included a number of aspects for the harvesting and hunting seasons described by the commenter(s) in the alternatives in order to analyze a reasonable range of alternatives under NEPA. Capping subsistence use at or near the maximum harvest level in recent years would fail to meet the Pribilovians' subsistence needs and would fail to provide necessary flexibility to ensure their food security, as discussed Section 4.4.1 of the DSEIS and FSEIS. In addition, past harvest level is not representative of actual subsistence needs on St. Paul Island because both ACSPI and representatives from the community have long indicated in past public comments that the current subsistence harvest regulations prevent them from meeting their subsistence needs.

Comment 33: One of the four main goals of the Conservation Plan for this MMPA-depleted species is to "identify and eliminate or mitigate the cause or causes of human-related mortality." With the exception of the status quo alternative, all of the proposed alternatives in the DSEIS would seek to increase human-related mortality in the face of documented declines in the stock. This would seem in direct contravention of the species' conservation plan. Given the declines in fur seal abundance and pup production, and the potential effects of other factors (e.g., climate change), no changes should be made that would decrease the level of federal involvement in management of the stock or that would increase the level of harvest. Such changes would also seem in direct contravention of the species' conservation plan.

Response to Comment 33: The level of subsistence use that would be authorized under the preliminary preferred alternative is consistent with the level NMFS has authorized every year for over 25 years, and is consistent with the conservation plan because even a harvest at this maximum permissible level would be sustainable. Shifting certain aspects of fur seal subsistence use management to the Co-management Council, within the framework and overall harvest limits codified in regulation, would not adversely affect conservation of northern fur seals.

Comment 34: As with the management of subsistence whaling under the auspices of the International Whaling Commission, harvest levels should reflect two components—whether the population can sustain a particular harvest level and the subsistence needs of the users. The DSEIS is not very informative on this second prong. The DSEIS provides some information on subsistence use of fur seals and other food sources on St. Paul Island, but fails to address the discrepancy between the identified subsistence needs of the users and recent harvest patterns. Given that each alternative other than the no-action alternative would set a harvest limit by regulation that is at the upper end of the currently established range or higher and would eliminate the requirement for that limit to be reviewed periodically, a more rigorous analysis is needed. NMFS should include information in the FSEIS that addresses why NMFS believes that subsistence needs are more than five times higher than the average number of seals harvested per year on St. Paul over the past 15 years; how the envisioned switch from harvesting sub-adult males to mostly pups is expected to change the yield of meat per seal; whether St. Paul residents have been foregoing the opportunity to stockpile meat during the current harvest season for use later in the year and, if so, why this might be the case; and how any shortfalls in the availability of seal meat may have been offset by greater reliance on other subsistence species (i.e., are data available that show corresponding trends in these other harvests?).

Response to Comment 34: NMFS is not aware of any additional subsistence or socio-economic data to specifically respond to questions regarding shortfalls in seal meat and how those are reconciled within the community. As described in the DSEIS and FSEIS, the most likely reason for the large discrepancy between the identified subsistence need and actual use is the overlap in timing of available wage earning jobs and the current 47-day subsistence harvest season. Subsistence users of fur seals who are also commercial and subsistence fishers on St. Paul are typically at sea during this period and do not have time to participate in fur seals harvests, thus curtailing their subsistence opportunities. Second, also as described in the DSEIS and FSEIS, a portion of that subsistence need includes pups, which are not authorized to be taken for subsistence use under the existing regulations. As noted in the DSEIS and FSEIS the community does not view other meat as an alternative, and they simply go without. From a cultural and nutritional perspective, seal meat is not replaceable. Stockpiling by freezing is not possible for everyone due to the significant energy costs on St. Paul Island. As described in the DSEIS and FSEIS, ACSPI and TDX representatives have repeatedly indicated in public comments regarding the subsistence regulations since 1985 that they need a longer season to meet their subsistence needs and their subsistence needs are not being met by the current regulations. NMFS has no socio-economic data to refute ACSPI or TDX representatives position that if allowed a longer subsistence season(s) and more flexibility in the

seals that they can meet their subsistence need and it is closer to 2,000 juvenile seals than current levels suggest.

Comment 35: The proposal to allow juvenile male seals (those up to 7 years old, excluding pups) to be harvested in addition to pups and sub-adult seals (those less than 124.5 cm – i.e., those between 2-5 years of age) is not adequately explained or analyzed in the DSEIS. While these larger seals may be the only seals available during the proposed January to May hunts, there is nothing in the DSEIS that indicates they are a preferred food source or that subsistence needs during the period from June through December cannot be met by harvesting sub-adults and pups.

Response to Comment 35: See response to comment 13 regarding the analysis presented in the DSEIS and FSEIS about the mortality of 6 year old males. See response to comment 32 regarding pups replacing the need for juvenile seals or other species. ACSPI has petitioned NMFS to change the regulation to allow hunting of seals in the winter and spring. The available evidence provided in the DSEIS and FSEIS indicates most seals near the Pribilof Islands are likely to be older than 4 and greater than 124.5 cm. The DSEIS and FSEIS also indicate that the hunt would support food security for the community. Seals harvested and salted or frozen in the summer or autumn are not a replacement for fresh meat in the winter and spring.

Comment 36: The proposed initial harvest limit under Alternative 5 (4,900 seals) deviates so much from recent harvest use patterns and assessments of estimated subsistence needs that NMFS should include a caveat indicating that this component of the alternative is included for illustrative purposes only and to ensure that a sufficiently broad range of alternatives is considered to satisfy requirements under the National Environmental Policy Act.

Response to Comment 36: NMFS included a number of aspects for the harvesting and hunting seasons in the alternatives, including Alternative 5, in order to analyze a reasonable range of alternatives under NEPA. Alternative 5 continues to set subsistence need by regulation, but under a new adaptive process for demonstrating subsistence need based on PBR from the most recent 3 years and then adjusted based on actual use in the next three-year period in order to estimate the lower and upper limit of the subsistence need. Alternative 5 also includes a mix of actions managed under federal regulations (such as apportioning the harvest of male fur seals by season and age) and actions managed under co-management in one alternative.

Comment 37: Throughout their range, northern fur seals depend on fish species that are targeted by commercial fisheries. Several fur seal prey stocks have declined, and managers have not always acted quickly to reduce fishing mortality for such stocks. In its December 2017 meeting minutes, the North Pacific Fishery Management Council's Scientific and Statistical Committee noted the ongoing declines of northern fur seals and called for a comprehensive look at the potential impacts from commercial fisheries. We encourage you to begin this process. There is an opportunity to take steps to recover not only northern fur seals, but also the population of Steller sea lions in the Pribilof Islands.

Response to Comment 37: This comment is not pertinent to the DSEIS or FSEIS or analysis, but NMFS agrees that potential interactions between commercial fisheries and marine mammals warrant further study. NMFS also notes that NMFS has statutory authority under the FSA and MMPA for the conservation, management, and protection of northern fur seals, and NMFS exercises with the Aleut Community of St. Paul Island co-management authority under the MMPA for the conservation and co-management of subsistence use of northern fur seals.

Comment 38: The DSEIS should be updated to rely on information obtained from the most recent draft and final stock assessment reports throughout the document. Also, the draft stock assessment report for 2016 (Muto et al. 2016) reported the PBR for the Eastern stock of northern fur seals as 11,405 animals, rather than 11,802 animals, as was stated in the DSEIS. In addition, the information on pup survival considered in the DSEIS appears outdated and should be updated to include more recent information on fur seal pups that have been tagged on St. Paul since 2008.

Response to Comment 38: NMFS updated the FSEIS with the current stock assessment information available in the 2018 stock assessment reports. While the commenter is correct that the draft 2016 stock assessment report estimated a PBR of 11,405, NMFS chose to use in the DSEIS the final 2015 stock assessment report (Muto et al. 2016), which reported PBR as 11,802, because the 2016 stock assessment report was not finalized until after publication of the DSEIS in January 2017. The best available information was used in the FSEIS, which includes the PBR reported in the 2018 stock assessment report (Muto et al. 2019), and NMFS has included those revisions in Chapters 3 and 4 of the FSEIS. NMFS is currently analyzing recent pup and adult survival data from St. Paul and St. George. The tags applied to fur seals in 2008 and 2009 experienced unacceptably high rates of loss, and no data are available to estimate survival. NMFS began to use new tags in 2010. Preliminary survival estimates from tags used since 2010 suggest that biases exist that need correction before survival estimates can be updated (Testa 2016). NMFS will not be able to utilize the pup and juvenile survival estimates until the biases can be corrected.

Comment 39: A commenter inquired how thorough current enforcement of the existing regulations is.

Response to Comment 39: NOAA Office of Law Enforcement (OLE) has successfully prosecuted four cases of illegal taking related to subsistence use since 2004. Numerous other cases not connected to subsistence use have been successfully prosecuted by NOAA OLE (e.g., fur seal harassment and entering closed areas around rookeries). NOAA OLE has conducted patrols on St. Paul Island but does not comment on active cases.

Comment 40: NMFS's conclusions in the DSEIS regarding the effects of the subsistence harvest on fur seals and the importance of 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 2007), 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 during modification of the federal regulations for St. George (NMFS 2014).

Response to Comment 40: NMFS agrees.

Comment 41: Some commenters generally expressed support for continued sustainable harvest opportunities for the community and maximizing opportunities for community engagement and involvement in fur seal management decisions.

Response to Comment 41: NMFS notes and appreciates the comment.

10. APPENDIX C - DSEIS COMMENTS

MARINE MAMMAL COMMISSION

27 February 2017

James W. Balsiger, Ph.D.
Regional Administrator
National Marine Fisheries Service, Alaska Region
P.O. Box 21668
Juneau, AK 99802-1668

Dear Dr. Balsiger:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the National Marine Fisheries Service's Draft Supplemental Environmental Impact Statement (SEIS) that considers possible changes to regulations governing the subsistence harvest of northern fur seals on St. Paul Island, Alaska. The Commission has commented previously on such revisions, first in a 24 August 2012 letter on the changes being sought by the Pribilof Island Community of St. Paul Island and the Aleut Community of St. Paul Island-Tribal Government and then in a 27 August 2015 letter on the scope of this SEIS. The comments and recommendations in those letters should be considered in conjunction with the comments and recommendations provided in this letter.

Need for regulations

As noted in section 2.1.1 of the SEIS, there is a need for some type of regulatory authorization to allow the taking of fur seals for subsistence on the Pribilof Islands under the Fur Seal Act (FSA). This is reflected in the alternatives being considered, all of which have some regulatory component. However, some of the alternatives being considered, to varying degrees, eschew regulations in favor of "Co-Management Conservation Control." Both of these approaches to managing the fur seal subsistence harvest have advantages and disadvantages. For example, regulations provide greater assurance that particular provisions will be retained and that the public will be notified and have an opportunity to comment on proposed management measures and any subsequent revisions. On the downside, revising regulations can be a cumbersome process. As noted in the SEIS, a co-management approach provides greater flexibility to adapt to changing circumstances and make seasonal adjustments, but provides little assurance to anyone other than the parties to such agreements that important provisions are adopted or retained. Based on the description in the SEIS, it is not clear that the process for negotiating co-management agreements will be transparent or that the contents of those agreements will be made public. This should be clarified in the final SEIS.

While the Commission supports cooperative efforts under section 119 of the MMPA for NMFS and Alaska Native organizations to develop agreements to conserve marine mammals and provide for co-management of subsistence use, we think that some aspects of harvest or hunting[1]

[1] Throughout this letter we follow the distinction between harvesting and hunting noted in the definition of those terms provided in Appendix A of the SEIS. That is, "harvesting" refers to the organized herding and driving of groups of seals

management need to be captured in regulations. This would ensure that measures necessary for conservation are developed with full public participation and have the force of law. To some extent, this is captured in the alternatives included in the SEIS, which all include regulatory provisions that limit the overall annual taking and delineate harvesting and hunting seasons. The Commission believes that setting a limit on the allowable annual mortality of female fur seals is also import and recommends that it such a limit be included in the regulations. Similarly, the Commission believes it would be good practice in every instance for those engaged in harvesting pups to establish affirmatively that a seal is a male before being allowed to kill it. As such, there is no need to have the co-management council exercise discretion as to whether this should be required. The Commission therefore recommends that, as with the pup harvest on St George Island (see 50 C.F.R. § 216.72(d)(8)), harvesting methods, including verification in advance that harvested pups are males, be included in the regulations, subject to a similar provision that deviations from those practices are permissible if NMFS, in consultation with the individuals conducting such harvest, determine that alternative methods will not result in undue stress to seals, increased disturbance of resting seals, or greater risk of accidentally harvesting female seals.

The Commission further recommends that regulations be used to establish limits on how the discretion of the co-management council can be exercised. For example, under alternative 2, the frequency with which rookeries and haulouts could be visited by harvesters/hunters would be left entirely to the discretion of the co-management council, based on community need and environmental conditions. That discretion could be exercised to provide either more restrictive or more lenient management than would be the case under the regulatory approaches reflected under the other alternatives. As noted in the discussion at 4.2.1.1, NMFS is not contemplating unlimited harvests under any of the alternatives and, it is "practically…not possible [using volunteer harvesters]…that harvests could occur more frequently than once or twice a week…." This being the case, setting some regulatory limit on the number of times a haulout could be subject to harvest each week (e.g., once or twice) does not seem like an overly burdensome requirement and would give added assurance that, as NMFS anticipates, unlimited harvests are not authorized. In this same vein, if NMFS decides to take the minimalist approach to regulating subsistence taking, as reflected under alternative 2, it should set forth in regulations the goals that the co-management program should be pursuing. Those goals should include minimizing: (1) the removal of females, (2) impacts on seals within specific areas (e.g., rookeries and haulouts) by spreading out harvests across those areas, (3) disturbance and harm to non-harvested seals, and (4) the number of intrusions into rookeries for harvests.

Interplay between the FSA and the Marine Mammal Protection Act (MMPA)

The discussion of management under the FSA and the MMPA in the SEIS (section 3.9.4.1) concludes with the statement that "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." The Commission disagrees with this assessment. There is nothing in section 119 or its legislative history that suggests any intention that this generally applicable provision should override the more specific requirements of the FSA, which, as noted above, include provisions for regulating the subsistence

---

from hauling grounds to inland areas where the seals are stunned and exsanguinated. "Hunting" refers to the taking of seals using firearms.

harvest of fur seals on the Pribilof Islands. Moreover, as demonstrated by the inadequacy of section 119 to provide authority for stemming the overharvest of Cook Inlet beluga whales (to the point where the stock warranted listing as endangered under the Endangered Species Act), section 119 lacks the teeth necessary to establish enforceable harvest limits. In response to the demonstrated inadequacy of section 119 agreements for harvest management, Alaska Native representatives and staff from NMFS, the Fish and Wildlife Service, and the Commission developed what was referred to as "section 119A," proposed legislation that would have provided co-managers authority to regulate subsistence harvest jointly without having to make a depletion finding or adopt regulations under section 101(b) of the MMPA. However, Congress declined to enact that proposal. Given this history, it is difficult to discern any intent on the part of Congress that co-management under section 119 of the MMPA should be viewed as the sole authority for governing subsistence takes, particularly for northern fur seals.

Reliance on PBR to evaluate impacts

Crucial parts of the analyses in section 4 of the SEIS assess the impacts of various types of removals relative to the fur seal stock's potential biological removal (PBR) level. NMFS has compared the anticipated removals with the applicable PBR, which for the St. Paul Island component of the stock is given as 10,386. Removing less than 10 percent of PBR is considered to have a negligible impact and up to 30 percent a minor impact. Between 30 and 50 percent would be considered as having a moderate impact, and over 50 percent a major impact. Thus, under all of the proposed alternatives that would cap removals at 2,000 seals, the impacts are viewed as being negligible or minor.

In this case, NMFS seems to be focusing on the details of the PBR analysis, rather than the principle underlying the concept. The discussion in the SEIS accurately portrays how PBR has been calculated in the applicable stock assessment report, apportions that number to St. Paul, and applies the significance thresholds it has applied in other contexts. However, it ignores the basic premise underlying the PBR concept. As explained in section 4.2.1 of the SEIS, PBR is defined under the MMPA 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." In this case, the fur seal stock was designated as depleted in 1988 because NMFS determined that the population was below its optimum sustainable level. As reflected in Figure 3.2.1 of the SEIS, the stock has been declining more or less continuously ever since. Although the Commission is not suggesting that taking fur seals for subsistence purposes has been the cause of the observed decline or even a major contributing factor, we believe that relying solely on a PBR analysis to assess the significance of removals is misguided given that the principle behind the PBR concept—that a population will increase and eventually achieve its optimum sustainable population level if removals are kept below PBR— is not being met in this instance. Even at the fairly low levels of removals of seals for subsistence on St. Paul over the past decade (about 350 per year between 2005 and 2016), the population has been declining by more than 4 percent per year since the late 1990s. Given this situation, it is not clear that strict reliance on the PBR approach for assessing the impacts of various removal levels is consistent with the underlying principle of that approach or with the mandate of section 2 of the MMPA to replenish depleted populations to their optimum sustainable population levels. Rather, an approach that assesses the impact of losses to the population from subsistence harvests/hunts *in addition to the population decline that already is occurring and that may continue to occur* is more appropriate given the status and trend of the population.

Takes of female seals

In its previous comments on the regulatory changes sought by St. Paul, the Commission has stressed the need to avoid, or at least minimize, killing female seals. Fur seals on St. Paul are from a depleted stock that is undergoing a prolonged and pronounced decline that is attributed largely to declining pup production. Cleary, recruiting breeding females to the population is crucial to the stock's recovery. Stopping and reversing the decline is important not only for the conservation of fur seals, but for the perpetuation of the subsistence cultures that rely on them.

The alternatives presented in the SEIS all include provisions that seek to avoid taking, and that set some limit on taking, female seals. The preferred alternative would cap accidental mortality of female seals at 20 per year and alternative 5 would set that limit at 200, the highest level considered. The SEIS cites a paper by Towell and Williams for its conclusion in section 4.3.6.3 that taking as many as 20 female seals a year would result in less than a one percent reduction in production or female population size and that taking at this level would have undetectable impacts on the population. The SEIS notes elsewhere (section 4.3.3.1) that accidental female mortality of up to 200 seals would result in less than a two percent loss of females to the population and likewise would be undetectable.

The Literature Cited section of the SEIS (section 7) omits any reference to publications by Towell and Williams, although two different citations are included in the text (Towell and Williams (2016) and Towel and Williams (NMFS unpublished). It is unclear whether these are two different publications or inconsistent citations for the same publication. This should be clarified and the relevant paper(s) made available to those reviewing and commenting on the SEIS and on the appropriate agency website.

The Commission is concerned that the SEIS relies on the conclusions of Towell and Williams regarding the effects of removing female seals without any discussion of the analyses behind those conclusions. This lack of explanation is exacerbated by the confusion over what study or studies the agency is relying on and by the associated difficulty that reviewers might have finding the source material. The potential effect of taking female seals is an important issue identified in the Commission's scoping comments and warrants more than summary conclusions. The Commission therefore recommends that NMFS, in the final SEIS and any proposed rule, provide a sufficient rationale for conclusions regarding the effect of taking of females on the fur seal population, as well as the necessary context for evaluating such conclusions. In this regard, NMFS should summarize the analyses of Towell and Williams, the assumptions underlying those analyses, and any caveats noted by the authors, and relate those analyses directly to the alternatives being evaluated by the agency.

Even if the taking of 20 female seals, as proposed in the preferred alternative, would have only a small impact on the population, efforts should be made to minimize any such taking to the maximum extent practicable while allowing sufficient subsistence opportunities to Alaska Natives on St. Paul. The Commission agrees with NMFS that, because of the distribution of fur seals in the winter and spring months, there is a low risk that female seals will be taken in the proposed January-May hunting season. However, authorized hunting in these months is unprecedented and there is limited information regarding the numbers, age classes, distribution and sex of seals using the island

and nearshore waters during January through May. Thus, the Commission recommends that NMFS and its co-management partner, as part of this alternative, commit to continue monitoring migratory patterns of fur seals, collect information on fur seals present on an around St. Paul Island during this period and adjust the winter-spring hunt accordingly. The proposed hunting methods are not particularly selective and, if female seals are more prevalent than believed or begin to show up in greater numbers during these months (e.g., in response to environmental changes), the winter-spring hunt will need to be re-assessed.

As noted in the SEIS, closing the season for harvesting sub-adult males on August 8 has been fairly effective in minimizing the accidental taking of female seals. In the two instances when the harvest was extended beyond that date, unacceptably high numbers of female seals were taken, causing the harvest to be terminated for the remainder of the year. This prompted NMFS, in 1992, to amend the harvest regulations to eliminate the extension provision altogether. Despite this history, and the demonstrated difficulty of even experienced sealers to be able to differentiate between sub-adult males and females once they begin to comingle, the preferred alternative would allow sub-adult seals to be harvested any time between June 23 and December 31. We are also struck by the numbers of female seals taken on the days when the harvest was extended beyond August 8. On a single harvest-day in September 1986, 16 of the seals taken (out of a total of 71, we believe) were females. This shows not only that there is a significant risk of taking sub-adult female seals during the proposed harvest season, but that the cap on the taking of females, which would foreclose harvest opportunities for the remainder of the year, could be reached quickly, even in a single day. Given the demonstrated risk of taking females after August 8, the likelihood that less experienced sealers (who would be participating in the harvest under the preferred alternative) would be less able to differentiate between male and female seals, and the implications for shutting down further harvests that year, the Commission recommends that allowing sub-adult fur seals to be harvested after this date be viewed as a "last resort" alternative that should be pursued only if subsistence needs cannot be met in any other way. In this regard, the seasonal approaches reflected under alternatives 3 and 4 that provide separate seasons for taking sub-adult seals and pups (including some combination of the two) are preferable to alternative 2.

Unlike sub-adult fur seals, pups are more easily handled and can be sexed before they are harvested. As demonstrated by three years of experience harvesting pups on St. George, the risk of accidentally killing female pups can be eliminated or reduced to a very low level by having two people confirm that a seal is a male before it is killed and releasing all female seals and those that cannot be affirmatively identified as male. As noted above, the Commission recommends that practices similar to those adopted for the harvest of pups on St. George be included as part of any regulations authorizing the harvest of pups on St. Paul.

Taking males up to seven years of age

The proposal to allow juvenile male seals (those up to 7 years old, excluding pups) to be harvested in addition to pups and sub-adult seals (those less than 124.5 cm – i.e., those between 2-5 years of age) is not adequately explained or analyzed in the SEIS. The Commission can understand why these larger seals might be targeted during the proposed January to May hunts—they may be the only seals available. However, there is nothing in the SEIS that indicates they are a preferred food source or that subsistence needs during the period from June through December cannot be met by harvesting sub-adults and pups. There may be a good reason for the proposed change but, if

so, it does not appear to be described anywhere in the SEIS. Likewise, there is no analysis of how expanding the age classes and sizes of seals that may be harvested would affect harvesting methods, disturbance to rookeries and haul outs, the humaneness of the hunt, or the risk of accidentally taking females, or have other possible effects. As noted in section 4.2.1 of the SEIS, "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." As such, the SEIS should provide some rationale for the proposal to allow harvest of these older age classes, whose removal is likely to have more significant impacts on the population. The Commission therefore recommends that, before proceeding with a proposal to expand the age classes of seals that may be harvested between June and December, NMFS provide a detailed analysis of the reasons for and the potential consequences of such a change.

January-May hunting season and use of firearms

There currently seems to be a low risk of taking female seals during the proposed hunting season. Also, because seals occur only sporadically at St. Paul Island during this period and in fairly low numbers, there does not seem to be a big concern about the disturbance of seals from the use of firearms early in the proposed hunting season. However, as the season progresses, male seals begin to arrive on St. Paul Island with greater frequency and start to occupy established breeding sites, thus disturbance from the use of firearms would become a greater concern later in the proposed hunting season. The Commission's primary concern relates to the potential for struck and lost seals. Based upon data from Steller sea lion hunts, NMFS speculates that struck and lost rates from the proposed hunt of fur seals could range from 9 to 50 percent, or perhaps even higher, because, as noted in section 4.2.5 of the SEIS, these events may be under-reported. In any event, the loss rate during the proposed hunt is likely to be much higher than for the proposed harvests.

One of the elements of "wasteful take" identified in the 1986 fur seal harvest regulations is employing harvest methods that are not likely to ensure successful killing and retrieval of each selected fur seal. In comparison to the existing and proposed harvest methods, the proposed hunt is much more likely to result in killing seals that are not retrieved. On the other hand, the hunt appears to be the preferred method of securing fresh seal meat during this time of the year. However, this is an issue where additional limitations could further reduce the likelihood that seals will be struck and lost. Although the SEIS notes that shooting marine mammals from vessels on the water, even in calm seas, can be unsteady, and that most if not all hunting would be done from land, alternative 2 would allow the hunting of fur seals from vessels. Similarly, NMFS and its co-management partners should assess whether retrieval rates for seals shot when in the water are significantly different than those for seals shot when hauled out and adjust hunting practices accordingly.

As noted in the SEIS, there is no direct experience of hunting fur seals with firearms on the Pribilof Islands from which to assess struck and lost rates or design measures aimed at reducing those rates. As such, it is particularly important that these hunts, if authorized, be monitored closely by NMFS, in collaboration with its co-management partners, at least at the outset, to collect information necessary to understand and reduce struck and lost incidents, including details concerning the conditions under which they occurred and the ages and distribution of animals available to hunters.

Rookeries

As discussed elsewhere, harvests should be rotated among areas to avoid overharvesting any of the rookeries and the number of entries to rookeries by harvesting groups should be controlled to minimize disturbance. As we interpret Table 4.2.1, NMFS anticipates that under the preferred alternative there would be 137 harvest events during the proposed harvest season. The accompanying analysis indicates that 2 pups and 1.15 non-pups would be disturbed for each pup harvested and that 60 additional pups and 50 additional older animals would be disturbed for each harvest event. The Commission believes that these estimates of disturbance are low and that actual numbers could be considerably higher if round-ups are conducted at rookery areas where a large number of mothers and pups are adjacent to the harvest area and can see or smell the harvesters. In addition, experience from research activities conducted on St. Paul over the years indicates that, over time, repeated entries into rookeries make seals more wary and responsive to the mere scents and sight of humans. Thus, it seems that as the season progresses, more seals could be disturbed than predicted. The Commission is also concerned that, if the projected number of harvest events were to occur, there would be an unprecedented level of activity and disturbance of seals in those rookeries. Efforts should be taken to lower the allowed number of harvest events by consolidating harvest activities to the extent possible. Because the number of entries to the rookeries and the potential for cumulative effects from disturbance could be at historically high levels, the Commission recommends that NMFS provide further discussion of its plans for monitoring the impacts from the proposed harvest scheme if the preferred alternative is adopted.

More detailed discussion of the assumed number of harvest events and how these relate to the predicted disturbance levels is also needed. Among other things, NMFS should explain what constitutes a harvest event and how it arrived at the estimates of disturbance associated with each event and with each harvested seal. It also is not clear how the "family-style" organization of the harvest factors into those estimates. More detail is needed as to how family-style harvests would be conducted—e.g., how many people/families are involved, would families act independently or coordinate their efforts, would different groups enter a rookery on the same day and, if so, would those be counted as single or multiple harvest events?

Subsistence needs

As with the management of subsistence whaling under the auspices of the International Whaling Commission, harvest levels should reflect two components—whether the population can sustain a particular harvest level and the subsistence needs of the users. The SEIS is not very informative on this second prong. The SEIS provides some information on subsistence use of fur seals and other food sources on St. Paul Island, but fails to address the basic question posed by the Commission in its scoping comments, which was prompted primarily by the discrepancy between the identified need and recent harvest patterns. We appreciate that residents of St. Paul rely on a variety of subsistence resources and store-bought foods and that the mix among those sources varies seasonally and from year to year, perhaps increasingly so under changing environmental and economic conditions. We also appreciate that some cushion is needed to ensure that subsistence users are not constantly up against the harvest limit. Further, the change from a harvest of exclusively sub-adult males to one focused also on pups likely means that more seals will have to be taken to satisfy the same subsistence needs. Given that each alternative other than the no-action alternative would set a harvest limit by regulation that is at the upper end of the currently established

range or higher and would eliminate the requirement for that limit to be reviewed periodically, a more rigorous analysis is needed. The Commission recommends that NMFS provide a more rigorous analysis of subsistence needs, to include, at a minimum—

- why NMFS believes that subsistence needs are more than five times higher than the average number of seals harvested per year on St. Paul over the past 15 years,
- how the envisioned switch from harvesting sub-adult males to mostly pups is expected to change the yield of meat per seal,
- whether St. Paul residents have been foregoing the opportunity to stockpile meat during the current harvest season for use later in the year and, if so, why this might be the case, and
- how any shortfalls in the availability of seal meat may have been offset by greater reliance on other subsistence species (i.e., are data available that show corresponding trends in these other harvests?).

Also, the proposed initial harvest limit under alternative 5 (4,900 seals) deviates so much from recent harvest use patterns and assessments of estimated subsistence needs that NMFS should note that this component of the alternative is included for illustrative purposes only and to ensure that a sufficiently broad range of alternatives is considered to satisfy requirements under the National Environmental Policy Act.

On a related point, the SEIS does not provide information about recent fur seal harvests on St. Paul in a user-friendly format. That information is included in Figure 4.3-1 but at a scale that makes it difficult to discern harvest patterns and trends since the inception of the subsistence harvest in the 1980s. Harvest data, including the numbers of female seals accidentally taken, should be presented in tabular form along the lines of those provided for pup harvests in the 1800s (Table 3.9-3) or subsistence takes of Steller sea lions (Table 4.2-3).

The Commission hopes that these comments and recommendations are helpful to NMFS as it evaluates the alternatives considered in the SEIS and whether to propose changes to the current subsistence harvest regulations. Please contact me if you would like to discuss or have any questions concerning the points raised in this letter.

Sincerely,

Rebecca J. Lent, Ph.D.
Executive Director

Aquilina D. Lestenkof
P.O. Box 107
St. Paul Island, Alaska 99660

February 26, 2017

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
P.O. Box 21668
Juneau, Alaska 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

I respectfully submit comment and request the National Marine Fisheries Service (NMFS) select Alternative 2 along with the modification proposed by the Aleut Community of St. Paul Island (ACSPI) concerning the regulation of accidental take of females as the final Preferred Alternative. Keeping the authority for accidental mortality of up to 20 females per year in the Co-Management Agreement, a firm and effective tool between the governments of the ACSPI and the United States, would allow for much needed real-time and more immediate examination of northern fur seals.

Let the Federal Government remember that the existing regulations for the subsistence take of northern fur seals still and too closely stem from principles that governed the commercial harvest of the 1900s. The regulations were not initiated by, nor took into account, subsistence principals of the Unangan (*or, also* Aleuts). Further, let the Federal Government recognize the merits in the existing regulations initiated by the Pribilof Islands' ancestral Unangan and that the merits were free and willingly provided to the federal rule makers to write regulations to govern the commercial take of the northern fur seals of the Pribilof Islands; a living creature the Unangan knew they had to protect. This openhandedness resulted in a sustainable commercial harvest. The regulations I speak of concern 1) preventing the killing of the females and 2) respecting the place-in this case the rookeries-where the fur seal mothers and their young live while on land. These two regulatory virtues stem from longstanding ecological relations between Unangan and other life within the ecosystem in which they lived and which the subsistence practices of Unangan advanced within for thousands of years. Modifying Alternative 2 with the ACSPI's proposed option for the regulation of accidental take of females stands by Unangan customary subsistence practices and ecological intuition. In addition, *keeping authority for accidental female mortality of up to 20 females per year under the Co-Management Agreement between the Aleut Community of St. Paul Island and the United States* honors and supports the fundamental rights of the Unangan, specifically those of St. Paul Island, to rightfully practice their responsibility and apply their instinctual understanding for a living creature that is their sustenance, the northern fur seals in this case. Keeping the authority in the Co-Management Agreement further allows for a more immediate state for representatives of the ACSPI and the U.S. to manage within and together. We, Unangan still live with the northern fur seals on the Pribilof Islands. We have useful knowledge to offer.

The allowable timeframe to harvest northern fur seals does not support the subsistence and cultural needs of the Unangan of St. Paul Island. The meager 47-day harvest timeframe was established because it was the timeframe in which the fur of the bachelor seals was best and could be taken with ease. The summer harvest timeframe was yet another regulation created specifically for the commercial harvest. The 47-day summer harvest serves a minimum purpose and is still useful and should be kept in place but should be extended, as requested in Alternative B, to December 31.

A harvest timeframe extension through December 31 still would not meet the winter subsistence needs of the community both quality- and quantity-wise. Quality-wise, hunting supports non-wasteful practices and produces a fresh food product in the winter months; a much needed commodity. An intrinsic quality, hunting fosters an integral connectedness across generational relationships in the community-between fathers, brothers, and sons; as well as grandparents, sisters and daughters, for some reason, in a way that the harvest does not. Such connectedness cultivates a commitment, a deep appreciation and purpose to protect that, which is the food of the community. Sadly, federal regulation took this fundamental right away from the Unangan of St. Paul Island. As an at least 5th generation of Unangan of the Pribilof Islands, who understands the union between conservation and subsistence, I invite the NMFS to also understand the importance of hunting, and stand by and with the ACSPI by supporting the request to hunt northern fur seal as stated in Alternative 2. Keeping such an integral custom of a people '*illegal*' has been going on for far too long.

Please accept these my comments along with my request that the NMFS select Alternative 2 along with the modification proposed by the ACSPI concerning the regulation of accidental take of females as the final Preferred Alternative.

Sincerely,

Aquilina D. Lestenkof (Unangax̂)

February 10, 2017

Dr. James Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
National Oceanic and Atmospheric Administration
P.O. Box 21668
Juneau, Alaska 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger,

The Tanadgusix Corporation, the Alaska Native Village Corporation for St. Paul Island, strongly supports the Draft Supplemental Environmental Impact Statement ("DSEIS") Preferred/Petitioned Alternative 2, Option A.

This DSEIS arose from a petition filed by the Aleut Community of St. Paul Island Tribal Government (the "Tribe") in which the Tribe asked that the National Marine Fisheries Service ("NMFS") change the subsistence use management of the Eastern Pacific stock of northern fur seals on St. Paul Island. Currently, the harvests on St. Paul and St. George are managed independently. The taking of seals for subsistence purposes is restricted to a season from June 23 to August 8 each year, limited to experienced sealers using harvesting methods that are a remnant of days when the federal government controlled the harvesting process.

In the Petition, the Tribe recommended that the 2,000 male fur seal annual upper limit be maintained, but that certain other changes be made including that: 1) 20 female fur seals incidental to the hunt be allowed to be taken to meet subsistence needs; 2) the fur seal length restriction be eliminated; 3) two subsistence use seasons be established, from January 1-May 31 (during which juvenile male fur seals could be taken by hunters using firearms) and June 23-December 31 (during which pups and juvenile male fur seals could be harvested for subsistence); and 4) the Tribe be allowed more flexibility to manage the harvest under the co-management system rather than through federal regulations.

In addressing the Tribe's petition, NMFS balances important goals: conserving the Northern Fur Seal and reasonably managing the subsistence use of fur seals on St. Paul. Achieving the right balance is critical, since the Northern Fur Seal stock has been listed as "depleted" under the Marine Mammal Protection Act for the last twenty years, and the stock has still diminished substantially. No group is better situated to take the lead on management, though, than the Aleut residents of St. Paul who have a need for long-term sustainable use of northern fur seals for purposes of food, cultural continuity, clothing, arts and crafts. The Tribe and Aleut people have been true stewards of the Northern Fur Seal, promoting the need for the

PO Box 88
St. Paul, Alaska 99660
907.546.2312
Fax 907.546.2366

tanadgusix.com

615 E 82nd Ave, Suite 200
Anchorage, Alaska 99518
907.278.2312
Fax 907.278.2316

U.S. government to perform more research to understand this ongoing decline, so that the fur seal stock can be protected and increased.

The Alaska Native residents of St. Paul rely on a traditional subsistence lifestyle, and the Northern Fur Seal is central to preserving their cultural heritage and historical subsistence practices. Traditionally, Pribilovians have hunted fur seals for subsistence in the spring and winter, and harvested fur seal pups in the fall season. The existing federal regulations unnaturally limit their harvest to an insufficient 47 day period from June 23-August 8. Complicating matters even further, the subsistence period overlaps with the local halibut fishing season that provides the only source of cash income to many community members. Families are forced to choose between producing income and obtaining fur seal meat as food. And, as their opportunities for sealing diminish, they lose the attendant cultural and family benefits – sharing of resources with Elders and community members, teaching harvesting and hunting skills to young people and others new to the practices, collecting seal parts for Native crafts and participating in cultural ceremonial events. As these ties wane, it becomes more and more difficult to foster important cultural traditions which instill values. The current management scheme fails to meet even the basic needs of the Pribilovians to conduct traditional sealing and sustain the many cultural benefits that derive from subsistence activities.

NMFS developed five alternatives for evaluation, a No Action Alternative (Alternative 1) and four other alternatives that vary primarily in the level of co-management they apply. For example, Alternative 1 continues management under the current regulations. Alternative 2 proposes that most aspects of the harvest be managed by the Co-Management Council while Alternatives 3, 4, and 5 propose that certain harvest restrictions and termination of the harvest be managed by the Co-Management Council. None of the alternatives achieves the proper balance of NFMS's goals, except for Alternative 2, Option A.

As the Tribe has shown, the current management approach is too rigid, and does not allow Pribilovians to maintain traditional subsistence practices. Current management, and the other alternatives that reflect the same federal strong hand, are inconsistent with the co-management framework and needlessly increase federal oversight and enforcement. They conflict with the Tribe's subsistence rights, and undermine the unique, historic interdependent relationship between the Aleut residents of St. Paul Island and the Northern Fur Seal.

Alternative 2, Option A, on the other hand, maintains the overall regulatory framework, but removes unnecessary regulations and creates subsistence use benefits. For example, NMFS recognizes that by removing the requirement that sealers be experienced, the government will allow for a more flexible, performance-based management system where improvements, innovation and creativity will be advanced through user participation, rather than be stymied by regulations.[1] Also, by allowing subsistence hunting with firearms, similar to the way stellar sea lions and other pinnipeds are hunted, the government will enable the community to enjoy fresh fur seal meat virtually year round. The Co-Management Council will assure proper hunting

[1] DSEIS, p. 4-26.

performance measures are in place. Overall, by authorizing the harvest at any breeding or resting area and by adding a hunting season in the first half of the year, the government will significantly increase opportunities for the fur seal harvest, while keeping essentially the same limits in place.

Further, Alternative 2 best addresses the impacts of climate change. As climate change continues to negatively impact marine ecosystems, it will be impossible to predict all the ramifications for the Northern Fur Seal population. Under Alternative 2, the community will have greater flexibility under changing future environmental conditions to meet its subsistence needs because subsistence opportunities will range across the St. Paul fur seal population. Obtaining seal meat for survival may become increasingly important as climate change causes other subsistence resources to decline in availability.

Importantly, under Alternative 2, NMFS will continue research to monitor the abundance, growth rates, vital rates and the overall status of the Northern Fur Seal population for conservation purposes.[2] However, the St. Paul residents, harvesters/hunters and the Co-Management Council will be able to address the effectiveness of the fur seal subsistence harvest and hunt in meeting subsistence needs more directly, consistent with conservation goals. The Tribe has had effective monitoring and reporting mechanisms in place for almost twenty years, as Tables 4.3-13 and Figure 4.3-3 in the DSEIS, show. The Council will be able to apply and enforce its own restrictions as well as continue to manage suspension and termination provisions, just as it has under the current regulatory scheme.

Under Alternative 2, Option A is preferable to Option B. Measures related to controlling accidental female mortality during the subsistence harvest will be put in place in a better manner, through co-management, rather than be codified in new regulations.

TDX very much appreciates that NMFS has found Alternative 2 to be the preliminary preferred alternative, and it asks NMFS to select Alternative 2 as the final preferred alternative as well.

Best Regards,

Ron G. Philemonoff, CEO
The Tanadgusix Corporation

[2] *Id*. p. 4-81.

PO Box 88
St. Paul, Alaska 99660
907.546.2312
Fax 907.546.2366

tanadgusix.com

615 E 82nd Ave, Suite 200
Anchorage, Alaska 99518
907.278.2312
Fax 907.278.2316

2050 Venia Minor Road
P.O. Box 86
St. Paul Island, Alaska 99660

Office of the President

February 20, 2017

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
PO Box 21668
Juneau, AK 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

The Aleut Community of St. Paul Island Tribal Government (ACSPI) has reviewed the five alternatives evaluated in the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska. The ACSPI respects the National Marine Fisheries Service's (NMFS) selection of Alternative 2 Option B as the preliminary preferred alternative and petitions NMFS to modify Alternative 2 in the Final SEIS and Record of Decision to retain the current regulatory provision under 50 CFR 216.72(e)(4) in which, "…the intentional taking of female fur seals is prohibited", and to keep authority for accidental female mortality of up to 20 females per year under the co-management agreement as a non-regulatory conservation control. The ACSPI requests that NMFS select Alternative 2 as modified above as the final Preferred Alternative. This modification achieves the ACSPI's petition for greater flexibility to meet our community's subsistence needs and improves conservation and management of the fur seal population on St. Paul Island.

As the primary customary traditional users of northern fur seal in the Bering Sea, the ACSPI is committed to long term sustainable use of these animals for cultural continuity, food, clothing, arts, and crafts. The rich Unangan (Aleut) tradition and ancestral interaction with fur seal provides a unique understanding and knowledge of these animals. The regulations need to be changed to reflect our customary traditional practices, way of life, and inherent right to harvest and hunt fur seal.

Alternatives Considered

Alternative 1 (No Action)

St. Paul Unangan have traditionally and historically engaged in subsistence hunting of fur seals in the spring and winter and subsistence harvesting of fur seal pups in the fall. The current federal regulations limit the harvest of this vital resource to a short 47- day period between June 23 and August 8. Subsistence harvest opportunities thus overlap with the local halibut fishing season that many community members rely on for their livelihood. As many families rely on both resources, they currently must choose between earning income from

•907-546-3200 (Main) •907-546-3254 (Fax) •

fishing or obtaining fur seal meat as food. The short summer harvest season has not fulfilled the subsistence needs of our community for far too long and has forced community members to sacrifice sealing. However, community members are not replacing fur seal with other subsistence resources; this resource cannot simply be replaced with store bought meat. Alternative 1 also stifles the cultural benefits that accompany the subsistence use of fur seals including the sharing of resources with Elders and other community members, teaching new and young harvesters/ hunters, collection of parts for Native crafts, and valued cultural ceremonial events. Alternative 1 will continue to impose the 'production line' style harvest during a short summer season that forces community members to compromise their access to other subsistence resources (e.g., halibut) and does not address the subsistence needs of our community during the rest of the year. As other subsistence resources decline in availability and become increasingly less predictable in this drastically changing climate, it is critical that fur seal regulation changes reflect the needs of the community to obtain traditional foods for survival.

Alternative 2 (Petitioned Action and Preliminary Preferred Alternative)

The ACSPI appreciates NMFS' choice of Alternative 2 as the preliminary preferred alternative due to the high likelihood of beneficial effects on the community and similar environmental consequences to all other alternatives. NMFS' conclusion regarding the effects of the subsistence harvest on fur seals and the importance of 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 2007), 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 during modification of the federal regulations for St. George (NMFS 2014).

Alternative 2 represents the most significant improvement of the management of fur seal subsistence use on St. Paul Island. This alternative addresses the expressed subsistence needs of our community and recognizes the ACSPI's request to delegate authority to the St. Paul Co-Management Council and use the co-management process rather than federal regulations to shape subsistence practices. The Co-Management Council is charged with the "…shared *local* responsibilities regarding management and research of fur seals…", as well as using a consultative process to resolve all management issues associated with fur seals (NMFS 2001). Alternative 2 provides the opportunity to open substantive dialogue within the co-management framework. The collaborative design facilitated by this alternative will significantly build upon common goals and objectives shared among NMFS, ACSPI, and the wider community to conserve northern fur seals and subsistence use.

This alternative increases opportunities for community members to obtain fresh fur seal meat outside the current insufficient summer harvest season by extending the harvest through December 31 and adding a hunting season from January 1 to May 31 every year. The ACSPI has had effective monitoring and reporting mechanisms in place for almost two decades as evidenced by Table 4.3-13 and Figure 4.3-3 in the DSEIS concerning the hunting of Steller sea lion on St. Paul. Active engagement with hunters in real time has been a successful long-term management tool for the ACSPI. Struck and lost sea lions are not under-reported as suggested in the DSEIS. Further, this change in the regulation will reduce the illicit

hunting of fur seals and thus reduce the continuing tension between subsistence users and NMFS. The Co-Management Council will enforce non-regulatory restrictions and continue to manage suspension and termination provisions, as well as fulfill all monitoring and reporting duties as they have successfully done under the current co-management agreement. Finally, by allowing subsistence opportunities to range across the population of fur seals on St. Paul, our community would have greater resilience in adapting to changing future environmental conditions to meet subsistence needs. The other alternatives presented in the DSEIS do not sufficiently improve access, availability, stability, and utilization of northern fur seals for St. Paul Unangan.

Alternative 2 – Options A and B

The main distinguishing factor between Alternative 2 Options A and B is the mechanism for controlling accidental female mortality during the subsistence harvest. The controls put forth in Alternative 2 Option A (Petitioned Alternative) include measures to manage and minimize accidental mortality of females. Option A authorizes the Co-Management Council to define an allowance for accidental female mortality in an annual harvest management plan, up to a maximum of 20 per year. Since 1998, the ACSPI has not had more than five accidental female mortalities over an entire season. In practice the ACSPI has conducted harvests in such a way that harvests are not wasteful and the Tribe is responsible for mitigating and resolving any instances that result in a female mortality incident. In fact, since the signing of our co-management agreement in 2001, 25 females have been accidentally killed from 2001 - 2016, with a maximum of four females killed in a single year (2006 and 2014 only).

Alternative 2 Option B (Preliminary Preferred Alternative) does not meet the intentions of the ACSPI's petition to defer management to the St. Paul Co-Management Council process. Specifically, Option B "terminates the subsistence use of fur seals by regulation if and when 20 female fur seals are killed during subsistence activities". In contrast to Option A, this option does not authorize the Co-Management Council to define an allowance of female mortality, but rather imposes an unnecessary regulation rather than entrusting the process to the Co-Management Council. Delegation of female mortality allowance to the Co-Management Council arguably provides more protection for females than Option B, which simply terminates subsistence use of fur seals when 20 females are killed. Moving forward, the Co-Management Council should be entrusted with using the consultative process to resolve the management of accidental female mortality.

Alternative 2 – Proposed Option for Regulation of Accidental Take of Females

For consideration in the Final SEIS and Record of Decision, the ACSPI petitions NMFS to modify Alternative 2 to retain the current regulatory provision under 50 CFR 216.72(e)(4) in which, "…the intentional taking of female fur seals is prohibited", and to keep authority for accidental female mortality of up to 20 females per year under the co-management agreement as a non-regulatory conservation control. This option would address the Fur Seal Act take prohibition while maintaining a non-regulatory mechanism for controlling accidental female mortality during all seasons when subsistence activities would occur. Like Option A, this option would authorize the Co-Management Council to define an allowance for accidental female mortality in an annual harvest management plan.

Alternative 3

Alternative 3 represents a greater use of federal regulations than co-management to manage the subsistence use of fur seals. There are several federal regulations that would be mandated under this alternative that are less desirable than deferring management to the Co-Management Council. Alternative 3 basically maintains the status quo of co-management to prohibiting subsistence use at sensitive breeding locations, monitoring and reporting subsistence use, and managing sub-lethal effects during subsistence harvests. This alternative would create a hunting season from January 1 to March 15, but provides hunting opportunities at only two sparsely occupied rookeries located at the far north end of the island (per Tables 4.3-11 and 4.3-12 in the DSEIS). Based on Island Sentinel observations of fur seals on St. Paul between April 2000 - April 2013, juvenile fur seals are not observed onshore or offshore in significant numbers until mid to late April annually. Further, choice of hunting location is largely dependent on winds, current direction and strength, and transportation. Northeast Point is 12 miles from town and is often closed during winter months because of drifting and/ or blowing snow, thus the two hunting areas authorized under this alternative may be inaccessible or limited because of winter weather conditions. Reef is currently a key hunting location for Steller sea lion hunters who do not have access to a truck or ATV, and would be an area of hunting interest for community members without vehicle access. Additionally, restricting hunting to two locations would concentrate mortality at Northeast Point resulting in a moderate effect on the fur seal population in terms of geographic extent. Finally, this alternative would eliminate the 47- day summer harvest season all together. When combined, the restrictions and regulations suggested in Alternative 3 reduce access to fresh meat to an unacceptable level and produce disproportionate, adverse human health impacts on the population of St. Paul Island.

Alternative 4

Alternative 4 is undesirable for several reasons. First this alternative limits the harvest of juvenile males to 500 per year during the combined seasons of January 1 to May 31 and June 23 to August 8 annually. From 1985 to 2016 the average number of fur seals harvested per year was 912, thus this alternative clearly does not address the subsistence needs of our community. This alternative also maintains the federal regulation to limit harvests to once per week per site (same as Alternatives 1 and 3). Due to the rapid and dramatic changes observed in recent years in the distribution and abundance of fur seals, our community has had to adapt and alter subsistence harvests to meet subsistence needs. In 2016, the ACSPI had to conduct seal harvests at multiple haul out sites in a single day to fulfill the community's subsistence needs due to low densities of sub-adult male seals. The fact is that St. Paul, the Pribilofs, and the Bering Sea are center stage for climate change. Our community members are constantly adapting to increasing unpredictability in subsistence resources on which they base their survival. Alternative 4 prohibits the use of firearms for harvesting fur seals, further limiting the ability of community members to access fresh seal meat year-round. This alternative does not facilitate the reduction of illicit hunting of seals, which is counterproductive to the responsible management and conservation of fur seals. Authorizing hunting with firearms will allow this currently unknown take to be monitored and accounted for via the co-management framework.

Alternative 5

This alternative includes a greater mix of actions managed under the co-management framework, but like Alternatives 3 and 4, Alternative 5 does not allow for flexibility in harvest timeframes or structure, and increases federal oversight and management to an unacceptable level. This alternative imposes a new process for demonstrating subsistence need that is not desirable or needed as the ACSPI has proven their capabilities to ensure non-wasteful harvests are conducted. Beginning in 2020, the upper limit of the harvest would be set based on the average number of seals harvested during the entire subsistence period (i.e., 1985 to the present year), which would be less than the 2,000 limit in all other alternatives. Further, the 2005 EIS concluded that the subsistence take range of 1,645 - 2,000 would have minimal effect on the northern fur seal stock. This regulation prohibits the use of firearms for harvesting which, as described above, does not meet the needs of our community and produces disproportionate, adverse human health impacts on the population of St. Paul. Finally, this alternative would terminate the subsistence use of fur seals by regulation if and when 200 female fur seals are killed during subsistence activities. This is obviously undesirable given the critical importance of females to this declining population.

St. Paul Unangan acknowledge that much of the public does not understand the long-lasting history and culture, nor the specific narration of Unangan occupying St. Paul Island. St. Paul Unangan have, since their arrival to the island, respected and been keepers of the fur seals. Although forced to harvest seals for the Federal Government, who was only interested in the pelts, community members sought only to take the meat that was needed for survival. Further, the current manner of harvesting seals by rounding up and clubbing is a remnant of the commercial harvest days, not the Unangan traditional methods of hunting seals, including pups. The current federal regulations are merely the result of an emergency interim rule made in 1985 in an attempt to address the subsistence needs of the Unangan of St. Paul after abruptly ending the commercial harvest. It is high time that NMFS revise the regulations to reflect the co-management process established under Section 119 of the Marine Mammal Protection Act. The ACSPI advises NMFS to take expedient action during development of the Final SEIS and Record of Decision to move forward with Alternative 2 and the ACSPI's proposed option for regulation of accidental take of females as the final Preferred Alternative.

Sincerely,

Amos T. Philemonoff, Sr.

Amos T. Philemonoff, Sr.
President, Aleut Community of St. Paul Island

cc: Jon Kurland, NMFS
Mike Williams, NMFS
St. Paul Island Tribal Council

Literature Cited

NMFS. 2014. St. George Final Supplemental Environmental Impact Statement on the Management of the Subsistence Harvest of Northern Fur Seals on St. George Island, Pribilofs. August 2014. U.S. Department of Commerce, NOAA, NMFS, Alaska Region Juneau, Alaska, Protected Resources Division, P.O. Box 21668, Juneau, Alaska 99801-1668.

NMFS. 2007. Steller Sea Lion and Northern Fur Seal Research Final Programmatic Environmental Impact Statement, June 2007. NOAA, National Marine Fisheries Service (NMFS), Office of Protected Resources, Permits, Conservation and Education Division, Silver Spring, Maryland. 20910.

NMFS. 2005. Final Supplemental Environmental Impact Statement on the Management of the Subsistence Harvest of Northern Fur Seals. U.S. Department of Commerce, NOAA, NMFS, Alaska Region Juneau, Alaska, P.O. Box 21668, Juneau, Alaska 99801.

NMFS and ACSPI (2000). Co-Management Agreement Between the Aleut Community of St. Paul Island and the National Marine Fisheries Service. Aleut Community of St. Paul Island and the National Marine Fisheries Service. June 13, 2000. 12 pp.

OCEANA Protecting the World's Oceans

175 South Franklin Street, Suite 418
Juneau, Alaska 99801 USA

+907.586.4050
OCEANA.ORG

February 27, 2017

Dr. James Balsiger, Regional Adminstrator
NOAA Fisheries, Alaska Region
709 West Ninth Street
Juneau, AK 99802-1668

RE: NOAA-NMFS-2015-0073: Draft Supplemental Environmental Impact Statement for Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska

Dear Dr. Balsiger:

Thank you for the opportunity to comment on the Draft Supplemental Environmental Impact Statement (EIS) for Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska, which supplements an earlier EIS completed in 2005. As you are well aware, the population of northern fur seals, which had already declined significantly by 2005, has continued to decline over the past decade. Fewer and fewer pups are being produced[1], and the population is in trouble. We encourage you to think broadly about the future of the northern fur seal population and to take steps to better understand and address the decline. It is overwhelmingly unlikely that subsistence harvests at recent or proposed levels are a major factor contributing to the ongoing decline, and the outcome of this process should not penalize subsistence users or community needs.

Fur seals rely on marine habitats from the Bering Sea to the California Current. Throughout that range, the population depends on fish species that are targeted by commercial fisheries. In its 2004 Programmatic EIS, the National Marine Fisheries Service (NMFS) found that the commercial fisheries had a potentially significant adverse effect on fur seals.[2] This conclusion is reasonable in light of the fact that there may be substantial overlap in the age classes of pollock consumed by northern fur seals and pollock caught by the commercial fishery[3] and in the geographic scope of the pollock fishery and fur seal foraging areas.

In the winter, female fur seals feed off the coasts of Washington, Oregon and California. They feed on species targeted by the commercial fisheries there, including Pacific hake, northern anchovy, market squid, Pacific herring, and rockfish.[4] Several of these prey stocks have declined and managers have not

---

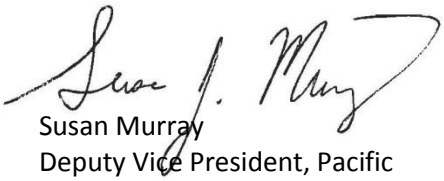
[1] Towell, R. G., Ream, R. R., & York, A. E. (2006). Decline in northern fur seal (Callorhinus ursinus) pup production on the Pribilof Islands. *Marine Mammal Science*, *22*(2), 486.
[2] National Marine Fisheries Service. 2004. Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries Implemented Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area.
[3] Gudmundson, C. J., Zeppelin, T. K., & Ream, R. R. (2006). Application of two methods for determining diet of northern fur seals (Callorhinus ursinus). *Fishery Bulletin*, *104*(3), 445-455.
[4] Antonelis Jr, G. A., & Perez, M. A. (1984). Estimated annual food consumption by northern fur seals in the California Current. *CalCOFI Rep*, *25*, 135-145.

always acted quickly to reduce fishing mortality on these stocks. In the minutes from its December meeting, the Science and Statistical Committee of the North Pacific Fishery Management Council noted the ongoing declines of northern fur seals and called for a comprehensive look at the potential impacts from commercial fisheries.[5] We encourage you to begin this process.

In addition, Steller sea lions were once relatively abundant in the Pribilof Islands in the late 19th century, with as many as 15,000 animals in a few rookeries there.[6,7] The breeding rookeries on St. Paul and St. George Islands were largely extirpated by 1916 due to a combination of hunting and culling.[7] The last remaining sea lion rookery in the areas is on Walrus Island, 15 km off St. Paul, and pup production there has declined precipitously with only 29 pups counted there in 2005. The Walrus Island rookery is now the last reproductive foothold of the Steller sea lion in the Pribilofs. There is an opportunity to take steps to recover the population of Steller sea lions in the Pribilofs as well.

Ultimately, there is an opportunity to take proactive steps to stop the decline and rebuild the fur seal population and to recover breeding rookeries of Steller sea lions in the Pribilof Islands. We look forward to working with you on those efforts.

Thank you,



Susan Murray
Deputy Vice President, Pacific
Oceana

[5] SCIENTIFIC AND STATISTICAL COMMITTEE REPORT TO THE NORTH PACIFIC FISHERY MANAGEMENT COUNCIL December 6–8, 2016
[6] Kenyon, K.W., and D.W. Rice. 1961. Abundance and distribution of the Steller sea lion. J. Mammal 2:223-234.
[7] Loughlin, T.R., D.J. Rugh, and C.H. Fiscus. 1984. Northern Sea Lion Distribution. Journal of Wildlife Management 48:729-740.

THE HUMANE SOCIETY
OF THE UNITED STATES

Eric L. Bernthal, Esq.
Chair of the Board

Jennifer Leaning, M.D., S.M.H.
Vice Chair

Jason Weiss
Second Vice Chair

Kathleen M. Linehan, Esq.
Board Treasurer

Wayne Pacelle
President & CEO

Michael Markarian
Chief Program & Policy Officer

Laura Maloney
Chief Operating Officer

G. Thomas Waite III
Treasurer & CFO

Andrew N. Rowan, Ph.D.
Chief International Officer
& Chief Scientific Officer

Roger A. Kindler
General Counsel
Vice President & CLO

Amy C. Rodgers
Secretary

DIRECTORS

Jeffrey J. Arciniaco
Eric L. Bernthal, Esq.
Jerry Cesak
James Costos
Anita W. Coupe, Esq.
Neil B. Fang, Esq., CPA
Jane Greenspun Gale
Cathy Kangas
Paula A. Kislak, D.V.M.
Jennifer Leaning, M.D, S.M.H.
Kathleen M. Linehan, Esq.
John Mackey
Mary I. Max
Patrick L. McDonnell
Judy Ney
Sharon Lee Patrick
Judy J. Peil
Marian G. Probst
Jonathan M. Ratner
Joshua S. Reichert, Ph.D.
Walter J. Stewart, Esq.
Andrew Weinstein
Jason Weiss
David O. Wiebers, M.D.
Lona Williams

James W. Balsiger, Ph.D. Administrator
NMFS/NOAA Alaska Region
P. O. Box 21668
Juneau, AK, 99802
Submitted via: www.regulations.gov

February 27, 2017

Comments on the Draft Supplemental Environmental Impact Statement for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska: NOAA-NMFS-2015-0073

Dear Dr. Balsiger,

On January 13, 2017, the National Marine Fisheries Service (NMFS) announced the availability of the Draft Supplemental Environmental Impact Statement (DSEIS) for an amendment to the hunting regulations for fur seals in St. Paul, Alaska. 92 Fed. Reg. 4336 (Jan. 13, 2017). The Humane Society of the United States (HSUS) has previously commented on proposed changes to the fur seal hunt. 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 fur seals. The HSUS commented on this petition and raised significant concerns. In 2015, The HSUS and the Center for Biological Diversity submitted joint comments to your office in support of the "No Action" alternative described in the Notice of Intent (NOI) to prepare a Supplemental Environmental Impact Statement on Northern Fur Seal Harvest. 80 Fed. Reg. 44,057 (July 24, 2015).

As stated in our prior comments, the depleted status of fur seals (*Callorhinus ursinus*) under the Marine Mammal Protection Act (MMPA), and the continuing decline in the species would seem to warrant heightened control of intentional kills, not a relaxation of restrictions. For varying reasons, discussed below, we find the action alternatives to be inappropriately risk prone. While the "no action" alternative appears the most conservative—and thus most deserving of support from among the alternatives presented--we continue to maintain that the range of alternatives should include one that would cap the quota at a level that is the highest number killed in the most recent five year period.[1] We also suggest that NMFS should have considered an additional alternative that would cap anthropogenic mortality and better suit the goal of slowing or halting the ongoing decline.

[1] As we discuss further below, between 2009 and 2014, the highest number of fur seals killed on St. Paul in any year was 383 but the average per year was 326. See Fn2.

With regard to the suite of alternatives presented, we have a number of concerns including changes in methodology and targeted age classes that would likely increase kills in this declining stock, add to the impact of disturbing animals if the use of firearms is permitted and we are concerned that NMFS has not provided a sufficiently robust justification of the need to increase the current number of animals killed other than stipulating the Islanders' historic and cultural traditions. We also believe that there is a continuing need for active federal management of the hunt rather than turning its management over to the tribal government. We will first discuss overarching concerns that pertain to most (in some cases all) presented alternatives and then will comment on each of the individual alternatives.

Fur seals are Suffering On-going Population Decline

Northern fur seals were designated as "depleted" under the Marine Mammal Protection Act (MMPA) in 1988 because population levels had declined to less than 50% of levels observed in the late 1950s. 53 Fed. Reg. 17888 (May 18, 1988). To naïve readers, the stock may still appear abundant, with an estimate of abundance of over 90,000 on St. Paul and approximately 139,000 range-wide.[2] However, fur seals are steadily declining in abundance.

The most recent (2016) NMFS draft Stock Assessment Report (SAR) provides abundance estimates based on pup counts. These abundance estimates and trends are available through 2014.[3] Table 1 in the SAR (excerpted below) shows that, over the past decade. The abundance estimate for St. Paul Island rookeries has dropped from 122,825 in 2004 to 91,737in 2014. This is a loss of over 30,000 fur seals in just 10 years. This is a continuation of an ongoing decline from almost 200,000 fur seals in St. Paul reported for 1994—a loss of approximately half the population in 20 years. NMFS itself acknowledges that "[t]here has been a decline in pup production on St. Paul Island since the mid-1990s."[4] Further, between "1998-2014, pup production declined 4.25% per year (SE =0.48%; P < 0.01) on St. Paul Island…. [and] declines at the larger Pribilof colony (specifically St. Paul) continue to drive the overall stock estimate down over time."[5] This is clearly illustrated both in the SAR and Figure 3-2.1 in the DSEIS. We have provided that figure below.

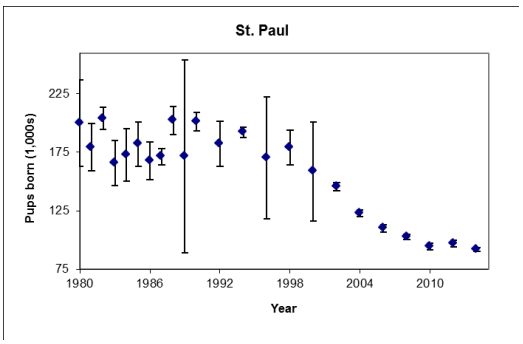


Figure 1. Estimated number of northern fur seal pups born on St. Paul Island, 1980-2014. NMFS 2016 draft SAR.

[2] NMFS 2016. Alaska Marine Mammal Stock Assessments, 2016: Northern Fur Seal. At: http://www.nmfs.noaa.gov/pr/sars/pdf/ak2016_draft.pdf.
[3] Id.
[4] Id.
[5] Id. and note that this is trend information in the SAR is updated from information in the DSEIS, which provides trend information only through 2012.

Moreover, the DSEIS illustrates the continued failure in pup production, even as the overall harvest levels dropped dramatically in 1994 and the harvest was confined largely to sub-adult males.[6] This would seem to argue *against* approving the killing of pups, a demographic that is already in significant decline.

This is not a situation in which one would normally seek to dramatically increase anthropogenic mortality.

NMFS states that future pup production in areas already experiencing reduced or unstable pup production is not expected to be affected by a pup harvest but the agency also stipulates that "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."[7] There is no process or criteria described in the DSEIS for designating and exempting these rookeries, particularly if more control over timing and location of hunts is delegated to the ACSPI. Given the ongoing decline in pup production in St. Paul Island, it would be risk-prone to err on the side of permissive harvests that will only increase the death toll in pups when there is little or no information to demonstrate that it will not result in adverse effects on the population growth.

We will discuss elsewhere the erroneous use of the term "negligible" but wish to point out that most alternatives are said to have impacts on pups that are "negligible." An impact analysis must consider that the 1,500 pup deaths are themselves a part of the total hunt-related mortality of 2,000, which is itself is said to be 17% of the Potential Biological Removal (PBR) for the species (range-wide).[8] Moreover, though NMFS proposes elsewhere that it may choose to define a subset PBR for St. Paul, the current mortality from range-wide harvests in St. George and Bogoslov (which affect the same species) must also be counted against the current PBR of 11,405 range-wide.

Importantly, we call attention to the first in the list of four main goals of the Conservation Plan for this MMPA-depleted species, which is to "identify and eliminate or mitigate the cause or causes of human-related mortality."[9] With the exception of the status quo alternative, all of the proposed action alternatives would actually seek to *increase* "human-related mortality" in the face of documented declines in the stock. This would seem in direct contravention of the species' conservation plan.

The Effects of Repeated Disturbance on Reproductive Fitness and Success are minimized in the DSEIS.

The proposed expansion of the seasons in which hunting are permitted and the proposal to allow pups to be killed seem designed to assure that 2,000 animals will be killed. The increase in the sheer number of seals that would be affected under the action alternatives is alarming enough but the potential adverse impact from disturbance during a lengthened season and increasing incursions into rookeries and haulouts was not as thoroughly considered in the impact analysis as we might have expected. As we noted in prior comments, in NMFS' 2007 EIS on fur seal research, NMFS acknowledges that there has been no detailed analysis of the influence of human disturbance on northern fur seals; however, it cites

[6] DSEIS at figure 4.3-1.
[7] DSEIS at 4-27.
[8] N.B.,NMFS states on DSEIS page 4-40 that killing 2,000 fur seals amounts to 19% of the stock's PBR.
[9] 72 Fed. Reg. 73766 (Dec. 28, 2007); see also DSEIS on page 3-6).

research showing "repeated displacement of females may result in permanent abandonment of sites."[10] This same research found juvenile male fur seals are less tolerant of human presence and are easily displaced from haulouts. As one of its mitigation measures in this 2007 EIS, NMFS suggested "limiting the frequency of disturbance at individual rookeries (to reduce chronic disturbance) between years and within one year." That would certainly *not* be the case under this hunt/harvest proposal where disturbance under all action alternative could be authorized over the vast majority of the year and, under some alternatives, could well occur multiple times each year in the same area. Rather than honoring its recognition of the need to limit disturbance as suggested in the mitigation measures in the 2007 EIS, under most alternatives the disturbance would be *increased*.

A dramatic increase in the duration and/or magnitude of the harvest risks not only additional mortality in a stock that can ill afford it, but may have significant adverse impacts on future productivity if haulouts and rookeries are abandoned or the stress on females from repeated disturbance causes adverse reproductive effects.

In its 2007 EIS on fur seal research, NMFS acknowledges that there has been no detailed analysis of the influence of human disturbance on northern fur seals; however, it cited research showing "repeated displacement of females may result in permanent abandonment of sites."[11] This same research found juvenile male fur seals are less tolerant of human presence and are easily displaced from haulouts. As one of its mitigation measures in the 2007 EIS, NMFS suggested "limiting the frequency of disturbance at individual rookeries (to reduce chronic disturbance) between years and within one year." That would certainly *not* be the case under the action alternatives for hunt/harvest proposal under all of which disturbance could be authorized for the vast majority of the year and, under some, could well occur multiple times each year at the same site. Only the no action alternative maintains the status quo disturbance levels.

NMFS Should Not Permit the Use of Firearms in the Harvest

We feel strongly that allowing the use of firearms is risk prone. First, we are concerned that in some of the alternatives, hunters would be allowed to shoot at animals in the water. This can only add to uncertainties about the fate of animals struck and lost. NMFS states that any animal struck and lost should be assumed to have resulted in mortality and must be reported as such. However, the knowledge that such a loss would affect attainment of the quota may result in a hunter's natural desire to avoid self-incrimination if the shot was not observed; perhaps preferring instead to "assume" that, in the absence of a major blood trail, the now-submerged animal was conveniently missed even though it was in fact struck and lost. Shooting in the water is highly risk-prone. NMFS notes that, in the most recent year with reports (2014) 40% of Steller sea lions shot by native hunters on the Island were lost (i.e., close to half of all animals were reported lost).[12] This would be an alarming loss rate if it also pertained to the declining fur seals.

---

[10] NMFS, 2007. Steller Sea Lion and Northern Fur Seal Research. Final Programmatic Environmental Impact Statement. Volume 1 NOAA-NMFS. May 2007. At Appendix B. Available at: http://www.nmfs.noaa.gov/pr/permits/eis/steller.htm.

[11] Programmatic DEIS for Research, Op Cit. Fn. 8.

[12] DSEIS at Table 4.2-3. We presume this pertains to animals shot in St. Paul since the citation says "Memo for Record St. Paul."

The status quo harvest under Alternative 1 does not as readily result in animals being struck and lost as would be more likely to happen when animals are shot near or in water where they may escape (and the hunter at distance may assume they were missed), only to die later. Moreover, at this time there is no means of estimating the magnitude of struck and lost that may be incurred under other alternatives. The DEIS stipulates, for example, under Alternative 2 Options A and B, that 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."[13] This would be after the fact of these impacts and it is not clear from the DSEIS how this critical variable would be monitored or calculated, nor is it clear that the monitoring and determination would be done by an entity with no self-interest in the resulting calculation.

As we noted in prior comments on the NOI, we believe that the accounting of the number of animals likely to be struck and lost after being shot in the water does not seem to have been adequately weighed in this proposal. A seal hunting conference found that "in 2006, the rate [of animals struck and lost] was between 5% and 50% for adult seals shot in water, compared to 0% up to 21% for seals struck on land (ice)."[14]A different report found even higher loss rates from shooting in the water. In Sweden, data on seal shooting between 2001 and 2006 showed 'struck and lost' rates as high as 43%. In Canada, a "struck and lost" rate of 50% was recorded for older harp seals shot in open water: in other words, for every seal shot and recovered from the water, one seal had sunk and its fate was unknown.[15] Loss rates of these magnitudes are not only wasteful but they would further jeopardize the species because—given the lack of independent monitoring—these "lost" animals may simply not be reported and/or counted against the total kill quota.

As NMFS itself acknowledges, use of firearms increases the likelihood of seals being struck and lost.[16] In the absence of the ability to project the likely magnitude of the effect of struck and loss rates on this population, NMFS attempts an analogy to Steller sea lions—a much larger animal—that can be hunted on St. Paul. NMFS stipulates that "[o]ver 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%." Moreover, "[i]t should be noted that struck and lost rates may be under-reported, and therefore, these data may be biased."[17] Given the lengthy season—and a loss rate that may be as high as 50% (and still considered a possible under-reporting)—we strongly oppose use of firearms in the harvest of this declining species.

Given the statement that "ACSPI has indicated that most if not all hunting will be based on land,"[18] there seems no valid reason to request authority to engage in risk prone methodology that stands to increase the struck and lost ratio and relies on hunter self-reports which are likely to be underestimates. The use of firearms to shoot animals in the water should not be permitted.

---

[13] DSEIS at 4-82.

[14] Butterworth A, Gallego P, Gregory N, Harris S and Soulsby C. Welfare aspects of the Canadian seal hunt: final report. 31 August 2007. http://www.hsus.org/webfiles/PDF/seals/welfareaspectsofcanadiansealhunt_butterworth.pdf

[15] European Commission. Scientific Opinion of the Panel on Animal Health and Welfare on a request from the Commission on the Animal Welfare aspects of the killing and skinning of seals. The EFSA Journal (2007) 610, 1-123.

[16] DSEIS at 4-29.

[17] Id.

[18] DSEIS at 4-11

Co-Management and Reliability of Reporting

NMFS staff has documented that relying on self-reporting generally results in under-reporting of mortalities.[19] This tendency to avoid self-incrimination is a fairly universal human trait.

In its 2009 request, ACSPI stipulates that struck and loss rates will be "gathered through hunter/harvester reporting requirements" including a requirement to self-report struck and lost animals within 24 hours.[20] The DSEIS states that "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."[21] This is a troubling statement. It appears to indicate that there is an acknowledged reluctance to accurately report kills. If hunt monitoring is being done by the ACSPI, we are concerned that there may be *less* reporting and accountability, not more. We have noted that reporting on Steller sea lion kills and ice seal kills is poor, where native Alaskan co-management is the major actor in monitoring.[22]

A workshop report produced by North Atlantic Marine Mammal Commission (NAMMCO), an organization favorable to hunting marine mammals, discussed the paucity of accurate information on struck and lost rates. In their report they stated that "[m]any hunters have the perception that information on struck and lost will be used against them, for example by imposing restrictive quotas or other hunting regulations. Most hunters do not understand self-reporting is generally not accurate, particularly if reporting is either time-consuming or likely to be contrary to the self-interest of the reporter."[23] As we noted earlier, a study contrasting reports of incidental marine mammal takes by NMFS observers versus self-reporting of marine mammal incidental takes by commercial fishermen under Section 117 of the MMPA (under which there were no penalties for takes that were reported), found substantial under-reporting by fishermen.[24] Another report on marine mammal takes used Alaskan fishers' self-reports "from 1990 to 1993, and fisher self-reporting programs from 1995 to 2001 in an attempt to estimate the fishery related mortality of marine mammals. However, this was

---

[19] Credle, V. A., D. P. DeMaster, M. M. Merlein, M. B. Hanson, W. A. Karp, and S. M. Fitzgerald (eds.). 1994. NMFS observer programs: minutes and recommendations from a workshop held in Galveston, Texas, November 10-11, 1993. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-OPR-94-1. 96 pp.

[20] Aleut Community of St. Paul Island Tribal Government. 2009. Letter to the National Marine Fisheries Service requesting fur seal harvest regulation changes. At: "http://alaskafisheries.noaa.gov/protectedresources/seals/fur/resolution_sp/stpaultrtonmfs102109.pdf.

[21] DSEIS at 3-58.

[22] See NMFS SARs for bearded and ringed seals where data are collected and reported by the co-managers of the Ice Seal Committee and where only 12 of 64 communities are reporting kills and only two of those in consecutive years. With regard to Steller sea lions (also harvested in a variety of areas, including St. Paul) the NMFS SAR reports that "As of 2009, annual statewide data on community subsistence harvests are no longer being consistently collected" and, St. Paul Island is one of the only communities reporting. We are concerned that if NMFS is no longer actively involved in gathering data, this Island, with its depleted and declining stock of fur seals may slip into the poor reporting seen in other areas where accountability and US government monitoring has shifted to native co-managers.

[23] NAMMCO, 2006. The NAAMCO Workshop to Address the Problems of "Struck and Lost" in Seal, Walrus and Whale Hunting. North Atlantic Marine Mammal Commission. Copenhagen, Denmark. 14-16 November 2006. Available at: http://www.nora.fo/files/13/20110518093256137.pdf#page=47.

[24] Credle. Op cit note 19

unsuccessful as logbook data were found to under-estimate mortality rates in comparison to more reliable observer data….”[25]

As we have pointed out in prior comments, females are at greater risk with a higher quota on killing young of the year (aka: pups) along with a longer season with a low likelihood of independent monitoring. And killing females would, at some point, result in closing the hunt completely. This latter threat of a cessation of hunting may act as a disincentive to report killing females, particularly if it is known that the cutoff point is approaching. Under the proposal by the Tribal government, the hunt would be terminated only if 20 females are documented to have been killed. This is said to be 1 percent of the 2,000 maximum harvest—a further indication of the tribal government’s intent to kill the full number in the current quota rather than the 300-450 animals that were killed each year over the course of the past decade.

Again, it is simple human nature that awareness of an undesirable consequence for certain actions will result in taking evasive action to avoid the consequence. In this case, killing 20 females stops the hunt for the year. This knowledge results in pressure on hunters with a possible result that (1) they assiduously avoid females if they want to kill the entire quota of 2,000 seals or (2)the cap becomes an incentive to under-report if the quota is nearing. Further, if shooting is allowed, as we have discussed above, there appears to be no plan in place to reasonably account for struck/lost ratios for animals in the water let alone a means of calculating whether some portion of the lost animals may be female.

The current harvest of fur seals, lasting 47 days, at least allows some opportunity for independent observation though it appears from reports that NMFS rarely observes the current brief hunt. The ability to reliably monitor mortality is particularly important in the case of depleted species where incidental or accidental take of females or other prohibited demographics is possible—and indeed past subsistence harvest reports have indicated this happens[26]—with “mistakes” likely exacerbated if shooting in the water is allowed. These concerns further substantiate the need for independent hunt monitoring to validate self-reports.

There is no Strong Justification Provided for the Need for a Dramatic Increase in Harvest

In the letter headed “Notice to Reviewers,” NMFS states that this hunt expansion is intended to “meet the subsistence needs [of St. Paul Islanders] and implement new conservation controls”[27] For close to a decade the Islanders have been permitted to harvest up to 2,000 fur seals per year yet, as we discuss below, to date they have not killed that number.

According to the NMFS draft SAR, the harvest on St. Paul has ranged from 266-383 between 2009-2014, with a mean annual harvest of 327 fur seals.[28] The DSEIS stipulates that “[t]he proposed action is

[25] NOAA. 2011. National By-Catch Report. Section 2: Data Sources for Estimating Bycatch. Citing Credle 1994, unpublished information from NMFS. At: http://www.nmfs.noaa.gov/by_catch/National_Bycatch_Report/2011/2_DataSources.pdf.

[26] In the hunt report for 2013, 11 of the 298 male animals killed violated the restrictions on size. That is, approximately 4% were improperly killed and an additional 3 females were reported killed. See subsistence harvest reports at: http://alaskafisheries.noaa.gov/protectedresources/seals/fur.htm.

[27] Letter to reviewers signed by James Balsiger available at: https://alaskafisheries.noaa.gov/sites/default/files/011017stpaulfursealdearreviewer.pdf.

[28] NMFS 2016 at Table 4.

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,"[29] which presumably includes seal hunting. However we find no discussion of adverse health or unsustainable economic impacts from a harvest that has averaged less than 400 fur seals for most of the past decade. NMFS simply discusses the preference for non-frozen seal meat and the higher cost of meat from traditional livestock. The DSEIS also avers that the ACSPI preferred alternative "would improve the management of fur seal subsistence use on St. Paul and significantly reduce illicit taking."[30] This is a somewhat confounding statement as it implies that illicit taking has been ongoing such that it should be reduced, yet we find no reports of violations or other indications in reports that NMFS is aware of such activity.

The justification for amending the seasons and method of harvest appears to be to increase the total harvest from the current average of about 325 fur seals killed each year to 2,000 to meet native Alaskan subsistence needs. But this is not a result of an increased population on the Island, as we note that the DSEIS stipulates that the native Alaskan population of St. Paul has itself declined since 1980 (when it was said to be 483) with the most recent population estimate of 394 native Islanders in 2010.[31] Allowing 2,000 fur seals to be killed would result in an average of just over 4 seals per native Alaskan per year (assuming an equal per capita share—though this is not likely the case). In addition to the harvest of fur seals, Pribilovians are permitted to harvest Steller sea lions throughout the year. As of the NMFS draft SAR for 2016, the mean annual subsistence take of Steller sea lions on St. Paul is 29 per year, though it has risen in more recent years to 35 in 2014.[32] We understand that there is a local preference for fresh fur seal meat over frozen and a preference for consuming seals over other species including off-Island produced beef. [33] NMFS itself acknowledges that "potential impacts on the social, economic, and cultural environment is primarily a qualitative assessment"[34] rather than having a current and factual basis for asserting a subsistence need to kill more than six times the total number of fur seals than were killed over each year during the past decade.[35] We would have liked to see a stronger justification for the dramatic increase in killing animals in a depleted and declining stock than simply cultural tradition and personal taste.

Comments on Proposed Alternatives

The DSEIS stipulates that 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."[36] Alternatives 2, 3 and 4 would expand the hunt to include killing male pups (which are not sexually dimorphic at distance) and up to 2,000 juvenile males. As noted above, it seems incongruous to amend the hunt regulations to ostensibly "conserve" fur seals even though the average person would not consider that "conservation" of a declining species is best served by *expanding* the hunt season, allowing the killing of seals from broader age classes and permitting the use of less selective hunting methods. Although the agency concludes for

[29] DSEIS at 1-4.
[30] DSEIS at ES-17.
[31] DSEIS Table 3.9-1.
[32] Muto et al., 2016. Alaska Marine Mammal Stock Assessments: Steller sea lion (western US). NMML Seattle. At: http://www.nmfs.noaa.gov/pr/sars/pdf/ak2016_draft.pdf.
[33] DSEIS at 3-65.
[34] DSEIS at 4-2.
[35] NMFS 2016 at Fn 2 documents a harvest average of less than 350 per year and an increase to 2,000 is a six fold increase.
[36] DSEIS at ES-1.3.

most aspects of the alternatives that impacts will be "negligible," as we discuss further below, this appears to be in error.

Alternative 1: No Action Alternative

As we have stated in prior comments, we believe the current subsistence harvest take is risk prone for a declining stock. That said, this alternative appears the most conservative of those presented in the DSEIS. It would maintain the current subsistence harvest take range on St. Paul Island of 1,645 to 2,000 northern fur seals and restrict subsistence harvests of sub-adult male fur seals (124.5 cm or less) to the period between June 23 and August 8 of each year. Further, under this alternative, seals may only be taken by experienced sealers using the traditional harvesting methods, including stunning followed immediately by exsanguination. This includes use of organized drives of sub-adult males to killing fields. As the DSEIS acknowledges, this methodology minimizes the risk of struck and lost seals.[37] Moreover, the limit on the permissible dates for the hunt is important to insure conservatism in the management of this declining stock. NMFS notes that "[f]emale 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."[38] Additionally, the current limits on age classes and seasons have been effective in maintaining very low levels of accidental mortality of females since adoption of the initial co-management agreement.[39] We support continuation of the current season and dates.

Aside from a desire to kill more seals (which may not be as readily accomplished under this alternative), one of the primary objection of ACSPI to continuing with the status quo appears to be that the term "experienced sealers" is subjective and the "prescriptive and regulatory requirements" are felt to be contrary to the term "co-management."[40] First, we point out the "co-management" does not, and need not, necessarily require native primacy in all matters pertaining to the hunt. The term is, in essence, referring to management that is shared, or cooperative, in which all parties play a role. Given the stocks' decline in abundance and the implication earlier in the DSEIS that illegal killing is apparently occurring when the hunt is not being monitored, we see no reason to *decrease* the role of federal managers. Under this alternative, the ACSPI maintains authority for terminating the hunt at specific threshold and for general monitoring and reporting. Second, the ACSPI's expressed confusion as to the definition of an "experienced sealer" and the desire to pass along traditions to inexperienced youth can readily be dealt with by instituting a form of "apprenticeship" program wherein youth pair with experienced hunters to learn the proverbial trade and "experience" might then be defined by NMFS as having first had a certain number of years as an observer/assistant. That sort of process can be undertaken fairly simply under this alternative.

Of the alternatives presented and considered in the DSEIS, we would favor this one as the most appropriately protective of this declining stock.

[37] DSEIS at 4-21.
[38] DSEIS at 4-22 (emphasis added).
[39] DSEIS at 4-24.
[40] DSEIS at 4-21.

Alternative 2: Petitioned/Preliminary Preferred Alternative

This alternative has two sub-alternatives, A and B. While we do not support this action alternative, it appears that at least Alternative B, which would *not* delegate authority to the Co-Management Council if females are killed, would at least require federal regulations to authorize the harvest to continue.[41]

Based in large part on a petition from the ACSPI, this alternative would replace current regulatory provisions for St. Paul in 50 C.F.R. § 201.72 with language that would allow up to 2,000 male fur seals to be killed annually with an almost year-round season. A hunt for juvenile males would extend from January 1-May 31 using firearms, and for pups and juvenile males from June 23-December 31 without firearms. This would appear to assure that dramatically higher numbers of fur seals will be killed than under the current short season in which an average of less than 350 fur seals are killed annually. These proposed changes and their implications for management are discussed in section 4.3.5 of the DSEIS. This alternative would remove a regulatory prohibition on taking pups. Moreover, it would allow up to 20 females to be accidentally killed each year. Rather than limiting hunts at any particular haul out to once a week, there would be no limit on how often a haul out can be disturbed and depredated unless the co-management council itself sets a limit. It is also not clear under this Alternative how the Council will determine whether some rookeries should be excluded from hunt pressure, which may be necessary if they deem pup production to declining in some rookeries—and we note that this phenomenon has been already documented at some rookeries.[42]

Under this alternative, it appears that NMFS will lose authority to suspend a hunt and will be surrendering authority to the Island's co-management council. The agency's role would largely be to "continue research to monitor the abundance, growth rates, vital rates, and overall status of the northern fur seal population."[43] The authority to manage, monitor and restrict subsistence use by the St. Paul Island community would be delegated to the co-management council; that is, the "user group" would be almost entirely self-regulating. As we have discussed above, and as published literature amply demonstrates, self-monitoring and regulation is almost always risk-prone. Fur seals can ill afford risk-prone management. We oppose this alternative

Alternative 3

Alternative 3 is described as being more prescriptive and restrictive than the ACSPI's preferred alternative. It would use federal regulations to manage most aspects of the subsistence use of fur seals and would limit the role of the Council to aspects of hunt management such as prohibiting subsistence hunting 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 also add regulations that would authorize and restrict the use of firearms to hunt fur seals to two specific locations. Under this alternative there would be two hunting seasons for juvenile males extending from January to March 15 with firearms and August 9-December 31 without.[44] That is, it

[41] DEIS at 4-18.
[42] We note that a NMFS report stipulates that pupping rates at Palovina Cliffs rookery declined significantly between 2008 and 2014. J. Ward Testa, Rolf R. Ream, and Thomas S. Gelatt. 2016 Demographic Studies of Northern Fur Seals On The Pribilof Islands, Alaska, 2007-2014. Pp. 27-49 at https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-316.pdf.
[43] DSEIS at 3-57.
[44] DSEIS at 4-32.

would dramatically extend the current hunt season and only deny the St. Paul council around 6 weeks of their request—still resulting in an almost year-round kill of fur seals.

While we find this alternative preferable to the "preferred" alternative, in that it maintains greater NMFS involvement in managing and monitoring the hunt; it also has the advantage of adding "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."[45] Further, in allowing the hunt to be terminated with the death of 5 females, it has a more "restrictive threshold for female mortality."[46]

NMFS clearly anticipates that this longer season and the use of firearms will result in the current annual kill of fur seals (average 327 per year) reaching the 2,000 quota maximum since this alternative is said to "limit" harvest of juvenile males (under age 7) shot with firearms to 500 fur seals and male pups killed between August and December would *be capped at 1,500 pups.*[47] We wish to note that the NMFS SAR shows a decline in pup counts between 2012 and 2014 (a two-year period) of over 5,000 animals even without this increased hunt.[48] If 1,500 pups are also killed each year in the hunt under this and/or other alternatives, it would be the equivalent of adding 3,000 more animals to this decline in each two-year monitoring period (i.e., 8,000 would lost to the population instead of the approximately 5,000 noted in the SAR). We don't see evidence that the added anthropogenic pup mortality would replace some fraction of the natural mortality, and are concerned it would only exacerbate it. This would only accelerate an already problematic decline.

Although this alternative reduces the risk of female pups being killed by requiring that pups be handled, and the sex be determined as male before they can be killed, and it limits the total number of accidental female mortalities to five; it increases over all death toll and allows the slaughter of up to 1,500 pups per year. Additionally, as noted above, this alternative is risk-prone given the already-declining population.

Alternative 4

This alternative assures continued involvement of federal government managers in overseeing and managing the hunt. It allows involvement of the co-management council in the development of plans for annual monitoring and reporting but would allow greater ability for federal managers to directly monitor and to intervene to stop the hunt if wasteful taking is occurring. That said, this alternative would also create a near year-round hunt, called a "subsistence period" (342 days in three split seasons) though it would retain the limit on hunting once per week (a weekly limit as in alternatives 1 and 3). This alternative shares with Alternative 3 a risk prone quota and hunting of pups that assures a dramatic increase in mortality of pups in a population where pup production is already in decline. Because of the longer season and the killing of pups, most of our comments and concerns with regard to alternative 3 apply here as well.

What is clearly preferable about this alternative over some of the prior action alternatives is that it prohibits the use of firearms and it retains the provision that the hunt/harvest may be conducted only

[45] DSEIS at 4-34.
[46] Id.
[47] DSEIS at ES-9.
[48] NMFS SAR note 2 at Table 1. Showing a decline from 96,828 seals in 2012 to 91,737 in 2014.

by experienced sealers using the traditional methods, including stunning followed immediately by exsanguination (as in Alternative 1). Nonetheless, given the expanded season, we oppose this alternative.

Alternative 5

This alternative would establish an entirely new process of setting the quota that would use the most recent 3-year average of actual harvest levels beginning in 2017 to set the lower limit and use a PBR level to set the upper limit for the initial 3-year period of the new regulation rather than relying on a household survey of the subsistence need as in Alternative 1. We note that the currently proposed PBR for fur seals in the 2016 SAR is 11,405[49] and the quota would be based on the 2017 PBR—though PBR has regularly declined as the population itself continues to decline and PBR is likely to change in 2017. As such, reviewers are not provided with necessary data on the likely number of mortalities that would result from this alternative.

However, attempting to set a new precedent, this alternative proposes to *establish a separate sub-PBR* for the St. Paul stock based on the 2012 abundance estimate.[50] It would then allow half of that PBR to be available for harvest, setting an upper limit of 4,902—which *is two and a half times* the 2,000 quota currently in regulations. It would prohibit the killing of adult males and prohibit harvest "from breeding locations at risk of reaching unsustainable population levels" which levels are not clearly specified in the DSEIS. It would require that the hunt be conducted only by experience sealers and that pups be captured, handled and their sex determined before they are killed. Alarmingly, this alternative would allow up to 200 females to be killed accidentally—which the DSEIS itself acknowledges is close to 2% of the female population[51]—and would only suspend the hunt if 150 females had been killed. Table 4.3-1 summarizes the impact of this alternative, showing it would allow up to 50% of the stock's PBR to be killed. This alternative is unacceptable and would clearly lead to the accelerated demise of this population. Thus, we strenuously oppose this alternative and do not offer additional comments on it beyond expressing our absolute opposition to its adoption.

Additional Concerns with the DSEIS Impact Analysis and Conclusions

Inappropriately Risk-prone considerations in the Impact Analysis

For its analysis, the DSEIS relied on the NMFS 2014 SAR,[52] which is not the best and most recently available scientific data. NMFS should rely on estimates derived from its most recent draft and final SARs.

NMFS avers that most male pups (97-99%) will not survive to adult age.[53] We do not necessarily disagree with this assessment but the estimate of survival is said to be based on work by Lander from 1981, prior to the most significant decline in this species. This seems outdated. The agency goes on to state that "a

[49] NMFS draft 2016 SAR at note 2. However the DSEIS proposes a novel approach that would set a separate PBR for St. Paul that would be a subset of this range-wide PBR. We cannot support this approach until and unless it undergoes expert and public review.
[50] We note that more recent SARs and drafts of SARs are available since 2012 for use in setting this quota.
[51] DSEIS at 4-18.
[52] DSEIS at 4-3.
[53] DSEIS at 4-5.

very large proportion of the population of young males that can be harvested would die naturally whether or not they are harvested." That may be true but, as we noted above, it is not clear whether the additional anthropogenic mortality would replace the natural mortality or would simply add to it (and exacerbate a decline). We note that the National Marine Mammal Lab (NMML) has tagged over 900 fur seal pups on St. Paul since 2008 with a goal of estimating survivorship. [54] More recent information on survivorship in various age classes than the 1991 publication should have been provided. Moreover, the DSEIS should have speculated whether the killing of up to 1,500 pups in the subsistence hunt would be additive to already significant levels of natural mortality or was somehow assumed to replace some portion of natural mortality such that overall survivorship of an age class would not be affected. This was not clearly discussed.

In the DSEIS, NMFS states that it "estimated the Eastern Pacific stock of northern fur seals as 648,534 (NEST). Thus, PBR for Eastern Pacific stock of northern fur seals = 11,802 animals (548,926 × 0.043 × 0.5) (Muto et al. 2016)."[55] Yet we note that this estimate is apparently incorrect as the cited SAR had updated earlier estimates and reduced the PBR to 11,405 (a difference of approximately 400 animal lives). This appears to require correction. Moreover, the DSEIS goes on to assert that "[t]he 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%)."[56]That is, NMFS is assuming that it can and will subdivide fur seals and manage just this portion of the range with its own abundance estimate and PBR; something we thought was confined to Alternative 5. We fail to see the legal basis for the agency doing this without subjecting a re-calculation of the PBR (and/or the factual and legal basis for calculating PBR to apply solely to a subset of the range) to required MMPA reviews. Prior to considering this action, NMFS must subject the proposed methodology for its re-calculation and subdivision of a PBR to a review by its own Scientific Review Group (SRG) and further subject it to public comment. Current stock boundaries and the appropriate PBR have been calculated according to the Guidelines for Assessing Marine Mammal Stocks (GAMMS) whereas this proposed novel approach has not. Any significant change to revise stock boundaries in order to facilitate sub-stock management and/or a calculation of a "sub-PBR" should be, but was not, subjected to review by the SRG and according to the GAMMS.

<u>NMFS appears to have Inappropriately Concluded a "Negligible Impact" from Many Alternatives</u>

We also wish to point to a possible misunderstanding or confusion with use of the term "negligible." The analysis of this alternative states that "[i]f 1,500…pups were harvested, it would represent about 1.6% of annual production, which would result in a negligible effect."[57] Although "negligible impact" has generally been used to define impacts of fisheries; in 1999 NMFS adopted criteria for making negligible impact determinations for MMPA permits (64 Fed. Reg. 28800 (May 27, 1999)) and, under this standard, "negligible impact" was defined as having a total human-related serious injury and mortality of less than 10% PBR. However, under most action alternatives in the DSEIS, proposed impact on pups alone is

---

[54] Pups have been tagged on St. Paul to help estimate survival rates since 2007 with discussion provided by Testa, Ream and Gellatt reported in Testa, J. W. (editor). 2016. Fur seal investigations, 2013-2014. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-316, 124pp. at: https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-316.pdf.

[55] DSEIS at 4-4.

[56] DSEIS at 4-4 (emphasis added).

[57] DSEIS at 4-37 moreover, DSEIS page 4-50 states "In summary, impacts associated with lethal take (mortality) under Alternatives 1 through 4 would all be negligible to minor with regard to PBR." Though this quote from the DESEIS cites table 4.3-1, we believe it meant to refer instead to the findings in table 4.4-1.

greater than 10% of the PBR (i.e., the 1,500 pup deaths alone account for more than 10% of the PBR of 11,405).[58]

It is worth nothing that NMFS itself appears to acknowledge that impacts must be below 10% of PBR to be considered negligible, as it states that "[f]or the purposes of this analysis, these thresholds [of negligible, minor and major impact] 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.'"[59] Despite this acknowledgement, population level effects under this DSEIS are erroneously evaluated as "negligible" under all alternatives.[60]

Given that the agency has acknowledged that impacts over 10% of PBR cannot be considered "negligible," NMFS must re-consider and correct its impact analysis relative to determination of "negligible" or "minor" impacts when the number affected would be greater than 10 percent of the PBR.

NMFS Should Consider an Additional Alternative that Would Provide More Appropriate Levels of Protection for This Declining Population.

As we stated in our prior comments on the Notice of Intent to prepare an EIS as well as earlier in these comments, the ongoing decline in fur seals is not given appropriate weight when considering the alternatives that would either maintain status quo or propose changes in season and methodology for the hunt that would increase the kill of fur seals beyond the typical hunt levels for most of the last decade. We strongly support the need for further limits on the hunt, not a liberalization of it, and thus support the need for an additional alternative that would cap the quota at or near the maximum harvest level over the past decade. That is, a quota that would be less than 500 non-pup seals.

We cannot stress enough that this is a depleted and declining stock. Pup production is declining at a rate of 5 percent per year in St. Paul Island, and NMFS has acknowledged that "declines at the larger Pribilof colony (specifically St. Paul) continue to drive the overall stock estimate down over time."[61] As referenced above, NMFS has documented an overall decline in the population in the most recent 10 years of abundance estimates. Clearly this is not the time to kill *more* fur seals or to engage in increased noisy and continually disruptive activities (including even greater handling of female pups in order to sex them) that can only stress animals and possibly challenge health and/or cause diminished reproductive fitness.

We suggest that an alternative be added that would maintain many of the hunt strictures outlined in the "No Action" alternative (e.g., short season, no firearms, etc.), but would reduce the harvest quota from the current authorization of 1,645 – 2,000 kills annually to a lower number more in keeping with the current harvest levels. The recent hunt levels have never exceeded 500 fur seals, and we see no documentation to support the notion that the current hunt level has not met the St. Paul Islander's

---

[58] NMFS 2016 at Fn 2.
[59] DSEIS at 4-4 (emphasis added).
[60] See, for example, DSEIS table 4.4-1.
[61] Northern Fur Seal Stock Assessment, In: Allen, B. M. and R. P. Angliss. 2014. Alaska marine mammal stock assessments, U.S. Dep. Commerce., NOAA Tech. Memo. NMFS-AFSC-301 At: http://www.nmfs.noaa.gov/pr/sars/2013/ak2013_northernfursealep.pdf.

nutritional needs over the past decade that would substantiate the need for far higher kill levels other than granting cultural primacy over promoting more expeditions recovery of fur seals. NMFS should propose an alternative that would reduce the annual harvest level to no more than 500.

Conclusion

The action alternatives proposed are highly risk-prone. They result would in more animals being killed annually; allow a portion of the harvest to be comprised of fur seal pups; generally allow hunting seals in a disruptive manner by using firearms; stipulate increases in accidental mortality of females; and transfer more management and enforcement responsibility of the subsistence use to the ACSPI, a self-interested user-group, thereby decreasing any independent oversight of the hunt. We oppose the action alternatives, and ask that the Agency consider our suggestion of another alternative that would cap the hunt at recent levels as described above.

The on-going decline in fur seals in St. Paul argues for more risk-averse management, not for assuring that even more animals suffer preventable anthropogenic mortality.

Thank you for the opportunity to comment.

Sincerely,

Sharon B. Young
Marine Issues Field Director
The Humane Society of the U.S.
syoung@humanesociety.org

Indigenous People's Council for Marine Mammals

Indigenous Peoples for Wise Use of Renewable Natural Resources"
Our Mission: To identify and address marine mammal issues of common concern.

February 23, 2017

Members

Alaska Beluga Whale Committee

Alaska Eskimo Whaling Commission (Observer)

Alaska Native Harbor Seal Commission

Alaska Sea Otter and Steller Sea Lion Commission

Aleut Community of St. Paul Island

Aleut Marine Mammal Commission

Association of Village Council Presidents – IUM

Bristol Bay Marine Mammal Council

Central Council Tlingit And Haida

Chugach Regional Resources Commission

Eskimo Walrus Commission

Ice Seal Committee

Inuit Circumpolar Council – Alaska

Maniilaq Association

Native Village of Tyonek

North Slope Borough Dept. of Wildlife Management

Sitka Marine Mammal Commission

Traditional Council of St. George Island

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
PO Box 21668
Juneau, AK 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

Indigenous People's Council for Marine Mammals (IPCoMM) is a coalition of 18 Alaska Native marine mammal commissions and other organizations whose mission is to identify and address marine mammal issues of common concern.

IPCoMM would like to provide comment on the Draft Supplemental Environmental Impact Statement for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska.

IPCoMM supports Alternative 2 and the proposed option for regulation of accidental take of females put forth by the Aleut Community of St. Paul Island (ACSPI). The proposed option would retain the current regulation in which "…the intentional taking of female fur seals is prohibited," and keep authority for accidental female mortality under the co-management agreement as a non-regulatory conservation control. Moving forward, the Co-Management process should be entrusted to resolve the management of accidental female mortality.

IPCoMM urges NMFS to select Alternative 2 with the ACSPI's requested modification as the final preferred alternative.

Sincerely,

Mike Miller, Chairman
Indigenous People's Council for Marine Mammals

cc: Jon Kurland, NMFS
Mike Williams, NMFS

800 E. Dimond Blvd, Suite 3-615, Anchorage, AK 99515 ~ Phone (907) 349-8066 ~ Fax (907) 349-8068
Web site: www.ipcommalaska.org ~ e-mail: ctorsenipcomm@alaska.net
Chairman: Michael Miller

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
PO Box 21668
Juneau, AK 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

Since the times of Russian fur traders enslaving the Unangan (Aleut) people from the Aleutian Chain in the Pribilof Islands to harvest northern fur seals for their pelts, seals have been harvested as a source of food critical for survival on these islands. Fur seals are an important traditional source of nutrition and culture for St. Paul Unangan. The Unangan people have been harvesting fur seals in the Bering Sea as a source of fresh meat for as long as recorded history shows. The tribal members of St. Paul have a historical and cultural right to continue the harvesting of seals as a traditional and locally available subsistence food. Having access to the local marine resources is the only means of survival on the Pribilof Islands. The current subsistence fur seal harvest regulations do not meet the subsistence needs of the community, which prompted the Aleut Community of St. Paul Island to seek changes to the regulations in 2007. It is difficult for community members to put away meat for the entire year during the inadequate 47-day summer season, especially in recent years with rapidly warming temperatures, declining densities of seals on haul outs, and the myriad of climatic changes occurring in the Bering Sea.

After reviewing the alternatives evaluated in the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska, I support the proposed preferred alternative put forth by the Aleut Community of St. Paul Island, a modification to Alternative 2, and petition the National Marine Fisheries Service (NMFS) to select the option put forth by ACSPI. This is the only acceptable alternative that will allow greater flexibility to meet the community's subsistence needs and improves conservation and management of the fur seal population on St. Paul Island. I commend NMFS' choice of Alternative 2 as the preliminary preferred alternative due to the high likelihood of beneficial effects on the community, and similar environmental consequences to all other alternatives. Alternative 2 represents the most significant improvement of the management of fur seal subsistence use on St. Paul Island. This alternative addresses the expressed subsistence needs of the community and recognizes community desires to delegate authority to the St. Paul Co-Management Council and use the co-management process rather than federal regulations to shape subsistence practices. This alternative increases opportunities for community members to obtain fresh fur seal meat outside the current insufficient summer harvest season by extending the harvest through December 31 and adding a hunting season from January 1 to May 31 every year. The other alternatives presented in the DSEIS do not sufficiently improve access, availability, stability, and utilization of northern fur seals for St. Paul Natives.

With regards to the current options to Alternative 2 (A and B), I am very supportive of the ACSPI's request to modify Alternative 2 moving forward in the Final SEIS to retain that the current regulation in which, "…the intentional taking of all female fur seals is prohibited," and to delegate the allowance for accidental female mortality to the Co-Management Council in the annual harvest management plan. The ACSPI has done a commendable job of monitoring the

subsistence take of fur seals in the last two decades and should continue to play a primary role in the conservation and management of fur seals on St. Paul Island.

Sincerely,

Lauren Divine

cc: Jon Kurland, NMFS
Mike Williams, NMFS
St. Paul Island Tribal Council

Aleutian Pribilof Islands Association, Inc.

1131 E. International Airport Rd.
Anchorage, Alaska 99518-1408
Phone (907) 276-2700
Fax (907) 279-4351

January 19, 2017

Administrator James W. Balsiger. Ph.D.
Alaska Region NMFS NOAA
P.O. Box 21668
Juneau, AK 99802–1668

RE: NOAA-NMFS-2015-0073

Dear Administrator Balsiger,

The Aleutian Pribilof Islands Association, Inc. (APIA) is the tribal consortium for the 13 Aleut Tribes. We provide a wide range of essential services, including health delivery, public safety, vocational training, cultural heritage, and environmental services. APIA requests that NMFS select and implement the Preferred/Petitioned Alternative (2 Option A) for the management of the subsistence taking of Northern Fur Seals on St. Paul Island.

The fur seal harvest has great historic and cultural significance for the Aleut Community of St. Paul Island. Only the Preferred/Petitioned Alternative (2 Option A) allows for the timely, sufficient and flexible subsistence use of St. Paul fur seals. This alternative also supports dispersed seasonal harvest, while continuing to protect subsistence under changing conditions. Finally, the preferred and petitioned alternative supports appropriate co-management, as well as enhancing the management of fur seal.

Thank you for your consideration of APIA's strong support for the Preferred/Petitioned Alternative (2 Option A). Please contact Community Environment & Safety Manager Karen Pletnikoff at karenp@apiai.org or (907) 276-2700 with any follow up.

Sincerely,

Dimitri Philemonof, President/CEO

Cc: Tribal Government for the Aleut Community of St. Paul Island

Pribilof School District

St. George School λ St. Paul School
Box 905 λ St. Paul Island λ Alaska 99660
Phone:907-546-3337 λ Fax:907-546-2327

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
PO Box 21668
Juneau, AK 99802-1668

Re: Docket Number NOAA-NMFS-2015-0073
Dear Dr. Balsiger:

The Pribilof Islands School District has reviewed the alternatives evaluated in the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska. We support the proposed preferred alternative put forth by the Aleut Community of St. Paul Island, a modification to Alternative 2, and continue to petition the National Marine Fisheries Service (NMFS) to select the option put forth by ACSPI. This is the only acceptable alternative that will allow greater flexibility to meet the community's subsistence needs and improves conservation and management of the fur seal population on St. Paul Island.

The Pribilof School District commends NMFS' choice of Alternative 2 as the preliminary preferred alternative due to the high likelihood of beneficial effects on the community, and similar environmental consequences to all other alternatives. Alternative 2 represents the most significant improvement of the management of fur seal subsistence use on St. Paul. This alternative addresses the expressed subsistence needs of the community and recognizes community desires to delegate authority to the St. Paul Co-Management Council and use the co-management process rather than federal regulations to shape subsistence practices. This alternative increases opportunities for community members to obtain fresh fur seal meat outside the current insufficient summer harvest season by extending the harvest through December 31 and adding a hunting season from January 1 to May 31 every year. The other alternatives presented in the DSEIS do not sufficiently improve access, availability, stability, and utilization of northern fur seals for St. Paul Natives.

The main distinguishing factor between Options A and B is the mechanism for controlling accidental female mortality during the subsistence harvest. The controls put forth in Alternative 2 Option A (Petitioned Alternative) include measures to manage and minimize accidental mortality of females. Option A authorizes the Co-Management Council to define an allowance for accidental female mortality in an annual harvest management plan, up to a maximum of 20 per year. Since 1998, the ACSPI has not had more than five accidental female mortalities over an entire season. In practice, the ACSPI has conducted harvests in such a way that harvests are not wasteful and the Tribe is responsible for mitigating and resolving any instances that result in a female mortality incident. In fact, since the signing of our co-management agreement in 2001, 25 females have been accidentally killed from 2001 - 2016, with a maximum of four females killed in a single year (2006 and 2014 only). Alternative 2 Option B (Preliminary Preferred Alternative) does not meet the intentions of the ACSPI's petition to defer management to the St. Paul Co-Management Council process. Specifically, Option B "terminates the subsistence use of fur seals by regulation if and when 20 female fur seals are killed during subsistence activities".

In contrast to Option A, this alternative does not authorize the Co-Management Council to define an allowance of female mortality, up to a maximum of 20 females, but rather imposes an unnecessary regulation rather than entrusting the process to the Co-Management Council. Delegation of female mortality allowance to the Co-Management Council arguably provides more protection for females than Option B, which simply terminates subsistence use of fur seals when 20 females are killed. Moving forward, the Co-Management Council should be entrusted with using the consultative process to resolve the management of accidental female mortalities.

With regards to the current options to Alternative 2 (A and B), the Pribilof School District is supportive of the ACSPI's request to modify Alternative 2 moving forward in the Final SEIS to retain that the current regulation in which, "…the intentional taking of all female fur seals is prohibited," and to delegate the allowance for accidental female mortality to the Co-Management Council in the annual harvest management plan. The ACSPI has done a commendable job of monitoring the subsistence take of fur seals in the last two decades and should continue to play a primary role in the conservation and management of fur seals on St. Paul Island.

Sincerely,

Brett Agenbroad
Superintendent, Pribilof School District

cc: Jon Kurland, NMFS
Mike Williams, NMFS
St. Paul Island Tribal Council

CITY OF SAINT PAUL
100 GORBATCH STREET PO BOX 901
SAINT PAUL ISLAND, ALASKA 99660
907-546-3100 (MAIN) 907-546-3188 (FAX)
WWW.STPAULAK.COM LIKE US ON FACEBOOK

February 24, 2017

James W. Balsiger, Ph.D.
Administrator, Alaska Region
National Oceanic and Atmospheric Administration-National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

The City of Saint Paul (City) is the second-class municipal corporation for St. Paul Island, Alaska, organized under Title 29 of the Alaska Statues.

The City has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska. The City supports Alternative 2 and the proposed modification put forth by the Aleut Community of St. Paul Island (ACSPI) to retain the current regulation in which, "…the intentional taking of female fur seals is prohibited," and to keep authority for accidental female mortality under the ACSPI's co-management agreement with the National Marine Fisheries Service (NMFS) as a non-regulatory conservation control.

Alternative 2 as modified by the ACSPI is the only alternative that will meet our community's subsistence needs. The other alternatives evaluated in the DSEIS do not sufficiently improve subsistence harvest opportunities for community members to obtain fresh fur seal meat throughout the year. The current regulations have not fulfilled our community's subsistence needs since 1985, when the emergency interim rule was promulgated. We would encourage NMFS to use the co-management process established under Section 119 of the Marine Mammal Protection Act rather than federal regulations to govern the subsistence use of fur seals on the Pribilofs.

Alternative 2 represents the most significant improvement of the management of the subsistence harvest on St. Paul Island. The City encourages NMFS to select Alternative 2 and the ACSPI's proposed option for regulation of accidental take of females as the final Preferred Alternative.

Sincerely,

Simeon Swetzof, Jr.
Mayor

Cc. Saint Paul City Council
Phillip A. Zavadil, City Manager, City of Saint Paul
Phyllis Swetzof, City Clerk, City of Saint Paul
Mateo Paz-Soldan, DTB Associates LLP

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Alaska Maritime National Wildlife Refuge
95 Sterling Highway, Suite 1
Homer, Alaska 99603

February 23, 2017

James W. Balsiger, Ph.D.
Administrator, Alaska Region, National Marine Fisheries Service
National Oceanic and Atmospheric Administration
P.O. Box 21668, Juneau, AK 99802

Dear Doctor Balsiger:

The Alaska Maritime National Wildlife Refuge is pleased to offer its support and congratulations to NOAA for your important work with the Aleut Community of St. Paul Island regarding fur seal management and harvest opportunities. Please accept this letter as refuge comments regarding the draft supplemental environmental impact statement (docket NOAA-NMFS-2015-0073).

NOAA is the proper agency to make federal management decisions regarding fur seals. While it is inappropriate for the Alaska Maritime National Wildlife Refuge to advocate for one explicit alternative versus another in your DSEIS when NOAA is in fact the deciding federal agency, I do want you to know that the refuge enthusiastically supports continued sustainable harvest opportunities for the community and maximizing opportunities for community engagement and involvement in fur seal management decisions.

Portions of both St. Paul and St. George are managed by the Fish and Wildlife Service as part of the Alaska Maritime National Wildlife Refuge. The refuge also includes Bogoslof Island, another key fur seal rookery, as well as over 2000 other islands and headlands across coastal Alaska. The refuge has explicit establishing purposes which include both providing the opportunity for continued subsistence uses by local residents as well as conservation of marine mammals and seabirds. We have enjoyed a long, fruitful relationship with both NOAA and the Aleut Community of St. Paul Island in refuge management activities.

Thank you for the opportunity to comment.

Sincerely,

Steve Delehanty
Refuge Manager

cc: St. Paul Eco Office

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

February 8, 2017

James W. Balsinger, Ph.D.
Administrator, Alaska Region
National Oceanic and Atmospheric Administration
P.O. Box 21668
Juneau, Alaska 99802-1668

Dear Dr. Balsinger:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, we have reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska (EPA Regional Project No. 03-048-NOA). Under our NEPA Review policy and procedures, we rate Draft EIS documents by considering both the adequacy of the document under NEPA and the potential environmental impacts of the action. An explanation of our rating system is enclosed.

Overall, we appreciate the National Oceanic and Atmospheric Administration's (NOAA) efforts to support cultural continuity among Alaska Natives on St. Paul Island by improving harvest flexibility, utilizing local knowledge, and increasing conservation and sustainability measures associated with the northern fur seal harvest. We believe that the range of alternatives and the alternatives analysis presented is adequate. We also find that the tables included in the document are extremely helpful in contrasting the different aspects of each alternative and option.

Based on our review, we have assigned a rating of "LO" (Lack of Objection) to the DSEIS, and we do not object to NOAA's preliminary preferred alternative (Alternative 2 Option A). This preliminary preferred alternative reduces restrictions to subsistence activities and supports co-management objectives, which supports the purpose and need of the project. However, we believe that Alternative 5 is the environmentally preferable action alternative, primarily due to the incorporation of monitoring data-based decision-making and management, as well as the regular assessment of harvest impacts.

We encourage NOAA to take timely action, as the Aleut Community of St. Paul Island, Tribal Government passed a resolution in 2007 requesting this, and the community submitted a petition to NOAA in 2012 in order to revise the subsistence take regulations. We believe that this current action will further strengthen the co-management relationship between the tribal government and NOAA.

We also understand under Alternative 2 Option A, the St. Paul Island Co-Management Council has the "ability to create additional limitations or clarifications 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."[1] We recognize such actions will likely be critical to the long-term

[1] Management of the Subsistence Harvest of Northern Fur Seals, St. Paul, Alaska Supplemental Environmental Impact Statement, January 2017, p. 2-7

conservation and sustainability of the Northern Fur Seal resource and encourage the Council to develop appropriate policies in a timely manner.

We appreciate the opportunity to review this DSEIS. If you have questions concerning our comments, please contact Jennifer Curtis of my staff in Anchorage, at (907) 271-6324 or curtis.jennifer@epa.gov, or you may contact me at (206) 553-1841 or nogi.jill@epa.gov

Sincerely,

Jill A. Nogi, Manager
Environmental Review and Sediments Management Unit

Enclosure:

1. US Environmental Protection Agency Rating System For Draft Environmental Impact Statements

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

W170°
N57°
CENTRAL BERING SEA FISHERMEN'S ASSOCIATION
Post Office Box 288 ▲ St. Paul Island, Alaska 99660 ▲ Phone (907) 546-2597 ▲ Fax (907) 546-2450

February 22, 2017

James W. Balsiger, Ph.D.
Administrator, Alaska Region
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
P.O. Box 21668
Juneau, AK 99802

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

The Central Bering Sea Fishermen's Association (CBSFA) is the management organization for St. Paul Island under the Western Alaska Community Development Quota (CDQ) Program. Since the program was created in 1992, the federal government has been awarding various species of fish (CDQ allocations) from the Bering Sea and Aleutian Islands commercial fisheries to CBSFA. In turn, CBSFA manages these allocations to promote social and economic development at St. Paul Island.

CBSFA has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for the Management of the Subsistence Harvest of Northern Fur Seals on St. Paul Island, Alaska. CBSFA supports Alternative 2 and the proposed option for regulation of accidental take of females put forth by the Aleut Community of St. Paul Island (ACSPI). This alternative and proposed option will meet the subsistence needs of the Unangan (Aleut people) residing on St. Paul Island.

St. Paul Unangan have traditionally and historically engaged in subsistence hunting of fur seals in the spring and winter and subsistence harvesting of fur seal pups in the fall. The current federal regulations limit the harvest of this important resource to a short 47- day period between June 23 and August 8. Subsistence harvest opportunities thus overlap with the local halibut fishing season that many community members rely on for their livelihood. As many families rely on both resources, they currently must choose between earning income from fishing or obtaining fur seal meat as food.

Alternative 2 represents the most significant improvement of the management of fur seal subsistence use on St. Paul. This alternative will increase opportunities for community members to obtain fresh fur seal meat outside the current insufficient summer harvest season by extending the harvest through December 31 and adding a hunting season from January 1 to May 31. The other alternatives presented in the DSEIS do not accomplish the ACSPI's petition for greater flexibility to meet the subsistence needs of our community.

The ACSPI proposes to modify Alternative 2 for consideration in the Final SEIS to retain the current regulation in which, "…the intentional taking of female fur seals is prohibited," and to keep authority for accidental female mortality under the ACSPI's co-management agreement as a non-regulatory conservation control. CBSFA encourages NMFS to select Alternative 2 with the ACSPI's proposed modification as the final Preferred Alternative.

Sincerely,

Phillip Lestenkof
President

Dr. James W. Balsiger, Administrator
National Marine Fisheries Service, Alaska Region
PO Box 21668
Juneau, AK 99802-1668

February 20, 2017

Re: Docket Number NOAA-NMFS-2015-0073

Dear Dr. Balsiger:

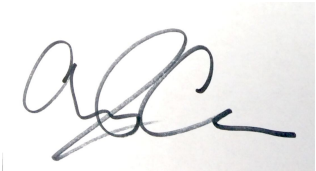
I have a PhD in mathematics where I developed fishery models as my thesis research. Through this research, I became familiar with the behavioral economics of common pool resources, such as the fur seals on Saint Paul Island. In my opinion, this research supports Alternative 2 and the proposed option for regulation of accidental take of females put forth by the Aleut Community of St. Paul Island (ACSPI).

Importantly, support and therefore compliance with regulations has been found to decline as resource management becomes more removed from those who use the resource. This was one of the main findings of Nobel Laureate Elinor Ostrom throughout her career studying common pool resources ending in 2012. (See, for example, Ostrom E (2006). "The value-added of laboratory experiments for the study of institutions and common-pool resources." Journal of Economic Behavior and Organization 61:149-163.) In my view, Alternative 2 with the ACSPI's requested modification to retain the current regulation in which, "…the intentional taking of all female fur seals is prohibited", and to keep authority for accidental female mortality under the co-management agreement as a non-regulatory conservation control, retains local input in fur seal management and respects the ACSPI's position and history of managing the fur seals.

I have known the people of St. Paul Island, Alaska since 2001. I have worked for the ACSPI's cultural programs since February 2016. The northern fur seal is a vital source of nutrition and cultural resilience, for and of the Unangan (aka. Aleuts) of St. Paul Island, Alaska. As ACSPI community members have indicated in their own comments on this docket, current regulations are antiquated and are not meeting the subsistence needs of the community. Centuries of dependence on fur seals on St. Paul Island have given the local Unangan community a unique connection and respect for careful exploitation of the population. It is vital that management actions meet community needs to retain community support for conservation.

The ACSPI continues to do a commendable job of monitoring and reporting the subsistence take of fur seals, which the ACSPI has done for nearly two decades. The ACSPI should continue to play a primary role in the conservation and management of fur seals on St. Paul Island. I petition the National Marine Fisheries Service to select Alternative 2, as modified by the ACSPI, as the final Preferred Alternative.

Sincerely,



Michael J. Crone, PhD

PUBLIC SUBMISSION

As of: 6/6/19 3:11 PM
Received: February 15, 2017
Status: Posted
Posted: February 17, 2017
Tracking No. 1k1-8ur9-gp5c
Comments Due: February 27, 2017
Submission Type: Web

Docket: NOAA-NMFS-2015-0073
Revision to Management Measures for the Subsistence Taking of Northern Fur Seals on St. Paul Island, Alaska

Comment On: NOAA-NMFS-2015-0073-0020
Draft SEIS

Document: NOAA-NMFS-2015-0073-0029
Comment from Katiana Candyfire

Submitter Information

Name: Katiana Candyfire

General Comment

Cultural traditions are at high risk of being lost forever due to westernization & American mainstream ideals of a way of life. People should have every right to continue living in practice of culture & traditions. Who are these people who do not/never have/never will live a subsistence lifestyle to say our people cannot live off what the good Earth provides? Our people are not the cause to declination in fur seal population because of subsistence. Denying this change is not the answer to global warming, fur seal population or killer whale problems. This change could provide positive growth in culture & the traditional practice of respecting our environment.

PUBLIC SUBMISSION

As of: 6/6/19 2:58 PM
Received: February 15, 2017
Status: Posted
Posted: February 17, 2017
Tracking No. 1k1-8urd-1ei0
Comments Due: February 27, 2017
Submission Type: Web

Docket: NOAA-NMFS-2015-0073
Revision to Management Measures for the Subsistence Taking of Northern Fur Seals on St. Paul Island, Alaska

Comment On: NOAA-NMFS-2015-0073-0020
Draft SEIS

Document: NOAA-NMFS-2015-0073-0028
Comment from Eve Tuck

Submitter Information

Name: Eve Tuck

General Comment

I support Alternative #2. Unangan people understand the delicate balance required to keep seal populations thriving while also engaging in subsistence living. Respect the knowledge that Unangan people have about harvesting fur seals.

PUBLIC SUBMISSION

As of: 6/6/19 2:56 PM
Received: February 16, 2017
Status: Posted
Posted: February 17, 2017
Tracking No. 1k1-8us2-7qjy
Comments Due: February 27, 2017
Submission Type: Web

Docket: NOAA-NMFS-2015-0073
Revision to Management Measures for the Subsistence Taking of Northern Fur Seals on St. Paul Island, Alaska

Comment On: NOAA-NMFS-2015-0073-0020
Draft SEIS

Document: NOAA-NMFS-2015-0073-0027
Comment from Nathan Berry

Submitter Information

Name: Nathan Berry

General Comment

The Unangan (Aleut) have harvested fur seal as a sustainable source of food, and the subsistence harvest has played an important role in shaping the Unangan culture on St. Paul Island. As time has passed, it has become abundantly clear that the current regulations do not protect St. Paul wildlife and people in a sustainable manner. Between a shorter hunting season, changing climate and declining densities, it is becoming harder and harder for the community of St. Paul to harvest an adequate number of fur seals to sustain families for the whole year. As it is a small community, it is difficult to harvest fur seal in a short season that also overlaps with that of the fishing industry.

I support the proposed preferred alternative put forth by the Aleut Community of St. Paul Island, a modification to Alternative 2, and petition the National Marine Fisheries Service (NMFS) to select the option put forth by ACSPI. This allows for a closer monitoring and harvest selection by the local community throughout the year. It ensures that the Unangan people continue their tradition to harvest fur seals to adequately fill their freezers as well as provide close, local monitoring of the fur seal population. As the St. Paul Co-Management Council and Unangan people have strong ties and a local history to the harvest of fur seals, it should be in fact them that have the delegating authority to manage and protect. Federal regulation does not currently meet the needs of the people nor the declining fur seal population.

Respectfully-

Nathan T. Berry

PUBLIC SUBMISSION

As of: 6/6/19 2:53 PM
Received: February 08, 2017
Status: Posted
Posted: February 08, 2017
Tracking No. 1k1-8um5-x1fo
Comments Due: February 27, 2017
Submission Type: Web

Docket: NOAA-NMFS-2015-0073
Revision to Management Measures for the Subsistence Taking of Northern Fur Seals on St. Paul Island, Alaska

Comment On: NOAA-NMFS-2015-0073-0020
Draft SEIS

Document: NOAA-NMFS-2015-0073-0023
Comment from cynthia reznick

Submitter Information

Name: cynthia reznick
Address:
3901 S. Sullivan St.
Seattle, WA, 98118
Email: cynthiareznick@gmail.com
Phone: 206-462-8312

General Comment

Seals are hunted enough already. An increase should not be allowed, if anything it should be decreased. We are losing enough already through Climate change, which is real. How thorough of an enforcement is being done now with the current limits? If even this protection is removed, it will be devastating to seals. Keep the current limits, at least!

PUBLIC SUBMISSION

As of: 6/6/19 3:13 PM
Received: January 20, 2017
Status: Posted
Posted: February 08, 2017
Tracking No. 1k1-8u9v-3wa8
Comments Due: February 27, 2017
Submission Type: Web

Docket: NOAA-NMFS-2015-0073
Revision to Management Measures for the Subsistence Taking of Northern Fur Seals on St. Paul Island, Alaska

Comment On: NOAA-NMFS-2015-0073-0020
Draft SEIS

Document: NOAA-NMFS-2015-0073-0021
Comment from simon parker

Submitter Information

Name: simon parker
Address:
p.o.box 281
241 canoe st.
neah bay, WA, 98357
Phone: 360 582 6179
Fax: na

General Comment

The Killer Whales that frequent unsound are in great danger from all the pollutants especially from pleasure boats, large and small, that leave oil sheen's from blow backs from there exhausts. These boats should be curtailed and and not allowed in locations where whales are present and kept out of such areas. These whales lived good normal lives long before these areas became inhabited by the people that are now doing this to them with the harm they are doing to the whales habitat and the vast surrounding waters with the boat problem that faces not only the whales but us as people. These Whales food source is shrinking at a alarming rate being devoured by the sea-lions that have moved into this area in huge numbers, sea-lions that are protected by laws that are hurting not only the Whales food source, but us as fisherman who depend on these fishes that these sea-lions are slowly wiping out. Areas where fish were plentiful are now being depleted by these sea-lions that are not of this area but from down south where they were over protected. There food source there became not enough to sustain such a huge number of sea-lions why they have migrated to the north, where they are not welcome. I believe this protection order should be removed as soon as possible to alleviate the problem that faces us.

11. INDEX

Actions
Reasonably Foreseeable Future Actions (RFFA), 260
Aleut Community of St. Paul Island (ACSPI), *i*, *ix*, *1*, *265*
Alternative 1, 39
Alternative 1 (No Action), *i*, *ii*, *v*, *vi*, *xi*, *xiii*, *xix*, *18*, *22*, *26*, *132*, *135*, *140*, *147*, *149*, *153*, *155*, *156*, *166*, *174*, *176*, *202*
Alternative 2, *ii*, *i*, *ii*, *iv*, *v*, *vi*, *vii*, *x*, *xiv*, *xv*, *xvi*, *xviii*, *xxviii*, *xxix*, *3*, *22*, *25*, *26*, *31*, *35*, *36*, *39*, *106*, *112*, *114*, *115*, *116*, *117*, *122*, *127*, *129*, *134*, *135*, *136*, *137*, *138*, *139*, *140*, *141*, *142*, *144*, *145*, *146*, *147*, *148*, *149*, *150*, *154*, *155*, *156*, *160*, *162*, *164*, *166*, *168*, *169*, *171*, *172*, *174*, *175*, *176*, *178*, *182*, *183*, *186*, *187*, *189*, *190*, *195*, *196*, *197*, *198*, *199*, *200*, *201*, *203*, *204*, *207*, *217*, *219*, *270*, *280*, *281*, *284*, *285*, *286*, *287*
Alternative 3, *i*, *ii*, *iv*, *vi*, *xix*, *xx*, *xxi*, *xxii*, *xxviii*, *26*, *27*, *28*, *29*, *30*, *31*, *39*, *42*, *43*, *112*, *114*, *115*, *116*, *142*, *143*, *144*, *145*, *146*, *147*, *148*, *149*, *150*, *152*, *153*, *154*, *155*, *164*, *175*, *176*, *178*, *179*, *183*, *186*, *189*, *199*, *200*, *203*, *204*, *281*, *284*, *287*
Alternative 5, *xxiv*, *287*, *289*, *290*
breeding, *xi*, *xvi*, *xviii*, *xix*, *xxi*, *xxii*, *xxv*, *xxvii*, *xxviii*, *xxix*, *4*, *15*, *25*, *26*, *27*, *28*, *29*, *30*, *33*, *39*, *45*, *46*, *50*, *51*, *52*, *53*, *55*, *56*, *57*, *58*, *59*, *60*, *62*, *66*, *67*, *76*, *79*, *80*, *81*, *86*, *99*, *104*, *108*, *109*, *110*, *111*, *124*, *130*, *136*, *138*, *139*, *143*, *144*, *146*, *147*, *150*, *151*, *153*, *156*, *157*, *160*, *162*, *163*, *165*, *166*, *168*, *170*, *171*, *172*, *173*, *176*, *177*, *179*, *180*, *182*, *191*, *193*, *195*, *196*, *198*, *200*, *203*, *204*, *213*, *214*, *234*, *241*, *242*, *260*, *268*, *269*, *276*, *279*, *282*, *283*
climate change, *74*, *75*, *76*, *206*, *228*, *230*, *245*, *288*
Climate change, *212*, *218*, *230*
Climate Change, *75*
climate impact, *74*
co-management agreement, *x*, *2*, *3*, *7*, *8*, *16*, *35*
Co-management Agreement, *9*, *96*, *133*, *142*
Co-Management Agreement, *xv*, *2*, *8*, *9*, *13*, *17*, *22*, *35*, *72*, *96*, *97*, *98*, *122*, *135*, *149*, *190*, *191*, *193*, *198*, *199*, *207*
Co-Management Council, *i*, *xv*, *xvi*, *xvii*, *xviii*, *xix*, *xxi*, *xxix*, *2*, *8*, *10*, *17*, *23*, *24*, *25*, *26*, *28*, *29*, *31*, *34*, *35*, *37*, *41*, *97*, *98*, *117*, *122*, *136*, *137*, *138*, *139*, *141*, *142*, *143*, *144*, *145*, *146*, *147*, *148*, *150*, *151*, *152*, *153*, *155*, *157*, *160*, *162*, *197*, *199*, *200*, *275*, *285*
commercial fisheries, *64*, *65*, *67*, *68*, *69*, *70*, *80*, *86*, *192*, *204*, *205*, *207*, *210*, *235*, *269*, *290*
Commercial fisheries, *64*, *68*, *69*
Commercial Fisheries, *210*, *217*
commercial harvest, *xxix*, *3*, *5*, *11*, *52*, *65*, *83*, *86*, *87*, *89*, *91*, *92*, *93*, *98*, *110*, *111*, *123*, *124*, *125*, *127*, *128*, *130*, *138*, *146*, *166*, *167*, *168*, *174*, *187*, *189*, *192*, *193*, *196*, *205*, *206*, *207*, *210*, *211*, *217*, *261*, *271*, *275*, *276*
Council on Environmental Quality (CEQ), 260
Cumulative Effects, 257
Diet, *ii*, *57*, *58*, *71*, *72*, *240*
Direct Effects, 257
draft Supplemental Environmental Impact Statement, *ii*
Draft Supplemental Environmental Impact Statement, *265*
EIS, 257
enforcement, *64*, *122*, *132*, *286*, *287*, *290*
entanglement, *2*, *49*, *64*, *65*, *66*, *67*, *187*, *204*, *205*, *206*, *210*, *213*, *217*, *225*, *227*, *242*, *244*, *246*, *248*, *269*
female mortality, *xv*, *xix*, *xxi*, *xxii*, *xxiii*, *xxiv*, *xxv*, *xxvi*, *23*, *27*, *29*, *30*, *32*, *33*, *34*, *36*, *41*, *123*, *124*, *125*, *126*, *127*, *128*, *129*, *132*, *139*, *141*, *142*, *143*, *146*, *147*, *149*, *150*, *155*, *156*, *159*, *161*, *195*, *198*, *199*, *266*, *271*, *280*, *284*, *285*, *286*
food security, *ii*, *83*, *102*, *103*, *104*, *119*, *120*, *137*, *145*, *147*, *148*, *153*, *159*, *195*, *196*, *199*, *201*, *207*, *226*, *234*, *267*, *274*, *288*, *289*
Forage, 257
foraging, *6*, *12*, *45*, *52*, *53*, *56*, *58*, *59*, *60*, *68*, *69*, *73*, *74*, *166*, *169*, *170*, *171*, *175*, *176*, *178*, *181*, *206*, *210*, *222*, *229*, *230*, *233*, *239*, *241*, *242*, *244*, *278*, *279*
Fur Seal Act, *ii*, *ix*, *1*, *92*, *214*, *218*, *266*
Fur Seal Predation, *217*
fur seal resting areas, *188*
harvest areas, *167*, *168*, *173*, *174*, *177*, *180*

harvest methods, *xvii*, *xviii*, *xxi*, *xxiii*, *xxvi*, *25*, *26*, *29*, *32*, *36*, *43*, *131*, *141*, *142*, *187*, *280*
harvest restrictions, *37*, *91*, *122*, *194*
Harvest Season, *xiv*, *xvi*, *xviii*, *xxi*, *xxiii*, *xxvi*, *22*, *25*, *26*, *29*, *32*, *36*, *41*, *112*, *164*, *183*
hauling ground, *xviii*, *xxi*, *5*, *26*, *29*, *147*, *166*, *168*, *177*, *180*, *258*, *260*, *276*, *287*
Humane Society of the United States (HSUS), *2*
hunting, *i*, *xiv*, *xv*, *xvi*, *xvii*, *xviii*, *xix*, *xxviii*, *xxix*, *2*, *8*, *9*, *13*, *18*, *22*, *23*, *24*, *25*, *26*, *28*, *64*, *89*, *90*, *91*, *96*, *97*, *102*, *103*, *104*, *106*, *113*, *114*, *115*, *116*, *117*, *118*, *119*, *130*, *134*, *135*, *137*, *140*, *141*, *145*, *146*, *147*, *148*, *149*, *151*, *155*, *162*, *166*, *175*, *176*, *182*, *183*, *184*, *186*, *187*, *188*, *189*, *190*, *191*, *192*, *194*, *195*, *196*, *197*, *198*, *199*, *202*, *203*, *204*, *258*, *268*, *274*, *280*, *281*, *282*, *283*, *284*, *285*, *286*, *287*, *288*, *289*, *290*
hunting areas, *287*
hunting methods, *xvii*, *xviii*, *25*, *26*, *198*, *281*, *282*, *283*
hunting season, *xv*, *xxix*, *24*, *113*, *115*, *117*, *137*, *145*, *148*, *149*, *155*, *182*, *183*, *186*, *189*, *191*, *195*, *196*, *197*, *280*, *281*, *283*, *286*
Illicit, *ii*, *64*
incidental take, *64*, *65*, *157*, *199*, *210*, *240*, *266*
Indirect Effects, 257
Intergovernmental Panel on Climate Change, *75*
IPCC, *75*
Male Mortality, *131*
Marine Mammal Commission (MMC), *2*
Marine Mammal Protection Act, 260
Marine Mammal Protection Act (MMPA), *1*, *199*, *258*, *267*
natural mortality, *49*, *139*, *140*, *147*, *149*, *153*, *155*, *259*, *284*
NEPA, x
  Scoping, x
population, *x*, *xi*, *xxii*, *xxiv*, *xxv*, *xxvii*, *xxix*, *1*, *4*, *6*, *7*, *9*, *11*, *12*, *13*, *14*, *17*, *18*, *28*, *30*, *33*, *34*, *43*, *45*, *46*, *270*, *271*, *276*, *278*, *280*, *283*, *284*, *285*, *286*, *288*, *290*
Population, *xxviii*, *45*, *46*
Potential Biological Removal, xxvii, 259, 260
Potential Biological Removal (PBR), *259*, *269*
public comment, *ix*, *xii*, *2*, *10*, *19*, *21*, *94*, *142*, *150*, *265*, *270*
pup mortality, *xxviii*, *60*, *62*, *127*, *132*, *154*, *155*, *161*, *212*, *270*, *282*, *284*, *285*
Pup mortality, *xxviii*, *203*
Pup Mortality, *132*, *140*, *149*, *155*, *161*
quota, *xxix*, *85*, *86*, *90*, *95*, *136*, *160*, *280*, *288*, *291*
regulation, *ii*, *x*, *xv*, *xix*, *xxiv*, *xxviii*, *3*, *7*, *16*, *23*, *24*, *26*, *32*, *34*, *36*, *40*, *83*, *95*, *96*, *107*, *111*, *128*, *134*, *135*, *138*, *139*, *141*, *146*, *147*, *149*, *155*, *158*, *159*, *160*, *167*, *179*, *182*, *195*, *196*, *197*, *199*, *204*, *261*, *266*, *268*, *274*, *287*, *288*, *289*, *290*
restrictions, *xi*, *xix*, *xxi*, *9*, *10*, *13*, *15*, *16*, *17*, *18*, *23*, *24*, *26*, *29*, *85*, *86*, *91*, *92*, *93*, *94*, *97*, *98*, *99*, *123*, *128*, *134*, *135*, *138*, *141*, *142*, *144*, *145*, *146*, *147*, *148*, *150*, *151*, *190*, *194*, *195*, *201*, *202*, *283*, *285*, *287*
rookery, *xii*, *5*, *211*, *212*, *239*, *255*, *258*, *260*, *275*, *276*, *277*, *278*, *279*
Rookery, *260*
site fidelity, *xi*, *5*, *45*, *51*, *52*, *56*, *79*, *110*, *130*, *134*, *147*, *167*, *221*, *223*, *240*, *269*
Site Fidelity, *51*
subsistence, *188*
subsistence harvest, *i*, *ix*, *xi*, *xiv*, *xx*, *xxi*, *xxii*, *xxiv*, *xxvi*, *xxvii*, *xxix*, *xxx*, *1*, *2*, *4*, *5*, *7*, *8*, *9*, *11*, *12*, *13*, *15*, *18*, *21*, *22*, *23*, *27*, *28*, *29*, *30*, *31*, *33*, *34*, *35*, *36*, *42*, *44*, *46*, *52*, *61*, *83*, *84*, *91*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *102*, *106*, *107*, *109*, *111*, *112*, *113*, *117*, *121*, *124*, *125*, *127*, *128*, *129*, *130*, *131*, *132*, *134*, *138*, *142*, *150*, *151*, *152*, *153*, *156*, *157*, *158*, *159*, *160*, *161*, *162*, *163*, *164*, *165*, *166*, *167*, *168*, *174*, *176*, *177*, *179*, *180*, *182*, *187*, *188*, *189*, *190*, *192*, *193*, *194*, *195*, *197*, *201*, *204*, *206*, *207*, *211*, *214*, *218*, *220*, *225*, *230*, *234*, *236*, *247*, *248*, *249*, *255*, *259*, *261*, *268*, *269*, *271*, *272*, *275*, *276*, *277*, *280*, *284*, *286*, *288*, *289*, *291*
Subsistence harvest, *196*, *226*, *235*
Subsistence Harvest, *1*, *i*, *ii*, *iii*, *iv*, *vii*, *ix*, *xvi*, *xviii*, *xxi*, *xxiii*, *xxvi*, *xxx*, *1*, *4*, *7*, *10*, *12*, *13*, *25*, *26*, *29*, *32*, *36*, *39*, *40*, *64*, *96*, *115*, *119*, *186*, *205*, *211*, *237*, *238*, *264*
subsistence harvests, *ix*, *189*
subsistence need, *xiv*, *xxii*, *xxiv*, *xxix*, *3*, *16*, *22*, *30*, *32*, *33*, *35*, *42*, *91*, *94*, *131*, *139*, *142*, *147*, *150*, *156*, *157*, *158*, *159*, *160*, *162*, *191*, *194*, *195*, *196*, *199*, *200*, *201*, *211*, *274*, *289*, *290*
subsistence requirement, *xii*, *19*, *160*
subsistence use, *i*, *ix*, *x*, *xi*, *xv*, *xix*, *xxi*, *xxii*, *xxiii*, *xxiv*, *xxv*, *xxvi*, *xxvii*, *xxix*, *2*, *3*, *4*, *9*, *13*, *15*, *16*, *17*, *18*, *23*, *24*, *26*, *27*, *28*, *29*, *30*, *32*, *33*,

36, *40*, *42*, *44*, *49*, *82*, *83*, *90*, *94*, *96*, *103*, *107*, *109*, *111*, *114*, *117*, *122*, *123*, *130*, *136*, *138*, *139*, *141*, *142*, *143*, *144*, *146*, *147*, *148*, *149*, *152*, *154*, *155*, *156*, *159*, *160*, *161*, *186*, *187*, *190*, *191*, *193*, *196*, *197*, *198*, *199*, *202*, *205*, *207*, *219*, *265*, *266*, *267*, *268*, *269*, *271*, *274*, *275*, *277*, *279*, *280*, *282*, *283*, *284*, *285*, *286*, *288*, *289*, *290*, *291*

tribal government, *xxix*, *104*, *188*, *198*

wasteful manner, *xi*, *xiii*, *xiv*, *xvii*, *xviii*, *xx*, *xxi*, *xxii*, *xxiii*, *xxv*, *xxvi*, *19*, *20*, *22*, *23*, *25*, *26*, *27*, *28*, *29*, *30*, *32*, *34*, *35*, *36*, *42*, *98*, *122*, *131*, *135*, *137*, *143*, *145*, *154*, *186*, *187*, *188*, *190*, *191*, *193*, *197*, *255*, *261*