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Subsistence Harvests and Uses in Three Bering Sea Communities, 2008: Akutan, Emmonak, and Togiak

by

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Alaska Department of Fish and Game **Division of Subsistence**

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols

alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly-accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly-accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures)	first three letters (Jan,...,Dec)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$log_{2,}$ etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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December 2012

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TABLE OF CONTENTS

Page

LIST OF TABLES iii
LIST OF FIGURES iv
LIST OF APPENDICES vi
ABSTRACT vii

CHAPTER 1: INTRODUCTION 1

Project Background 1

Research Methods 4

Project Planning *4*
Guiding Ethical Principles *5*
Data Collection Methods: Survey Instrument *6*
Mapping Methods *7*
Sample Goals and Achievement *8*
Survey Administration *9*
Data Analysis *9*
Data Review and Reporting *10*

CHAPTER 2: AKUTAN 13

About Akutan 16

Geographic Setting *20*
Cultural History of the Eastern Aleutian Islands *21*
Akutan History *22*

Research Methods 24

Demography 27

Seasonal Round of Resource Harvests 29

Wild Resource Harvests and Uses in 2008 30

Household Level Harvests and Patterns *43*
Salmon and Other Fish: Harvest Methods *47*
Harvest Areas *55*

Comparisons with Previous Findings 65

Overall Harvest Patterns *65*
LTK and Changes in Harvest Patterns *69*
Salmon *69*
Fish Other than Salmon *71*
Birds and Eggs *73*
Marine Invertebrates *73*
Marine Mammals *74*
Large Land Mammals *77*
Harvests of Plants for Food, Medicine, and Materials *78*

Harvest Comparison: Evaluation of 2008 Harvest Compared to Other Recent Years 79

Jobs and Income 84

Discussion and Conclusions 92

CHAPTER 3: EMMONAK 95

Research Methods 101

About Emmonak 101

Demography 107

Jobs and Income *109*
Wild Food Harvests 114
Household Level Harvests and Patterns *129*
Harvest Areas *133*
Harvest Assessments 144
Comparisons with Prior Results 147
Demographic and Economic Comparisons *147*
Harvest Changes *148*
Discussion and Conclusions 159
CHAPTER 4: TOGIAK 163
About Togiak 163
Research Methods 167
Demography 169
Seasonal Round of Resource Harvests 173
Wild Resource Harvests and Uses in 2008 174
Household Level Harvests and Patterns *184*
Salmon and Other Fish: Harvest Methods *184*
Harvest Areas in 2008 ..... *195*
Comparisons with previous findings 208
Overall Harvest Patterns *208*
Salmon *211*
Fish Other than Salmon *215*
Halibut *217*
Large Land Mammals *218*
Marine Mammals *220*
Harvest comparison–evaluation of study year's harvest compared to other recent years 225
Jobs and Income 231
Discussion and Conclusions 240
CHAPTER 5: DISCUSSION AND CONCLUSIONS 243

LIST OF TABLES

Table **Page**

Table 1-1.–Project chronology. 4
Table 1-2.–Project personnel. 5
Table 1-3.–Sample achievement, BSIERP comprehensive survey project, 2008. 8
Table 2-1.–Resources used for subsistence purposes in Akutan, 2008. 14
Table 2-2.–Demographic characteristics of Akutan, 2008. 19
Table 2-3.–Sampling and participation, Akutan. 26
Table 2-4.–Historical population, Akutan, 1950–2010. 27
Table 2-5.–Place of birth of household heads, Akutan, 2008. 28
Table 2-6.–Population profile, Akutan, 2008. 29
Table 2-7.–Harvest and use characteristics, Akutan, 2008. 32
Table 2-8.–Estimated harvests and uses of wild resources in Akutan, 2008. 33
Table 2-9.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Akutan, 2008. 45
Table 2-10.–Estimated harvest of salmon and other fish by gear type, in numbers of fish, Akutan, 2008. 48
Table 2-11.–Estimated harvest in pounds of salmon and other fish, Akutan, 2008. 50
Table 2-12.–Percentage of households harvesting salmon and nonsalmon by gear type, Akutan, 2008. 53
Table 2-13.–Estimated subsistence harvests of salmon, Akutan, 1991, 2002, 2003, and 2008. 71
Table 2-14.–Estimated subsistence harvests of halibut, Akutan, 2003–2010. 72
Table 2-15.–Estimated subsistence harvests of harbor seals, sea lions, and fur seals, Akutan, 1991–2008. 75
Table 2-16.–Changes in patterns of use, Akutan, 2008. 80
Table 2-17.–Reasons for changes in subsistence uses, Akutan, 2008. 82
Table 2-18.–Employment characteristics, Akutan, 2008. 85
Table 2-19.–Employment by industry, Akutan, 2008. 86
Table 2-20.–Akutan income from sources other than employment, Akutan, 2008. 88
Table 2-21.–Comparison of selected study findings for Akutan, 2008. 89
Table 3-1.–Resources used for subsistence purposes in Emmonak, 2008. 96
Table 3-2.–Harvest and use characteristics of Emmonak, 2008. 99
Table 3-3.–Demographic characteristics of Emmonak, 2008. 109
Table 3-4.–Comparison of selected study findings for Emmonak, 2008. 110
Table 3-5.–Employment characteristics, Emmonak, 2008. 111
Table 3-6.–Employment by industry, Emmonak, 2008. 113
Table 3-7.–Estimated harvests and uses of wild resources in Emmonak, 2008. 115
Table 3-8.–Estimated harvest, in pounds of salmon and other fish in Emmonak by gear type, 2008. 124
Table 3-9.–Estimated harvest of large land mammals by month and sex in Emmonak, 2008. 127
Table 3-10.–Estimated harvest of small land mammals by month and sex in Emmonak, 2008. 127
Table 3-11.–Estimated harvest of marine mammals by month and sex in Emmonak, 2008. 128
Table 3-12.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Emmonak, 2008. 131
Table 3-13.–Changes in patterns of use and resource condition, Emmonak, 2008. 144
Table 3-14.–Reasons for using/harvesting less resources in 2008 than in other recent years, Emmonak. 146
Table 3-15.–Reasons for using/harvesting more resources in 2008 than in other recent years, Emmonak. 147
Table 4-1.–Resources used for subsistence purposes in Togiak, 2008. 164
Table 4-2.–Sampling and participation, Togiak, 2008. 168
Table 4-3.–Historical population, Togiak, 1950–2010. 169
Table 4-4.–Demographic characteristics of Togiak, 2008. 171
Table 4-5.–Population profile, Togiak, 2008. 172
Table 4-6.–Place of birth of household heads, Togiak 2008. 173
Table 4-7.–Harvest and use characteristics of Togiak, 2008. 175
Table 4-8.–Estimated harvests and uses of wild resources in Togiak, 2008. 176
Table 4-9.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Togiak, 2008. 187
Table 4-10.–Estimated harvest of salmon and other fish by gear type, in numbers of fish, Togiak 2008. 189
Table 4-11.–Estimated harvest, in pounds of salmon and other fish in Togiak, 2008. 191

Table 4-12.–Percentage of households using gear type to harvest salmon and other fish by gear type, Togiak 2008. 193
Table 4-13.–Estimated subsistence harvests of salmon, subsistence permit returns, Togiak, 1983–2008. 213
Table 4-14.–Harvests of nonsalmon fish, Togiak, 1994, 1999, and 2008. 217
Table 4-15.–Estimated subsistence harvests of halibut, Togiak, 2003–2010. 218
Table 4-16.–Uses and harvests of caribou, moose, and brown bears, Togiak, 1999, 2001, and 2008. 220
Table 4-17.–Estimated subsistence harvests of harbor and spotted seals, Togiak, 1992–2008. 223
Table 4-18.–Changes in patterns of use, Togiak, 2008. 226
Table 4-19.–Reasons for using/harvesting less resources in 2008 than in other recent years. 229
Table 4-20.–Reasons for using/harvesting more resources in 2008 than in other recent years. 229
Table 4-21.–Employment characteristics, Togiak, 2008. 232
Table 4-22.–Employment by industry, Togiak, 2008. 233
Table 4-23.–Togiak income from sources other than employment, 2008. 235
Table 4-24.–Selected study findings for Togiak, 2008. 236

LIST OF FIGURES

Figure **Page**

Figure 1-1.–BSIERP study communities. 3
Figure 2-1.–Aerial view of Akutan Bay and of Akun Island, 2009. 17
Figure 2-2.–View of Akutan Village, 2009. 17
Figure 2-3.–In 2008, the seaplane Grumman Goose was the only air service available for the community of Akutan. 20
Figure 2-4.–ADF&G researcher Tori Cicconi helps conduct training session for local research assistants, Akutan, 2009. 25
Figure 2-5.–Historical population, Akutan. 27
Figure 2-6.–Population profile, Akutan, 2008. 29
Figure 2-7.–Composition of harvest, Akutan, 2008. 42
Figure 2-8.–Top 10 resources harvested ranked by estimated usable weight, Akutan, 2008. 42
Figure 2-9.–Cumulative percentage of harvest, Akutan, 2008. 44
Figure 2-10.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Akutan, 2008. 46
Figure 2-11.–Fish harvests by gear type, Akutan, 2008. 52
Figure 2-12.–Harvest locations and search areas, all resources, 2008, Akutan. 57
Figure 2-13.–Harvest locations and search areas, salmon, Akutan, 2008. 58
Figure 2-14.–Harvest locations and search areas, marine fish, Akutan, 2008. 59
Figure 2-15.–Harvest locations and search areas, trout and Dolly Varden, Akutan, 2008. 60
Figure 2-16.–Harvest locations and search areas, marine mammals, Akutan, 2008. 61
Figure 2-17.–Harvest locations and search areas, shellfish, Akutan, 2008. 62
Figure 2-18.–Harvest locations and search areas, birds, Akutan, 2008. 63
Figure 2-19.–Harvest locations and search areas, berries, plants, and wood, Akutan, 2008. 64
Figure 2-20.–Average number of resources used, attempted to harvest, harvested, received, and given away per household, Akutan, 1990 and 2008. 66
Figure 2-21.–Change in percentage of Akutan households using resources, 1990 and 2008. 67
Figure 2-22.–Estimated harvests by resource category, pounds per person, Akutan, 1990 and 2008. 68
Figure 2-23.–Percentage of total resource harvest by category, Akutan, 1990 and 2008. 68
Figure 2-24.–Percentage change in 2008 in harvests (pounds usable weight per capita) of 10 resources harvested in the largest amounts in 1990, Akutan. 69
Figure 2-25.–Salmon drying on racks, Akutan, 2008 70
Figure 2-26.–Estimated harvests of sea lions and harbor seals, Akutan, 1991–2008. 76
Figure 2-27.–Jars of oil rendered from sea lion (left) and harbor seal (right), Akutan, 2009. 77
Figure 2-28.–Akutan households' assessments of uses in 2008. 81
Figure 2-29.–Reasons for change in use/harvest of any resource category in 2008 compared to other recent years, Akutan. 83
Figure 2-30.–Sources of earned income, Akutan, 2008. 87

Figure 2-31.–Top 10 income sources ranked by estimated amount, Akutan, 2008. 90
Figure 2-32.–Role of commercial fishing in local economy, Akutan, 1990 and 2008. 91
Figure 2-33.–Number of commercial halibut fishery permits held by Akutan residents, 1980–2010. 92
Figure 3-1.–Top 10 resources harvested ranked by estimated usable weight, Emmonak, 2008. 100
Figure 3-2.–Composition of harvest, Emmonak, 2008. 100
Figure 3-3.–Population profile for Emmonak, 2008. 108
Figure 3-4.–Top 10 income sources ranked by estimated amount, Emmonak, 2008. 112
Figure 3-5.–Cumulative percentage of harvest, Emmonak, 2008. 130
Figure 3-6.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Emmonak, 2008. 132
Figure 3-7.–All resources search and harvest areas, Emmonak, 2008. 134
Figure 3-8.–Salmon search and harvest areas, Emmonak, 2008. 135
Figure 3-9.–Nonsalmon (excluding whitefish) search and harvest areas, Emmonak, 2008. 136
Figure 3-10.–Whitefish search and harvest areas, Emmonak, 2008. 137
Figure 3-11.–Moose search and harvest areas, Emmonak, 2008. 138
Figure 3-12.–Small game and furbearer search and harvest areas, Emmonak, 2008. 139
Figure 3-13.–Marine mammals search and harvest areas, Emmonak, 2008. 140
Figure 3-14.–Birds and eggs search and harvest areas, Emmonak, 2008. 141
Figure 3-15.–Vegetation search harvest areas, Emmonak, 2008. 142
Figure 3-16.–Comparison of percentage of households indicating a change in use pattern, Emmonak, 2008. 145
Figure 3-17.–Estimated harvests by resource category, pounds per person, 1980 and 2008, Emmonak. 149
Figure 3-18.–Estimated per capita harvest by resource category, 1980, Emmonak. 150
Figure 3-19.–Estimated per capita harvest by resource category, 2008, Emmonak. 150
Figure 3-20.–Subsistence salmon harvests, 1988–2008, Emmonak. 151
Figure 3-21.–Fish camp locations, Emmonak, 1980 and 2007. 154
Figure 3-22.–Nonsalmon fish harvests, pounds per capita, 1980 and 2008, Emmonak. 155
Figure 3-23.–Wildlife harvests, pounds per capita, 1980 and 2008, Emmonak. 156
Figure 3-24.–Estimated ice seal harvests, 1980, 1998, 1999, and 2008, Emmonak. 157
Figure 4-1.–Historical population, Togiak 170
Figure 4-2.–Population profile for Togiak, 2008. 172
Figure 4-3.–Composition of harvest, Togiak, 2008. 183
Figure 4-4.–Top 10 resources harvested ranked by estimated usable weight, Togiak, 2008. 183
Figure 4-5.–Cumulative harvest in pounds, Togiak, 2008. 185
Figure 4-6.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Togiak, 2008 186
Figure 4-7.–Fish harvests by gear type, Togiak, 2008. 188
Figure 4-8.–All resources search and harvest areas, Togiak, 2008. 196
Figure 4-9.–Salmon search and harvest areas, Togiak, 2008. 197
Figure 4-10.–Marine fish search and harvest areas, Togiak, 2008. 198
Figure 4-11.–Herring search and harvest areas, Togiak, 2008. 199
Figure 4-12.–Freshwater fish search and harvest areas, Togiak, 2008. 200
Figure 4-13.–Moose and brown bear search and harvest areas, Togiak, 2008. 201
Figure 4-14.–Caribou search and harvest areas, Togiak, 2008. 202
Figure 4-15.–Small land mammals search and harvest areas, Togiak, 2008. 203
Figure 4-16.–Marine mammals search and harvest areas, Togiak, 2008. 204
Figure 4-17.–Marine invertebrates search and harvest areas, Togiak, 2008. 205
Figure 4-18.–Birds and eggs search and harvest areas, Togiak, 2008. 206
Figure 4-19.–Vegetation search and harvest areas, Togiak, 2008. 207
Figure 4-20.–Estimated harvests by resource category, pounds per capita, Togiak, 1999 and 2008. 208
Figure 4-21.–Percentage of total resource harvest by category, Togiak, 1999 and 2008. 209
Figure 4-22.–Percentage change in 2008 in harvests (pounds usable weight per capita) of 10 resources harvested in the largest amounts in 1999. 210
Figure 4-23.–Change in percentage of Togiak households using resources, 1999 and 2008. 211
Figure 4-24.–Estimated subsistence harvests of salmon, subsistence permit returns, Togiak, 1983–2008. 214
Figure 4-25.–Estimated harvests of spotted and harbor seals, Togiak, 1992–2008. 224
Figure 4-26.–Togiak households' assessments of uses in 2008. 227

Figure 4-27.–Reasons for change in use/harvest of any resource category in 2008 compared to other recent years, Togiak. 231
Figure 4-28.–Percentage of earned income by industry category, Togiak, 2008. 234
Figure 4-29.–Top 10 income sources ranked by estimated amount, Togiak, 2008. 237
Figure 4-30.–Role of commercial fishing in local economy, Togiak, 1999 and 2008. 238
Figure 4-31.–Number of Bristol Bay commercial set gillnet and drift gillnet permits held by Togiak residents, 1980–2010. 239
Figure 4-32.–Gross earnings by Togiak set gillnet and drift gillnet permits, 1980–2010. 240
Figure 5-1.–Estimated harvests of fish, shellfish, mammals, and birds, pounds usable weight per capita, study communities, 2008. 244
Figure 5-2.–Harvests of fish and shellfish, pounds usable weight per capita, study communities, 2008. 244
Figure 5-3.–Total subsistence harvests pounds per person, Akutan, Emmonak, and Togiak, 2008 and previous study year. 245

LIST OF APPENDICES

Appendix **Page**

Appendix A.–Survey instrument. 254
Appendix B.–Conversion factors, 2008. 280
Appendix C.–Lifetime subsistence use maps, Akutan, 1990. 290

ABSTRACT

This report summarizes the results of systematic household surveys and key respondent interviews in 3 southwest Alaska communities: Akutan in the eastern Aleutian Islands, Togiak in the Bristol Bay area, and Emmonak near the mouth of the Yukon River. The research was part of the local and traditional knowledge (LTK) component of the Bering Sea Integrated Research Program (BSIERP), a multidisciplinary 5-year study funded by the North Pacific Research Board, designed to investigate the implications of climate change for the ecosystem of the Bering Sea. Goals of the LTK component included 1) document, characterize, and quantify local harvest practices, and changes thereto, in order to better understand the relationship between Bering Sea communities and the Bering Sea ecosystem, and 2) document and characterize local understanding of the Bering Sea ecosystem to allow comparison with biological understanding and sharing of knowledge between both ways of knowing. The household surveys found that in the 2008 study year, subsistence harvests of fish, wildlife, and plant resources were substantial in the 3 communities: 327 lb per person in Akutan, 303 lb per person in Togiak, and 482 lb per person in Emmonak. Salmon and other fish comprised the largest portion of these harvests, but land and marine mammals, birds and eggs, and wild plants were important as well. The research also found that changes in subsistence harvests had occurred compared to earlier study years. Harvests dropped in Akutan from 461 lb per person in 1990 to 327 lb in 2008, with lower harvests of sea lions and migratory waterfowl. Harvest quantities in Togiak in 2008 were higher than those of 1999 (246 lb per person); harvests of salmon increased while harvests of large land mammals declined. In Emmonak, the role of moose in the local subsistence economy grew substantially in 2008: moose provided 26% of the total pounds harvested, compared to 6% in 1980. There was also a shift in marine mammal harvests at Emmonak, with a large decline in the harvest of ringed seals but a higher harvest of bearded seals. Respondents offered complex and multifaceted explanations for changes to subsistence harvests and the local environment. Access remains a key to hunting and fishing success. Access is shaped by environmental factors, such as abundance, distribution, weather, ice, and travel conditions. It is also affected by economic factors such as costs of equipment and fuel. There appeared to be a consensus that the ecosystem is changing physically and biologically. There also appeared to be a consensus that economic, social, and cultural changes are taking place as well. Overall, the residents of the 3 Bering Sea study communities have been able to respond to these changes so far, but the future is less clear if such changes intensify or accelerate.

Key words: subsistence hunting, subsistence fishing, subsistence harvests, marine mammals, ecosystem, Akutan, Togiak, Emmonak, Bering Sea, traditional ecological knowledge, Unangan, Aleuts, Yupik

CHAPTER 1: INTRODUCTION

PROJECT BACKGROUND

In 2007, the North Pacific Research Board (NPRB) launched the Bering Sea Integrated Research Program (BSIERP) as part of the "Understanding Ecosystem Processes in the Bering Sea" project, a partnership with the National Science Foundation's "Bering Ecosystem Study" (BEST). This comprehensive 5-year study sought a multi-disciplinary understanding of the eastern Bering Sea ecosystem, noting:

> Climate change and reduced ice cover could significantly impact the Bering Sea ecosystem. We seek to understand the mechanisms that create and sustain this highly productive ecosystem, and how they may be altered over time as our climate changes. (NPRB 2010:3)

A key goal of BSIERP was "ecosystem modeling" to "improve our ability to predict the production and spatial distribution of lower trophic level and forage species, fishes, seabirds, and marine mammals, as well as local impacts on communities and the economy" (NPRB 2010:8). BSIERP was guided by a conceptual framework with 5 hypotheses which addressed ecosystem changes and their consequences (NPRB 2011).

Documenting "local and traditional knowledge" (LTK) was one component of BESIRP/BEST. The NPRB Science Plan (NPRB 2005) defines LTK as "information, understanding, and wisdom accumulated over time based on experience and often shared within a group or community." BSIERP's LTK component had 4 specific objectives:

1. Document, characterize, and quantify local harvest practices, such as species harvested, harvest quantities, search areas, and timing of harvests, and changes thereto, in order to better understand the relationship between Bering Sea communities and the Bering Sea ecosystem.
2. Document and characterize local understanding of Bering Sea ecosystem structure and function to allow comparison with biological understanding and sharing of knowledge between both ways of knowing.
3. Integrate the results of (1) and (2) across the communities involved, identifying key similarities and differences as well as regional trends or associations with particular environmental features.
4. Incorporate the results of (1), (2), and (3) into ecosystem models and other syntheses developed through BSIERP.

Although the LTK component had the potential to address most BSIERP hypotheses, it was most relevant to those that concerned the distribution and abundance of species. The LTK component directly addressed hypothesis 5b, which states:

5. Climate-ocean conditions will change and thus affect the abundance and distribution of commercial and subsistence fisheries. Specifically:
    b. For subsistence users, these changes will lead to: 1) greater reliance on owners of larger vessels that can travel farther to harvest and distribute subsistence goods, 2) decreased consumption of species with decreased local abundance, and 3) adoption of new species into the diet as these species colonize local areas (NPRB 2011).

Five communities participated in the LTK component of the BSIERP project (Figure 1-1). They were chosen to represent the range of association with sea ice among Bering Sea communities. From south to north, the communities were Akutan, St. Paul, Togiak, Emmonak, and Savoonga. The communities also represented a range of linguistic and cultural diversity, with 2 Unangan communities (Akutan and St. Paul), 2 Central Yup'ik communities (Togiak and Emmonak), and a Siberian Yup'ik community (Savoonga). In addition, several Central Yup'ik communities on Nelson Island participated in the BEST project, and provided LTK about changing ocean conditions, weather, and climate (Fienup-Riordan 2011). Harvest surveys were not conducted in the Nelson Island communities as part of BEST.

In addition to the 5 BSIERP study communities, other partners in the LTK component were Henry Huntington, Pew Environment Group, (who was the lead principal investigator for this component); the Division of Subsistence of the Alaska Department of Fish and Game (ADF&G); Ecotrust (which provided data management services); the Alaska Fisheries Center of the National Marine Fisheries Service (co-lead research on LTK in Akutan); Kawerak, Inc. (the regional Alaska Native non-profit organization for the Norton Sound area, which conducted the household harvest survey in Savoonga); and the University of Washington (co-lead research on LTK in Akutan).

The study plan for the LTK component noted that exact methods for documenting subsistence patterns could vary by community, based in part on community preferences and size. The common goal was to compare results with previous harvest survey work in each community and across communities, and to provide quantitative data to contribute to modeling and to serve as a basis for additional LTK research in a later phase of the project.

The Division of Subsistence had lead responsibility for conducting the household surveys that addressed objective one of the BSIERP LTK component in 3 of the study communities: Akutan, Emmonak, and Togiak. Kawarek, Inc. assisted Savoonga with the harvest survey in that community, using data gathering and data analysis methods similar to those employed by ADF&G (Tahbone and Trigg 2011). St. Paul, through its Ecosystem Conservation Office, continued its monitoring programs for fur seals, sea lions, and reindeer (Lestenkof et al. 2011).

Additionally, the Division of Subsistence was responsible for conducting LTK key respondent interviews in Togiak and Emmonak. Those results, along with the findings from Akutan developed by Jennifer Sepez (NMFS) and Eugene Hunn (University of Washington) have been summarized in separate documents, but selected findings were applied to provide context for the survey data in this report.

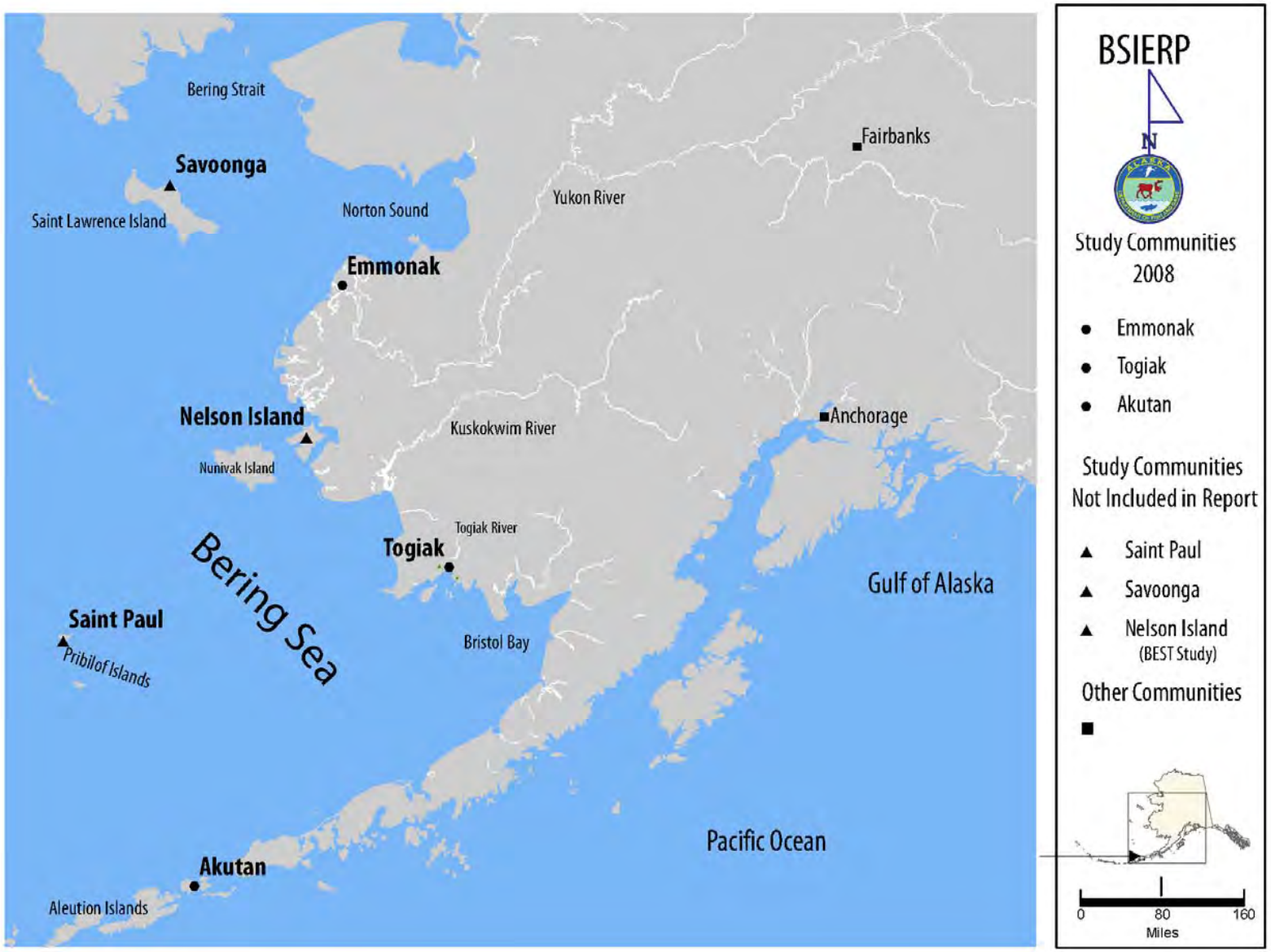

Figure 1-1.–BSIERP study communities.

RESEARCH METHODS

Project Planning

Table 1-1 provides a chronology of the project, with a focus on activities regarding the household surveys and LTK research in Akutan, Emmonak, and Togiak. Table 1-2 lists project personnel who played a role in one or more of the following: designing the household survey, conducting the interviews, performing the data analysis, or writing the final report.

A key feature of the BSIERP LTK component was the formation of a Regional Advisory Board (RAB), composed of representatives of each partner organization and the study communities. The RAB served as a forum for discussion and decision making about all aspects of the project, including study designs, scheduling, and review of findings. A Community Advisory Board (CAB) was also formed in each of the 5 study communities to provide guidance to the project at the community level.

The first meeting of the RAB took place in Anchorage on January 24, 2008. At that meeting, division staff presented an overview of household survey methods (including examples of survey instruments), data analysis methods, and previous survey findings for Akutan, Emmonak, and Togiak.

Table 1-1.–Project chronology.

Date	Activity
August 21–22, 2007	Initial project planning and organizational meeting, NPRB offices, Anchorage
September 17–19, 2007	Principal Investigator (PI) meeting, Seattle
January 24, 2008	RAB meeting, Anchorage
March 8, 2008	Approval of final study plan by NPRB
October 13, 2008	RAB meeting, Girdwood
October 14–16, 2008	PI meeting, Girdwood
December 11, 2008	CAB meeting, Akutan and teleconference
February 23, 2009	CAB meeting, Togiak
February 5–28, 2009	Survey administration in Togiak
March 27–April 2, 2009	Survey administration in Akutan
April, 2009	Survey administration in Emmonak
October 12, 2009	Presentation of preliminary findings, RAB meeting, Girdwood
October 13, 2009	Presentation of preliminary findings, PI meeting, Girdwood
February 10 and 12, 2010	Public meetings to review draft study results, Togiak
February 2010	LTK and ethnographic interviews, Togiak
September 2010	Ethnographic and LTK interviews, Emmonak
October 19–21, 2010	RAB meeting, Anchorage
March 21, 2011	RAB meeting, Anchorage
March 22–24, 2011	PI meeting, Anchorage
April 2011	LTK and ethnographic interviews, Emmonak
September 14–17, 2011	Presentation of study findings, Fishing People of the North Symposium, Anchorage
October 31, 2011	Draft final report prepared for review
February 24, 2012	Deadline for submission of summary paper, *Deep Sea Research*
March 28–30, 2012	PI meeting, Anchorage
December 31, 2012	Final report on LTK component completed

Table 1-2.–Project personnel.

Task	Name
Overall project design and coordination	James Fall
Akutan survey administration	Lisa Hutchinson-Scarbrough
	Victoria Ciccone
	Samantha Fairbanks, local assistant
	Jacob Stepetin, local assistant
	Karen Vincler, local assistant
	Jennie Webster, local assistant
Emmonak survey administration	Caroline Brown
	Josh Wisniewski
	James Van Lanen
	Nicole Braem
	Daisy Lamont, local assistant
	Fortuna Manumik, local assistant
	Louis Immamak, local assistant
	William Jimmy, local assistant
	Louis Kelly, local assistant
Togiak survey administration	Ted Krieg
	Josh Wisniewski
	Victoria Ciccone
	Jory Stariwat
	Bessie Gonzalez, local assistant
	Helen Gregorio, local assistant
	Karen Kasak, local assistant
	Mary Sergie, local assistant
Data analysis	David Koster
	Brad Robbins
Data entry	Chloe Dunlap
	Analin Lazatin
	River Ramuglia
Map production	Terri Lemons
Editorial review lead	Lisa Ka'aihue

Note All with Division of Subsistence, ADF&G, unless otherwise noted as a "local assistant."

Guiding Ethical Principles

The project was guided by the research principles adopted by the Alaska Federation of Natives in 1993 and the Interagency Arctic Research Policy Committee, June 28, 1990 (see Miraglia 1998). These principles emphasize community approval of research designs, informed consent of participants, anonymity of study participants, community review of draft study findings, and the provision of study findings to each study community upon completion of the research.

In this project, the research design was developed with guidance from the Community Advisory Board in each community. Review and approval of research plans was obtained from study community governments. Informed consent was obtained from household members selected for interviewing. Confidentiality of individual and household-level data is maintained in this report and in publically-accessible databases. Study communities had an opportunity to review the draft findings during community meetings and commenting on the draft final report. Copies of the final report were provided to each community.

Data Collection Methods: Survey Instrument

The primary method for collecting information about contemporary subsistence harvests and uses, community demography, and the kinds of jobs and sources of cash income in the 3 study communities was a systematic household survey. The survey followed procedures established in previous rounds of household interviews in Togiak (Coiley-Kenner et al. 2003) and Akutan (Community Subsistence Information System [CSIS[1]], and used by the Division of Subsistence throughout the state (Fall 1990). The survey instrument was modeled after those administered by the Division of Subsistence and its research partners during previous rounds of research in Togiak and Akutan, and in approximately 200 other Alaska communities (see Appendix A). Information was collected for a 12-month study year, calendar year 2008.

Key topics for data collection during the household surveys included the following:

1. Subsistence harvest and use information;
    a. Whether the household used, attempted to harvest, harvested, received, or gave away each wild resource;
    b. Harvest quantities in numbers of animals, buckets, gallons, or other appropriate units;
    c. Households' assessments of uses and harvests in the study year compared to other recent years, and reasons for differences;
    d. Harvest locations in the study year;
    e. Individual involvement in subsistence activities, including the involvement of children;
2. Demographic information, including, for each household member, age, sex, ethnicity, birthplace, and length of residency in the community;
3. Employment and cash income, including jobs held by household members, occupational type, employer type, earned cash income, and other income;
4. Households' comments and concerns: open ended responses.

The survey instrument was not designed for self-administration. Rather, teams of researchers (Division of Subsistence staff and local researchers) administered the survey in face-to-face interviews in the study communities. A detailed training manual, developed during previous rounds of surveys throughout the state, guided the orientation of local researchers. Orientation sessions took place in each study community before the surveys began.

1. ADF&G CSIS: http://www.adfg.alaska.gov/sb/CSIS//. Hereinafter cited as CSIS.

Mapping Methods

During household interviews, the researchers asked respondents to indicate the locations of their hunting, fishing, and gathering activities during the 2008 study year. In addition, interviewers asked the respondents to mark on the maps the sites of each harvest, the species harvested, the amounts harvested, and the months of harvest. Points were used for harvest locations and polygons (circled areas) were used for search areas. Some lines were also drawn in order to depict trap lines or courses taken during fishing.

The base maps were produced by Division of Subsistence staff using ArcGIS 9.3 software[2] on 11″ x 17″ paper. Maps were organized by writing the community identification number, the household's identification number, the survey date, and the interviewer's initials on each map.

In Togiak, researchers used a set of 4 paper maps: 1) a map covering the Togiak Bay, Nushagak Bay, the western coast north to Quinhagak in Lower Kuskokwim Bay and the inland area up to and including Nuyakuk Lake at a scale of 1:750,000; 2) a map covering the general area around Togiak, mostly inland, at a scale of 1:500,000; 3) a map covering the general area around Togiak, mostly seaward, at a scale of 1:249,000; and 4) a map generally centered on the Togiak River valley including portions of Togiak Bay and Togiak Lake.

There were also 4 base maps prepared for use in Akutan: 1) a large area that showed Akutan Island, Akun Island, and all the Fox Islands to the south; 2) a map of just Akutan Island and Akun Island together (used for almost all the mapping; 3) a map of the Fox Islands south of Akutan; and 4) a map of the west side of Akutan Island and Unalga Island (which was not used because no activities took place there during the study year).

In Emmonak, researchers mapped using two 1:500,000 scale maps printed on 11″ x 17″ paper. The first, vertically-oriented map displayed the lower Yukon River Delta from the community of St. Mary's to the coast, with the Black River and Kusilvak Mountain at the western extent and the mouth of the Pastolik River to the north and east. The second, horizontally-oriented map also depicted the Yukon River Delta, but extended farther east into the Andreafsky Mountains and not as far south along the Yukon River. Researchers noted afterwards that mapping in such a delta environment with so much water (numerous interconnected small sloughs, lakes, and rivers) was particularly challenging. At the scale used in this project, 1:500,000, there were so many small waterways that they were nearly indistinguishable—simplifying the map by removing some of the smaller sloughs and lakes removed some of the "noise" but made it difficult for some respondents to trace their travel routes. In future, those seeking to map subsistence use areas would do well to include maps in their fieldwork materials at the 1:250,000 or even a 1:100,000 scale, using larger format paper than 11″ x 17″, if necessary.

Some mapping procedures differed from researcher to researcher. Some researchers chose to do the mapping while conducting the survey; that is, mapping each resource as it came up in the interview. Others chose to map harvest areas immediately following the survey.

Division of Subsistence staff checked all maps for consistency by matching them to the survey forms at the end of each work day. They also removed extraneous marks from the maps to make sure the digitizing process would go as smoothly as possible. The maps were designed with tick marks marking geographical points that could be recorded for accuracy when digitizing occurred. Each map was registered by the GIS software using these points and then ADF&G staff digitized the polygons, points,

2. Product names are given because they are established standards for the State of Alaska or for scientific completeness: they do not constitute product endorsement.

and lines that field staff had hand-drawn on the paper maps during the interviews. From this data set, ADF&G produced the maps for this report.

Sample Goals and Achievement

The goal was to interview a random sample of households in Togiak and Emmonak. Because of its small size, a census sample was attempted in Akutan. Participation was voluntary. Table 1-3 provides a summary of sample achievement in the 3 study communities. In total, 225 household surveys were conducted, including 36 in Akutan (90% of all resident households), 109 in Emmonak (a 61% random sample), and 80 in Togiak (a 43% random sample). For more detail, see each individual community chapter.

Table 1-3.–Sample achievement, BSIERP comprehensive survey project, 2008.

	Akutan	Emmonak	Togiak
Initial estimate, number of dwelling units	37	181	197
Interview goal, number of households[a]	40	91	80
Households interviewed	36	109	80
Households failed to contact	1	17	10
Households declined to be interviewed	3	29	43
Moved/nonresident households[b]	+3	-2	-9
Total households attempted to interview	39	138	123
Refusal rate	7.7%	21.0%	35.0%
Final estimate of permanent households	40	179	188
Percentage interviewed	90.0%	60.9%	42.6%
Interview weighting factor[c]	1.11	1.64	2.35
Sampled population	72	480	341
Estimated population	80.0	788	801

Source ADF&G Division of Subsistence household surveys, 2009.

a. Random samples selected in Emmonak and Togiak.

b. Nonresident households had lived in the community less than 3 months during the study year.

c. The interview weighting factor is the value by which each observation is multiplied to expand for households that were not contacted. This computational approach to mean replacement is described in Cochran (1977).

Survey Administration

Surveys took place in Togiak in February 2009, in Akutan in late March and early April 2009, and in Emmonak in April 2009. To reduce respondent burden, efforts were made to coordinate the surveys with other subsistence data collection efforts administered by the Division of Subsistence and its project partners. These include subsistence salmon permits in Togiak, marine mammal surveys in Akutan and Togiak, subsistence halibut surveys in all 3 communities, and migratory bird surveys in Akutan. For more detail on survey administration, see each individual community chapter.

Data Analysis

All data were coded by Division of Subsistence staff following standardized codebook conventions to facilitate data entry. Staff within the division's Information Management Section set up database structures within an MS SQL Server at ADF&G in Anchorage to hold the survey data. The database structures included rules, constraints, and referential integrity to insure that data were entered completely and accurately. All data were entered twice, and compared programmatically for inconsistent data entry. Double data entry ensures more accurate transfer of information from the coded survey forms into the database, and is a standard practice with data processing for the Division of Subsistence. After data were entered and confirmed, information was processed with the Statistical Package for the Social Sciences (SPSS). Initial processing included the performance of standardized logic checks of the data. Logic checks are often needed in complex data sets where rules, constraints, and referential integrity do not capture all of the possible inconsistencies that may appear. Harvest data collected as numbers of animals, or in gallons or buckets, were converted to pounds usable weight using standard factors (see Appendix B for conversion factors).

SPSS was also used for analyzing the survey information. Analysis included review of raw data frequencies, cross tabulations, table generation, estimation of population parameters, and calculation of confidence intervals for the harvest estimates. Missing information was dealt with situationally. The Division of Subsistence has standardized practices for dealing with missing information, such as minimal value substitution or use of an average response for similarly characterized households.

Harvest estimates and responses to all questions were calculated based upon the application of weighted means (Cochran 1977). These calculations are standard methods for extrapolating sampled data. As an example, the formula for harvest expansion is

$$H_i = \bar{h}_i S_i \qquad (1)$$

where:

$\bar{h}_i = \frac{h_i}{n_i}$ (mean harvest per returned survey)

H_i = the total harvest (numbers of resource or pounds) for the community I,

h_i = the total harvest reported in returned surveys,

n_i = the number of returned surveys, and

S_i = the number of households in a community.

As an interim step, the standard deviation (SD), or variance (V; which is the SD squared), was also calculated with the raw, unexpanded data. The standard error (SE), or SD, of the mean was also calculated for each community. This was used to estimate the relative precision of the mean, or the likelihood that an unknown value would fall within a certain distance from the mean. In this study, the relative precision of the mean is shown in the tables as a confidence limit (CL), expressed as a percentage. Once the standard error was calculated, the CL was determined by multiplying the SE by a constant that

reflected the level of significance desired, based on a normal distribution. The constant for 95% confidence limits is 1.96. Though there are numerous ways to express the formula below, it contains the components of an SD, V, and SE.

Relative precision of the mean (CL%):

$$CL\ \%\ (\pm) = \frac{t_{\alpha/2} \times \frac{s}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}}{\bar{x}} \qquad (2)$$

where:

$s =$ sample standard deviation,

$n =$ sample size,

$N =$ population size, and

$t_{\alpha/2}$ = Student's *t* statistic for alpha level (α=.95) with n–1 degrees of freedom, and,

$\bar{x}$ = mean harvest.

Small CL percentages indicate that an estimate is likely to be very close to the actual mean of the sample. Larger percentages mean that estimates could be further from the mean of the sample.

The corrected, final data from the household survey will be added to the Division of Subsistence CSIS. This publicly-accessible database includes community-level study findings.

Project staff compiled harvest data from other sources for comparisons with the 2008 survey results and for development of time series to help discern harvest trends. These data sets included results of previous household surveys by the Division of Subsistence, which collected comprehensive harvest data for 1980 for Emmonak (Wolfe 1981), 1990 for Akutan (CSIS), and 1999–2000 for Togiak (Coiley-Kenner et al. 2003); and data collection efforts which focused on specific resources, such as salmon, large land mammals, halibut, and marine mammals.

Data Review and Reporting

A workshop to review preliminary survey results involving division project staff took place in Anchorage on September 1, 2009. Participants reviewed draft findings, compared community results, and planned for presentations for the RAB and Principal Investigator (PI) meetings in October 2009.

At the RAB in Girdwood, Alaska, on October 12, 2009, division staff presented preliminary survey findings for the 3 communities and compared the results with those from other years. A presentation of draft study findings was also made at the PI meeting in Girdwood, on October 13.

Following these initial rounds of data review and cleaning, project personnel planned to travel to each study community for a preliminary review and discussion of the survey findings. Reviews took place in Togiak on February 10 and 12, 2010. In February 2010, arrangements were made for 5 key harvesters from Akutan to review the study findings, after attempts to organize a community meeting were unsuccessful. Data review occurred in Emmonak during the month of August, 2012**.**

Following review of the draft final report, it was revised to be part of the Division of Subsistence Technical Paper Series. Reports in the Technical Paper Series are available on line at www.adfg.alaska.gov/sf/publications/ Survey data at the community level also appear in the CSIS.

Selected findings from the surveys were also summarized in a paper to be included in a special issue of the journal *Deep Sea Research* that features findings from the BSIERP project. This technical paper was also incorporated with others from the LTK component in a final report to the NPRB.

CHAPTER 2: AKUTAN

This chapter summarizes findings from the comprehensive subsistence harvest household surveys conducted in Akutan, in 2008 by the Division of Subsistence, ADF&G. This summary includes a community description and history, methods of research, 2008 demographic characteristics, employment and income, harvest estimates, and harvest area maps. Comparative data from a previous baseline subsistence survey conducted in Akutan in 1990 by the Division of Subsistence are included as well. Complete results of both surveys were reviewed by the several active subsistence harvesters in Akutan prior to publication and are available as part of the CSIS.

Applicable information from the subsequent key respondent interviews about local and traditional knowledge has been included in this chapter to provide context for the survey findings. Because this key respondent research was conducted independently of the harvest survey research and explored a broader set of topics, the complete summary of these interviews by co-principal investigators Jennifer Sepez and Eugene Hunn is not included in this report, but is available as a separate document (Hunn and Sepez 2010).

As part of the LTK component of the BSIERP, in late March and early April 2009, ADF&G Division of Subsistence researchers visited Akutan, and with the assistance of 4 local researchers, conducted comprehensive subsistence harvest surveys and harvest area mapping with 36 out of 40 total households (90% of households). Because not all households were interviewed, harvest estimates were expanded to account for the non-participating households. Residents of Akutan harvested an estimated 327 edible lb per person of fish, marine and land mammals, shellfish, birds and their eggs, and wild plants in 2008, with a community total of 26,909 lb. Though a significant harvest was documented in 2008, there has been a decline since 1990, when Akutan per capita harvests of local resources averaged 461 edible pounds per person. Demographic changes have occurred as well since 1990, with the number of households increasing from 31 households to 40 but the total population declining from 102 people in 1990 to 82 in 2008.

By resource category, salmon provided the greatest proportion of Akutan's 2008 wild resource harvest in usable lb per person (45%), followed by fish other than salmon (25%), marine invertebrates (10%), marine mammals (8%), and combined, wild plants, birds, eggs and land mammals (12%). Every household in Akutan used (harvested and/or consumed) as well as received (sharing from other household) at least 1 subsistence resource and the average was 12 resources received and 17 used per household. Table 2-1 lists the resources used for subsistence purposes in Akutan in 2008, along with their scientific and Unangan (Aleut) names. Most (97%) Akutan households attempted to harvest at least 1 resource in 2008, with a household average of 9 resources harvested and maximum of 38 resources harvested. In 2008, Akutan households on average used fewer resources than in 1990, when households averaged 31 resources used with a maximum of 69 resources used by any household.

Table 2-1.–Resources used for subsistence purposes in Akutan, 2008.

Common English name	Scientific name	Unangan name, Eastern dialect[a]	Unangas name, Western/Atkan dialect[a]	Other names
Fish				
Pacific salmon				
Chinook salmon	*Oncorhynchus tshawytscha*	*Chavichax̂*	*Chavichax̂/Sumgax̂*	King salmon
Sockeye salmon	*Oncorhynchus nerka*	*Aanux̂*	*Haanux̂*	Red salmon
Coho salmon	*Oncorhynchus kisutch*	*Qakiidax̂*	*Qakiidax̂*	Silver salmon
Chum salmon	*Oncorhynchus keta*	*Xaykix̂*	*Xaykux̂*	Dog salmon
Pink salmon	*Oncorhynchus gorbuscha*	*Adgayux̂/Qungaayux̂*	*Adgayux̂/Qungaayux̂*	Humpies
Pacific halibut	*Hippoglossus stenolepis*	*Chagix̂*	*Chagix̂*	Halibut
Cods				
Pacific cod	*Gadus macrocephalus*	*Atxidax̂*	*Atxidax̂*	Gray cod
Pacific tomcod	*Microgadus proximus*		*Atxidam chiidaa*	
Sculpins	*Cottus* spp.			
Irish lord	*Hemilepidotus* spp.	*ikayax̂*	*Hmiikaayax̂*	Red sculpin
Yellow Irish lord	*Hemilepidotus jordani*	*Kaalagaadax̂*	*Kalagax̂*	Yellow sculpin
Slimy sculpin	*Cottus cognatus*	*alaamusax̂*	*Kuhyux̂/Araamuchux̂*	Bullhead sculpin
Sablefish	*Anoplopoma fimbria*	*Atxidam Qaxchikdaa*	*Atxidam qaxchikdaa*	Blackcod
Walleye pollock	*Theragra chalcogramma*			Pollock
Flounders/soles		*Taadmaayux̂*	*Taadaayux̂*	
Yellowfin sole	*Limanda aspera*			
Rockfishes				
Black rockfish	*Sebastes melanops*	*Qaxchiiikux̂/Uukunax̂*	*Tukux̂*	Black bass
Red Rockfish	*Sebastes spp.*		*Tukum uluudaa*	Red bass
Greenlings				
Greeling (Pogies)	*Hexagrammos decagrammus*	*Sx̂iigix̂/Agugim qaa*	*Sx̂iigix/Sxiix̂*	Kelp greenling
Greeling (Pogies) roe	*Hexagrammos decagrammus*	*Uhngulĝun*	*Umĝuulus*	Pogie roe
Atka mackerel	*Pleurogrammus monopterygius*	*Tmadgix̂*	*Tmadgix̂*	Yellow perch
Chars				
Dolly Varden	*Salvelinus malma*	*Qaadax̂/Sadgunix̂*	*Qaadax̂*	
Lake trout	*Salvelinus namaycush*	*Hanim Qaa/Anim Qaa*	*Hanim qaadaa*	
Marine invertebrates				
Crabs				
Dungeness crab	*Cancer magister*	*Qimgiitix̂*	*Qimgitix̂*	
King crab	*Paralithodes camtschaticus*		*Qimgitiigamax*	
Tanner crab				
Tanner crab, bairdi	*Chionoecetes bairdi*	*Missing from survey*	*Qimgitix̂*	
Snow crab	*Chionoecetes opilio*	*Missing from survey*		Tanner crab, opilio
Octopuses, common	*Octopus vulgaris*	*Ilgaagux̂/Amgux̂*	*Aaqanax̂*	
Scallops[b]				
Sea urchins[b]		*Agugĝnax̂/Aguĝaadax̂*	*Agugĝnax̂*	Sea eggs
Chitons				
Black chiton	*Katharina tunicata*	*Qasuqix̂/Qasiiqux̂*	*Kasuqix̂*	Bidarkis
Gumboot chiton	*Cryptochiton stelleri*	*Agamgix̂*	*Agamgix̂*	Red chiton
Blue mussels	*Mytilus trossulus*	*Waygix̂*	*Waygix̂*	
Clams		*Chalax̂*	*Chalax̂*	

-continued-

Table 2-1.–Page 2 of 3.

Common English name	Scientific name	Unangan name, Eastern dialect[a]	Unangas name, Western/Atkan dialect [a]	Other names
Marine invertebrates, continued				
Razor clam	*Siliqua* spp.	*Chalax̂*	*Chalax̂*	
Butter clam	*Saxidomus gigantea*	*Chalax̂*	*Chalax̂*	
Pacific littleneck	*Protothaca staminea*			Littleneck clam, steamer clam
Land mammals		*Algax̂*		
Large land mammals				
Moose	*Alces alces*			
Caribou	*Rangifer tarandus*	*Itx̂ayax̂*	*itx̂aygix̂*	
Sitka black-tailed deer	*Odocoileus hemionus sitkensis*		*Itx̂aygikuchax̂*	
Feral cattle	*Bos taurus*	*Kuruuvax̂*	*Kuruuvax̂*	
Marine mammals				
Harbor seal/spotted seal	*Phoca vitulina, Phoca largha*	*isux̂*	*isux̂/isuĝix̂*	
Steller sea lion	*Eumetopias jubatus*	*qawax̂*	*qawax̂*	
Northern fur seal	*Callorhinus ursinus*	*Laaqudax̂*	*Hlaaqudax̂*	
Whale[b]		*Alax̂*	*Alax̂*	
Birds		*San*	*Sas*	
Geese				
Emperor goose	*Chen canagica*	*Qamgaangix̂*	*Qagmangix̂*	Beach goose
Ducks				
Mallard	*Anas platyrhynchos*	*Aaĝix̂*	*Aaĝix̂*	
Greater scaup	*Aythya marila*	*Kuchutux̂*	*Kuchutux̂*	Bluebill
Green-winged teal	*Anas crecca*	*Atax̂chiiyax̂*	*Qiix̂chiidax̂*	European teal
Common merganser	*Mergus merganser*	*Aĝlaayax̂*	*Aĝlaayax̂*	
Bufflehead	*Bucephala albeola*	*idmitxix̂*	*Midimitxix̂*	Butterball
Common goldeneye	*Bucephala clangula*		*Hanim kamgituu*	Whistlers
Harlequin duck	*Histrionicus histrionicus*	*Kaahngadgix̂*	*Kaaxadgix̂*	Rock duck
White-winged scoter	*Melanitta fusca*	*Tamgaalux̂*	*Tamgaalux̂*	
Steller's eider	*Somateria spectabilis*		*Saakux*	
Puffins				
Tufted puffin	*Fratercula cirrhata*	*Uxchux̂*	*Uxchux̂*	
Horned puffin	*Fratercula corniculata*	*Qagidax̂*	*Qagidax̂*	
Shorebirds				
Black oystercatcher	*Haematopus bachmani*	*Iix*	*Hiigix̂/Hiix*	Black snipe
Upland game birds				
Willow ptarmigan	*Lagopus lagopus*	*Aĝdiikax̂*	*Aĝdiikax̂*	
Eggs				
Gull eggs[b]		*Slukam Saamlangin*	*Slukam Saahlangis*	Large, glaucous-wing
Unknown gull eggs[b]				
Black oystercatcher eggs[b]		*Iigim Saamlangin*	*Hiigim Saahmlangis*	Black snipe

-continued-

Table 2-1.–Page 3 of 3.

Common English name	Scientific name	Unangan name, Eastern dialect[a]	Unangas name, Western/Atkan dialect [a]	Other names
Vegetation		*Hitnisan*	*Hitnisas*	
Berries				
Strawberry	*Fragaria virginiana*	*Tudanguŝ*	*Tudaanguŝ*	
Blueberry	*Vaccinium* spp.	*Unignaŝ*	*Unignaŝ*	
Lowbush cranberry	*Vaccinium vitis idaea*	*Kiikaŝ*		
Salmonberry	*Rubus spectabilis*	*Alagnaŝ*		Cloudberry
Crowberry		*Qaayuŝ*	*Aangsus*	
Mossberry		*Qaayuŝ*	*Aangsus*	
Other plants				
Fireweed	*Epilobium angustifolium*	Kimliiyaŝ	Chikayaasiŝ	
Cow parsnip	*Heracleum lanatum*	*Saaqudaŝ*	*Taaĝan'giŝ*	Wild celery
Wild parsley (Petruski)	*Pastinaca* spp.	*Qanasiŝ*	*Pitruuskiŝ*	
Wild parsley (Putchkie)	*Pastinaca* spp.	*Saaqudiigamax*	*Saaqudaŝ*	
Wild rhubarb	*Polygonum alaskanum*	*Quugulnaadaŝ*	*Qugulinaŝ*	
Chocolate lily	*Fritillaria camschatcensis*	*Saranaŝ*	*Alugaŝ*	Rice roots (bulbs)
Minkin grass/ swamp grass[b]		*Miiniaŝ*[c]	*Biinikaŝ*[c]	
Yarrow	*Achillea millefolium*	*Chngaatuudaŝ*	*Saahmikaadaŝ*	
Wormwood	*Artemisia tilesii*	*Sixsiqaŝ*	*Sixsiqaŝ*	
Wood[b]		*Iklaŝ*	*Iklaŝ*	

Sources Moses Dirks and ADF&G Division of Subsistence household surveys, 2009.

a. Blank cell indicates that a specific Unangan name was not verified.

b. A specific species was not identified.

c. Name is of Russian origin.

ABOUT AKUTAN

Akutan is located on Akutan Island, in the eastern Aleutian Island archipelago, 35 miles east of the city of Unalaska/Dutch Harbor and approximately 766 air miles southwest of Anchorage (Figure 2-1). It is situated on the eastern side of Akutan Island, on a flat piece of land with the steep slope of a mountain rising behind the village, confining the community to a small area. Akutan is situated on the north shore of Akutan Bay, a large deep body of water protected by the island's active volcano (also called "Akutan") that blocks much of the prevailing easterly winds of the Aleutian Islands. The bay accommodates large vessels, including floating processors, and large container and cargo ships that service both Akutan as well as the large adjacent shore-based seafood processing facility, Trident Seafoods (Trident). Established at its present location in the 1980s, Trident replaced numerous floating seafood processors that earlier occupied Akutan Harbor. The Trident facility leases some of the land it uses from the Akutan Village Corporation. At the time of writing, it was the largest seafood processing facility as well as one of North America's busiest fishing and shipping ports. This facility processes Bering Sea-caught seafood products year-round and during peak periods employs and houses more than 1,000 people, with imported labor from around the world.[3]

3. Trident Seafoods. 2011. Alaska plants. http://www.tridentseafoods.com. (Accessed 2012).

Figure 2-1.–Aerial view of Akutan Bay and of Akun Island, 2009.
Trident Seafoods is in the foreground and the community of Akutan is in the background, with adjacent Akun Island seen in the distance.

Figure 2-2.–View of Akutan Village, 2009.

Akutan is part of the Aleutians East Borough. Present in the community are 2 local governments, the Native Village of Akutan (a federally recognized tribe with an active tribal council) and the City of Akutan (incorporated as a second class city in 1979). The City of Akutan represents populations that reside in the village of Akutan, with about 82 residents, most of whom are of Alaska Native ancestry (Table 2-2), as well as Trident employees who reside in dormitories at the facility (U. S. Census Bureau 2011a). For this study, research was only conducted with residents of the village and did not include those working and residing at the Trident facilities. The Akutan Corporation, with its headquarters in the community, is an Alaska Native for-profit or non-profit village corporation organized under the provisions of the Alaska Native Claims Settlement Act (ANCSA).

In 2008 there was very little interaction apparent between the 2 populations. Only one resident of the village was employed full-time by Trident and a few others worked part-time as longshoremen. Occasionally some Trident workers or transient fishers visited the village to eat at the local restaurant, or frequent the local bar. Akutan village residents also occasionally ate at the Trident mess hall or went to the Trident dock to obtain bycatch from fishing boats—most commonly octopuses that were taken home for consumption or used for commercial or subsistence fishing bait. Some socialization also occurred at the Safe Harbor Church and Community Center, a non-denominational church and community recreation center situated between the village and Trident. It was built by Trident about 10 years ago with the intent to provide meeting and exercise space for both populations.

Table 2-2.–Demographic characteristics of Akutan, 2008.

Sampled households	36
Number of households in the community	40
Percentage of households sampled	90.0%
Estimated population	82.2
Household size	
Mean	2
Minimum	1
Maximum	5
Age	
Mean	37.7
Minimum	1.0
Maximum	81.0
Median	41.0
Length of residency–population	
Mean	25.3
Minimum	1.0
Maximum	81.0
Length of residency–household heads	
Mean	31.2
Minimum	1.0
Maximum	81.0
Sex	
Males	
Number	52.2
Percentage	63.5%
Females	
Number	30.0
Percentage	36.5%
Alaska Native	
Households (either head)	
Number	35.6
Percentage	88.9%
Estimated population	
Number	66.7
Percentage	81.1%

Source ADF&G Division of Subsistence household surveys, 2009.

Boardwalks connect the homes and facilities for foot and ATV traffic. Except for a one mile-long road that leads from the village to Trident, there are no roads in Akutan. Akutan village houses a limited number of community facilities and organizations including the city, tribal, and village corporation offices, a local store, the historic St. Alexander Nevsky Russian Orthodox Church, a K-12 state school, the Anesia Kudrin Memorial Tribal Health Care Clinic, a jail, a new seasonally-operated restaurant (Bay View Cafe) owned by the City of Akutan, and a locally-owned bar (Akutan Roadhouse Bar). The Akutan Corporation rents apartments to visitors in the Bayview Plaza Hotel and the Salmonberry House. Akutan village has its own small boat harbor, boat dock, and seaplane base, serviced by a Grunman Goose (Figure 2-3) but no airstrip because the steep topography of Akutan Island prohibits one. However, in 2008, the City of Akutan and Trident worked cooperatively on a project to build a 4,500-foot-long runway on the adjacent Island of Akun that would include hovercraft ferry service to provide transportation between Akutan and Akun islands. The project was expected to be completed in 2012.

Other projects scheduled to occur on Akutan Island in 2012 include a new harbor located at the head of Akutan Bay, as well as geothermal exploration and a hydroelectric project.[4]

Figure 2-3.–In 2008, the seaplane Grumman Goose was the only air service available for the community of Akutan.
A runway on Akun Island, scheduled to be built in 2012, will likely make this historic seaplane service obsolete.

Geographic Setting

The Aleutian Archipelago consists of a chain of more than 70 islands that extends 1,500 miles from the Alaska Peninsula southwest toward Russia, and includes the Pribilof Islands to the north in the Bering Sea. The islands form a boundary between 2 major water bodies: the Pacific Ocean to the south and the Bering Sea to the north. The Aleutian Archipelago has a maritime climate, which is generally cloudy, wet, windy, and stormy, with prevailing winds blowing northeasterly from Japan. Average winter temperatures range from 27–37 degrees Fahrenheit, and summer temperatures range from 45–57 degrees Fahrenheit. Annual precipitation averages range between 30 and 63 inches per year. The islands are primarily mountainous and volcanic in origin and earthquakes are frequent.[5] The islands and adjacent waters are resource-rich with various species of fish and marine mammals, productive intertidal reefs, and bird rookeries. While they are not indigenous, caribou, feral cattle, and red foxes are present on many of the islands.

4. Aleutian East Borough. 2012. "In the loop," July 3, 2012 newsletter. www.aleutianseast.org. (Accessed July 2012).
5. Western Regional Climate Center. 2012. http://www.wrcc.dri.edu/. Accessed July 2012.

Cultural History of the Eastern Aleutian Islands

The Aleutian Islands are the ancestral home to the *Unanga{* (plural) (*Unangan*—eastern dialect; *Unangas*— western dialect) people—meaning "coastal people" or "people of the sea" or "seasiders" (Bergsland and Dirks 1993; M. Dirks, Unangam tunuu teacher and linguist, Anchorage, personal communication, 2012). More commonly known as "Aleut,"[6] the name given to them by early Russian explorers, the Unangan/Unangas have resided throughout the Aleutian Islands for more than 9,000 years, according to Unanga{ oral accounts and archaeological records (Lantis 1970; Ounalaska Corporation 2002; Veltre 1999; Veltre and Veltre 1982).

As evident from their long existence in the Aleutian Islands, the Unangan people developed a maritime culture superbly adapted to the sea as the source of most food and resources used for survival. The Aleutian Islands provided abundant resources for sustenance and fabrication of tools, clothing, and shelter, and enabled the Unangans to maintain fixed village locations. The Unangan people remain skilled seamen, hunters and fishers, and craftsmen of boats, homes, clothing, art, tools and other equipment. They use many natural resources including marine mammals, birds and their eggs, fish, marine invertebrates, and plants. Prehistorically, and up until the 1930s, travel, hunting, and fishing often required the use of finely constructed kayaks, commonly known as *baidarka* (Russian) or *iqya{* (Unangan). They were constructed out of driftwood and covered with skins of marine mammals (sea otters and sea lions). Intestinal linings of marine mammals were used to make rain parkas, hats, and boots, and the esophagi were used for boot leggings; all of these items of clothing were worn by the hunter in his kayak to help keep him dry. Other inedible resources, such as driftwood, stone, grass, and animal parts such as skins, innards, and bones, were used for clothing and to manufacture boats, tools, and homes (Veltre 1999).

The Unangan traditionally built and resided in large semi-subterranean homes commonly called *barabaras* (Russian) or *ula{* (Unangan) that were constructed from driftwood, whale bone, and stone. These dwellings were used until the early 20th century when framed above-ground homes with windows were introduced following contact (Ounalaska Corporation 2002; Veltre 1999).

The first recorded contact between Unangans and Europeans occurred in 1741 when the Russian government sent Vitus Bering and Alexei Chirikov on a voyage of discovery to the North Pacific Ocean. Though the Aleutians were home to the Unangan people, the Russians claimed the Aleutians as well as all of Alaska as their territory. The Unangans experienced the longest and harshest history of contact with foreigners of any Alaska Native group, and suffered enormous population and cultural loss during the first part of the Russian era (Veltre 1999). By the 1780s, Russian fur traders were frequenting the eastern Aleutian Islands and because of the Unangan hunters skills, enslaved the hunters for sea otter hunting. The Unangan people were then exposed to diseases, and suffered massacres from the Russian fur traders. This resulted in an estimated 80% population loss over 2 generations from the time of contact, and by 1899 only 2,500 Unangan remained (Aleutians East Borough 2011; Jorgensen 1999; Veltre 1999). During the Russian era, Unangan men were enslaved to earn money through sea otter fur harvests, affecting the subsistence economy because these men were no longer available to help with village subsistence activities.

Foreign foods were also introduced, but were expensive and limited in quality, so the Unangan continued to be highly dependent on traditional resources procured by traditional means during the Russian period, hunting and gathering local resources throughout the year as they were available (Veltre 1999).

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6. "Aleut" often refers to a broader name for 3 distinctly different (culture and language) indigenous maritime peoples of Alaska: Alutiiq (people of Kodiak, Prince William Sound, Alaska Peninsula); Central Yupik (people of Bristol Bay) and the Unangam Tunuu (people of the Aleutian, Pribilof, and Commander islands) (M. Dirks, Unangam tunuu teacher and linguist, Anchorage, personal communication, 2012).

After the United States purchased Alaska from Russia in 1867, forced labor established by the Russian American Company gave way to independent commercialism of private trading companies and commercial fishing. By 1900, commercial fishing for cod, halibut, and salmon were introduced to the eastern Aleutian Islands. The Unangan people began to work in the commercial fishing and processing industry and the cash economy was introduced. Reliance on local resources for sustenance did not cease; however, technology used for obtaining these resources changed with the purchase of boats, firearms, fishing gear, and clothing (Spalding 1955; Veltre 1999)

Akutan History

The community of Akutan developed at its present location in approximately 1878 when the Western Fur and Trading Company established a fur storage and trading post and the Russian Orthodox Church built a church and school at the present site of the village of Akutan (ADCCED 2011). In 1912, the Pacific Whaling Company built a processing station across the bay from the village and hired local residents to run the whaling station and hunt whales. This operation lasted until 1939 (Spalding 1955). Unangan people residing on the nearby Krentizen Islands, including Akun Island at the old settlement of Chulka, Tigalda, Ugamak, Avatanak, and Unalga, were the first Unangan (*Qigii}un*, the language dialect) to move to the present location of Akutan in order to gain employment (Spalding 1955; M. Dirks, Unangam tunuu teacher and linguist, Anchorage, personal communication, 2012). Hugh McGlashan, who was born in England, was hired as an agent for the Western Fur and Trading Company in Akutan in 1878 and later started a commercial cod fishing and processing business in Akutan. A salt house and dock for salting and drying cod were built on the west side of the village. McGlashan purchased a number of wooden halibut and cod fish dories and hired local Unangan people to do the fishing, drying, and packing of fish for commercial sale (Spalding 1955). By 1897, the population of Akutan was recorded by a U.S. Naval Commander as being 59 people distributed among 14 families (Hooper 1897). McGlashan was about 25 years old when he arrived in Akutan and resided there the rest of his life. He married Matrona Krukoff, a local Unangan woman, and together they are the ancestors of many people who reside in Akutan today (Darryl Pelkey, key respondent, Akutan, personal communication, April 2009).

Despite the availability of the larger dory boats, many Unangan fishers continued to use baidarkas to commercial fish for cod, as well as to assist with their subsistence hunting and fishing, as late as the 1930s. Though a wooden dory could haul a larger supply of harvested resources, it was large, heavy and hard to navigate. The smaller baidarka could be easily maneuvered for hunting and provided easy access to most of the coastline. But when outboard motors were introduced in the 1930s, the baidarka was virtually abandoned in Akutan. At about this same time, most of the original homes in Akutan, commonly known as barabaras (Russian) or ula{ (Unangan), were replaced by above-ground frame structures. By 1955 all homes in Akutan were above-ground structures with attached entryways (Spalding 1955).

Before the arrival of the Russians, the Unangan used furs extensively for subsistence purposes. The commercial fur trade grew rapidly and by 1882 the United States began leasing lands in the Aleutian Islands for fox fur farming. Local Unangans participated and fur farming provided many Akutan families a good source of income from the early 1900s until the 1930s when the Great Depression put an end to the market. Fox farms were abandoned by the end of World War II (Bailey 1993). World War II arrived in the Aleutian Islands after the Japanese bombed Pearl Harbor, Hawaii in 1941. The United States government forcibly evacuated most of the Unangan people from their villages to internment camps in Southeast Alaska. Those living in Akutan were sent to camps near Ketchikan in 1942 and were not returned to Akutan until 1945, though many of the original residents did not survive the internment (estimated 10% with 35 returning) or chose not to return (Spalding 1955; Arnold 2011).

Phillip Spalding (1955) in his ethnohistorical study of Akutan (conducted from 1951–1953), noted that the population in Akutan in 1953 was 92 individuals, with 12 families, who gained income primarily by commercial salmon, cod, and crab fishing, and cannery work. He noted that the Unangans residing in Akutan were heavily reliant on local resources. Their skills and knowledge enabled them to obtain local

resources for food, medicine, clothing, heat, and home construction. He counted 36 privately owned boats with diesel inboard motors. The use of skin boats had been abandoned. The larger diesel boats and smaller wooden dories were used for subsistence hunting and fishing as well as commercial activities. Subsistence hunting and fishing remained very important and many of the traditional resources continued to be hunted and gathered for sustenance, though accomplished with commercial tools and boats. Spalding noted that most of the prepared foods were of Russian origin, though the ingredients included foods from the natural environment, and often substituted for ingredients in the Russian recipes, such as roots from blue lupine for potatoes. Seal oil was eaten with many foods and when combined with salmon, halibut, or other fish and rice, was a common, favorite dish. Also, seal oil was mixed with berries for "Aleut Ice Cream." *Taagu{*, or *Parux*, a baked meat or fish and rice dish, was made using any locally available meat including sea lion, seal, duck, goose, or fish. Fish roe ("chisun") was also commonly eaten with bread, and *stuudin{*, a dish with sea lion flipper boiled until it was a gelatinous mass (Spalding 1955; M. Dirks, Unangam tunuu teacher and linguist, Anchorage, personal communication, 2012). Some of these dishes were still prepared in Akutan in 2008, as described by local respondents or observed by ADF&G researchers.

ANCSA was signed into law in 1971 by President Nixon. The Aleut Corporation is one of the 13 Alaska Native regional corporations established in the act. People of primarily "Aleut" (Unanga{) descent became shareholders in the for-profit corporation and their shares could be passed down generationally. The act was created with the intent to resolve long standing land issues with the indigenous people of Alaska, and gave title to the Aleut Corporation of 66,000 acres of surface lands. Native village corporations were also organized under ANSCA and within the Aleut Regional Corporation, 13 Aleut village corporations were established. Village corporations are entitled to run as business for profit or non-profit to hold, invest and manage lands and assets for the behalf of a Native village.[7]

The crab and fish processing industry developed in Akutan in the late 1940s with the use of numerous floating processors operating in Akutan Bay. In the 1980s, a shore-based processing plant was built just west of Akutan Village. It is presently owned and operated by Trident. In 1990, several floating seafood processors still operated in Akutan Bay, but were no longer present in 2008. In 2008, Trident expanded the plant to include a seafood cold storage facility. The Alaska Department of Commerce, Community and Economic Development collects taxes from fishery resources (commonly referred to as the "Raw Fish Tax Program"), which are shared with eligible incorporated municipalities that are affected by fish processing industries. Raw fish tax is administered by the Alaska Department of Revenue, and is shared with eligible municipalities.[8]

In 2008, there were numerous personal skiffs, and 4 larger boats (between 16–60 feet in length) owned by Akutan residents. Six residents owned Individual Fisheries Quotas (IFQs)[9] for commercial halibut fishing. Akutan was excluded from the opportunity to participate in the Community Development Quota (CDQ) program when it was originally developed for Bering Sea communities.[10] The 4 larger boats were used for commercial halibut and cod fishing as well as subsistence fishing and hunting. The owners of these boats were also some of the main providers and distributors of subsistence caught fish, marine mammals, and birds in Akutan in 2008. Skiffs are also used to support subsistence fishing, hunting, and gathering.

Subsistence harvests and uses documented by the Division of Subsistence in 1990 and 2008 were shown to be of continuing importance and need for Akutan. Results of these studies are summarized later in this

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7. Aleut Corporation. 2008. www.aleutcorp.com. (Accessed July 2012).
8. Alaska Department of Commerce, Community, and Economic Development. 2010. http://commerce.alaska.gov/. (Accessed July 2012).
9. For background on the Individual Fishing Quota Program, see http://alaskafisheries.noaa.gov/ram/ifq.htm..
10. For background on the Western Alaska Community Development Quota Program, see http://www.fakr.noaa.gov/cdq/default.htm.

report. Timing for local resource harvest and use procurement activities in 1990 as well as in 2008 was much the same as has been done historically by Unangan people. Resources harvested throughout the year were variable depending on resource availability, ocean conditions and weather. For example, in the spring, Akutan residents focused their attention on fishing halibut, cod and Dolly Varden; summer consisted of egg gathering, geese hunting and salmon fishing and berry and plant gathering; fall activities included marine mammal and waterfowl hunting; and winter activities included marine mammal, waterfowl, and octopus hunting.

RESEARCH METHODS

As noted in Chapter 1, the LTK component of BSIERP was designed to provide data and perspective on the dynamics of the Bering Sea ecosystem by inviting residents of 5 Bering Sea Alaska Native communities to share their life-long experience of the Bering Sea environment. Akutan was the southernmost of these Bering Sea communities selected to explore human relationships with the Bering Sea and climate change. The study was coordinated through the Akutan Community Advisory Board (CAB) (formed specifically for BSIERP), the Akutan Tribal Council, and the City of Akutan. As with the other BSIERP study communities, the research for Akutan had 2 components: collecting subsistence harvest data through comprehensive household surveys, and key respondent interviews with Akutan residents particularly knowledgeable about the local environment. Jennifer Sepez of the Alaska Fisheries Science Center, NOAA, and Eugene Hunn of University of Washington Department of Anthropology were responsible for key respondent interviews with Akutan residents particularly knowledgeable about the local environment. ADF&G Division of Subsistence researchers Lisa Hutchinson-Scarbrough and Victoria (Tori) Cicconi were responsible for collecting subsistence harvest data through comprehensive household surveys.

The subsistence harvest comprehensive survey and subsistence harvest area mapping component was conducted in March and April, 2009, by Hutchinson-Scarbrough and Cicconi, and 4 local research assistants. During this time, some limited LTK information was also collected. In September 2010, Sepez and Hunn traveled to Akutan and conducted comprehensive interviews and observations relevant to the LTK goals, detailed in a separate report (Hunn and Sepez 2010).

Sepez contacted Akutan Mayor Joe Bereskin in early 2008 to introduce the project and asked him to appoint a 5-member CAB and name a person to chair the board and serve as the community coordinator. Jennie Webster was appointed the CAB chairperson and coordinator and 4 other residents who were active in subsistence activities were appointed to serve on the CAB, which provided a means for the community to be involved with the BSIERP project. The other CAB members were John Borenin, Zenia Borenin, Antone Shelikoff, and Jacob Stepetin. John Borenin resigned in March 2009 and Richard Stepetin was appointed to replace him. From June 16–20, 2008, Hunn traveled to Akutan and met with the mayor, the village council and corporation staff, and interested residents to discuss project design and implementation. The tribal administrator and mayor provided letters of support for the project. Hunn obtained Human Subjects clearance from the University of Washington Human Subject Office (which has been renewed each year since). Hunn reported on progress with respect to the Akutan collaboration at the Regional Advisory Board (RAB) meeting in Girdwood, Alaska, October 2008.

In December 2008, Hutchinson-Scarbrough and Cicconi attempted to travel to Akutan to meet with the Akutan Village Council and the CAB to provide another overview of the BSIERP project and plan for the subsistence harvest survey. Weather prevented their arrival in Akutan, so a teleconference was held instead on December 11 involving the Akutan CAB, Hutchinson-Scarbrough, Cicconi, and Tom Van Pelt, a staff member for NPRB who served as BSIERP project manager.

Subsequently, ADF&G researchers worked closely with the Akutan tribal administrator to review the research plan and prepare for the start of the household subsistence harvest surveys. Hutchinson-Scarbrough and Cicconi administered the household surveys in Akutan from March 27 through April 2, 2009. Before the surveys started, separate presentations were made at a meeting of the Akutan CAB and

at a village meeting to inform interested residents about the project. Questions and concerns were addressed. Hutchinson-Scarbrough and Cicconi conducted a 2-day training session with 5 local researchers, 4 of whom (Samantha Fairbanks, Jacob Stepetin, Karen Vincler, and Jennie Webster) assisted with the household surveys (Figure 2-2). The assistants were paid for the training and given a stipend for every survey they completed. The household surveys were administered in teams of 1–2 researchers per household and on average took about 1 hour to complete. Households that harvested 1 or more resources also were asked to identify on a map where they obtained the resource. Out of 40 year-round resident households, 36 households (90%) were interviewed. Of the households not interviewed, 3 refused to be interviewed and the other household was not able to be contacted (Table 2-3).

Figure 2-4.–ADF&G researcher Tori Cicconi helps conduct training session for local research assistants, Akutan, 2009.

Table 2-3.–Sampling and participation, Akutan.

	Households
Initial estimated number of households	37
Interview goal	37
Households interviewed	36
Households failed to contact	1
Households declined to participate	3
Refusal rate[a]	7.7%
Moved/non-resident households[b]	0
Households added to initial list	3
Adjusted final estimated number of households	40
Percentage of households interviewed	90.0%
Percentage of interview goal achieved	90.0%

Source ADF&G Division of Subsistence household surveys, 2009.

a. Equal number of refusals/number of refusals + number of interviews.

b. Households that were not present during the study year or resident in the community for less than 3 months, + households that had moved from the community.

The harvest survey and map data were analyzed and results produced by the ADF&G Division of Subsistence information management staff in Anchorage. Preliminary survey findings were presented by Hutchinson-Scarbrough to the BSIERP (RAB) at their October 12, 2009 meeting in Girdwood, Alaska. An in-person return trip to Akutan to present the draft survey results and maps to the community was not possible due to a limited travel budget. However, staff were aware of another ethnographic research project being conducted in Akutan in February 2010 by Katherine Reedy-Maschner, an anthropologist with Idaho State University. She graciously agreed to bring the draft results and maps to Akutan for CAB members and key harvesters to review for corrections, additions, or clarifications. Hutchinson-Scarbrough prepared a Power Point presentation of the project and survey results to present to the Akutan CAB members and other interested residents during a teleconference that Reedy-Maschner would help facilitate. Though not successful at scheduling a meeting, Reedy-Maschner met with 5 key harvesters and asked them to review the draft survey results and map data. Only a few comments were made. These were incorporated into the final harvest and map summaries presented in this report. Sepez and Hunn visited Akutan September 4–8, 2010, to conduct interviews and observations relevant to the LTK project goals. They delivered another copy of the 2008 harvest survey and mapping results to Jacob Stepetin for the Tribal Council and used this information to guide their questions regarding local and traditional knowledge.

During their September 2010 visit, Sepez and Hunn conducted in-depth discussions and interviews with 7 Akutan residents particularly knowledgeable about the local marine and shore environment. They also visited with community officials in the tribal offices about a range of community concerns, from meeting the student quota for the local school to the disappointing berry abundance for harvest. They also reviewed a collection of local plants with 4 key respondents. Hunn had the opportunity to gain additional insights into the local geography, natural history, and practices related to commercial and subsistence fishing.

These various conversations ranged widely over topics related to local subsistence practices, seasonal harvest patterns, distributional and behavioral patterns of and ecological relations among marine mammals, sea birds, fishes, marine invertebrates, marine algae, and terrestrial flora and fauna, plus observations with respect to climatic and oceanographic trends in the local Bering Sea environment. With the informed consent and permission of those interviewed, these interviews were recorded digitally to facilitate a more complete and accurate summary of local perspectives. Quantitative data from 2

comprehensive subsistence harvest surveys conducted by ADF&G for the years 1990 and 2008 provided the basis for key questions with regard to trends in the distribution and abundance of subsistence resources and other species.

DEMOGRAPHY

Table 2-4 and Figure 2-3 shows the population of Akutan from 1950 to 2010 based on the U.S. Census. Only the population living in households is reported; the "group quarters" population is excluded. The population has fluctuated since 1950 from a low of 75 residents in 2000 to a high of 169 residents in 1980. The 2010 U.S. Census estimated that the combined population of the village of Akutan and Trident Seafoods group quarters was 1,027, with 937 residing in group quarters and 90 in households. The Alaska Department of Labor population estimates include residents of group quarters; these cannot be separated from the residents of households. The group quarters population consists of transient workers hired by Trident, and who are not known to engage in subsistence hunting, fishing, or gathering activities. This population was therefore not included in this study.

Table 2-4.–Historical population, Akutan, 1950–2010.

	U.S. Census (count)		
Year	Residents of households only	Residents of group quarters	Total population
1950	86	0	86
1960	107	0	107
1970	101	0	101
1980	169	100	269
1990	88	501	589
2000	75	638	713
2010	90	937	1,027

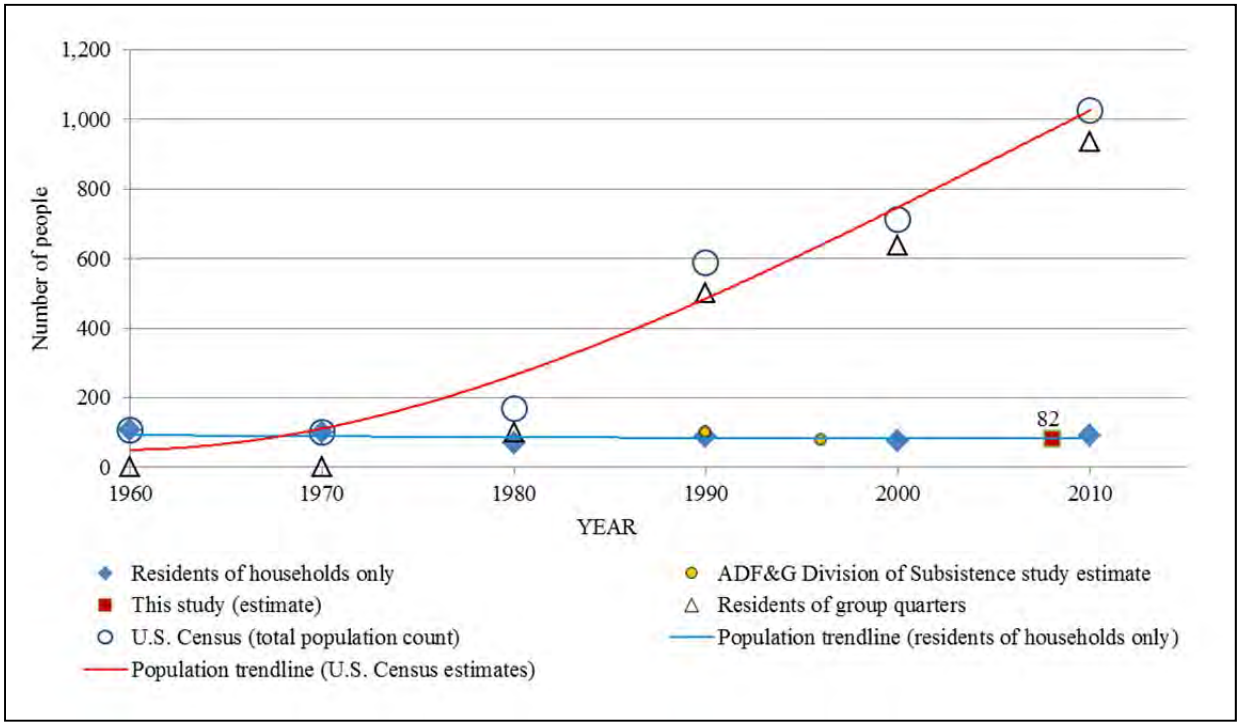

Figure 2-5.–Historical population, Akutan.

For 2008, the household surveys estimated that Akutan village had 40 permanent households with an estimated population of 82 people, with 67 individuals (81% of population) identifying themselves as Alaska Native. Of all households, 90% had a least one Alaska Native as the household head (Table 2-2). Though undeniably of Alaska Native heritage, most of Akutan's population also has other ancestries as well because of the community's complex history, as described above. Their Unangan ancestors experienced contact earlier than most other indigenous people in Alaska, starting with the Russians in 1741, followed by an influx of other Europeans seeking work in the fur, whale, fisheries, and mining industries, and exacerbated by the forced exile of the Akutan Unangan population during World War II. Many newcomers married local Unangan women and were integrated into the community and culture, thus connecting with the land and resources.

In Akutan in 2008, 53% of the household heads were born in Akutan, 20% in other Alaska communities, 24% born in other U.S. communities, and 4% were foreign born (Table 2-5). The average years of residency in Akutan for household heads was 31 years, with the maximum 81 years (Table 2-4). Males made up 64% of the population and females just 37% (Table 2-6, Figure 2-4). The mean age was 38 for all residents, and the oldest resident was 81. Only 6 residents were of school age. The shortage of school-age children was a major concern for the village in 2008, because the State of Alaska will close the school if the number of students remains below 10. Akutan residents believed that such an action would threaten the viability of the community. The teachers and some local people believed that lack of housing for families in Akutan was one of the main factors contributing toward a decline in the number of families with school age children. Some families may leave to seek what they believe will be a better education for their children in a larger community. Others leave in order to find employment not available in Akutan. On the other hand, the rich local natural resources may motivate residents to remain or to return if they have temporarily left Akutan, depending on the availability of housing, subsistence opportunities, or work opportunities. If the airstrip on nearby Akun Island is constructed, some local people in 2008 predicted that this could potentially encourage more people to move back for employment as well as enable people to build homes and reinhabit Akun Island, most likely at the old village site of Chulka.

By contrast, in 1990, the Division of Subsistence estimated that Akutan village had 31 households with an estimated population of 103, with 88 (86%) of Alaska Native descent. Males outnumbered females 60% to 40%, and the average length of residency was 19 years with the maximum 68 years. There were an estimated 7 school aged children in 1990, just 1 more than in 2008.

The Unangan/Aleut language (eastern dialect) is now spoken only by a few older residents in Akutan, but understood by more. Many of the Unangan names for places, resources, and foods remain a common part of the everyday language.

Table 2-5.–Place of birth of household heads, Akutan, 2008.

Birthplace	Percentage of household heads
Akutan	52.9%
Anchorage	3.9%
Chignik Lake	3.9%
Ketchikan	3.9%
Kodiak City	2.0%
Port Lions	2.0%
Saint George	2.0%
Belkofski	2.0%
Other United States	23.5%
Foreign	3.9%

Source ADF&G Division of Subsistence household surveys, 2009.

Note "Place of birth" means place of residence of the person's parents when the person was born.

Table 2-6.–Population profile, Akutan, 2008.

	Male			Female			Total		
Age	Number	Percentage	Cumulative percentage	Number	Percentage	Cumulative percentage	Number	Percentage	Cumulative percentage
0–4	2.0	4.3%	4.3%	3.0	11.1%	11.1%	5.0	6.8%	6.8%
5–9	1.0	2.1%	6.4%	2.0	7.4%	18.5%	3.0	4.1%	10.8%
10–14	4.0	8.5%	14.9%	2.0	7.4%	25.9%	6.0	8.1%	18.9%
15–19	1.0	2.1%	17.0%	0.0	0.0%	25.9%	1.0	1.4%	20.3%
20–24	5.0	10.6%	27.7%	2.0	7.4%	33.3%	7.0	9.5%	29.7%
25–29	4.0	8.5%	36.2%	3.0	11.1%	44.4%	7.0	9.5%	39.2%
30–34	2.0	4.3%	40.4%	2.0	7.4%	51.9%	4.0	5.4%	44.6%
35–39	2.0	4.3%	44.7%	0.0	0.0%	51.9%	2.0	2.7%	47.3%
40–44	3.0	6.4%	51.1%	1.0	3.7%	55.6%	4.0	5.4%	52.7%
45–49	7.0	14.9%	66.0%	2.0	7.4%	63.0%	9.0	12.2%	64.9%
50–54	3.0	6.4%	72.3%	4.0	14.8%	77.8%	7.0	9.5%	74.3%
55–59	4.0	8.5%	80.9%	2.0	7.4%	85.2%	6.0	8.1%	82.4%
60–64	5.0	10.6%	91.5%	2.0	7.4%	92.6%	7.0	9.5%	91.9%
65–69	0.0	0.0%	91.5%	0.0	0.0%	92.6%	0.0	0.0%	91.9%
70–74	2.0	4.3%	95.7%	0.0	0.0%	92.6%	2.0	2.7%	94.6%
75–79	1.0	2.1%	97.9%	0.0	0.0%	92.6%	1.0	1.4%	95.9%
80–84	1.0	2.1%	100.0%	0.0	0.0%	92.6%	1.0	1.4%	97.3%
85–90	0.0	0.0%	100.0%	0.0	0.0%	92.6%	0.0	0.0%	97.3%
90+	0.0	0.0%	100.0%	0.0	0.0%	92.6%	0.0	0.0%	97.3%
Missing	0.0	0.0%	100.0%	2.0	7.4%	100.0%	2.0	2.7%	100.0%
Total	**47.0**	**63.5%**		**27.0**	**36.5%**		**74.0**	**100.0%**	

Source ADF&G Division of Subsistence household surveys, 2009.

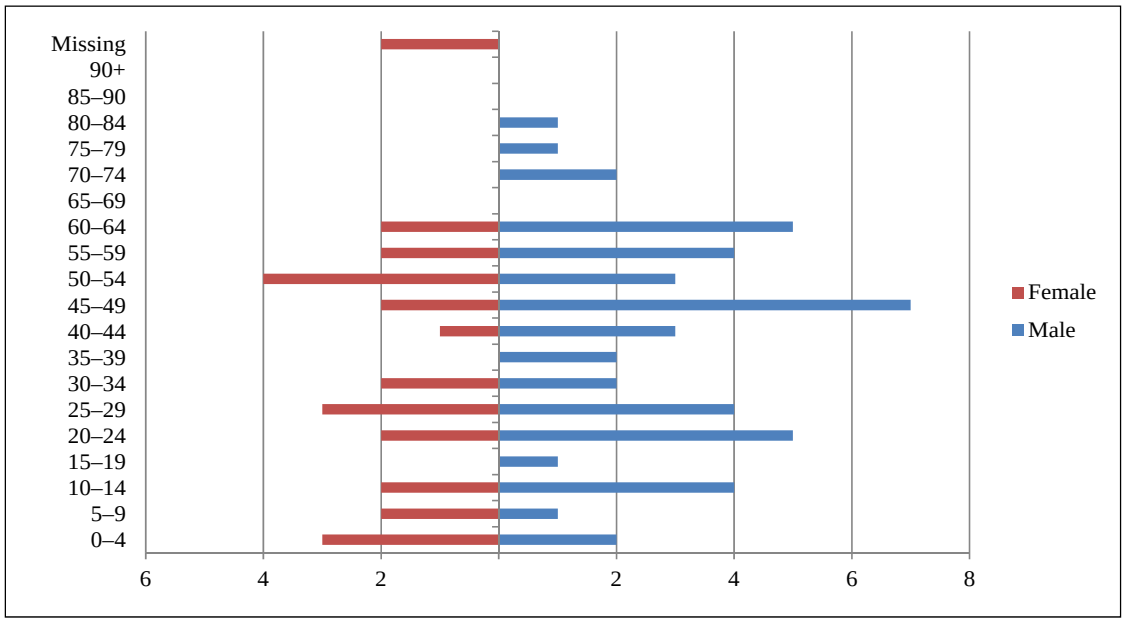

Figure 2-6.–Population profile, Akutan, 2008.

SEASONAL ROUND OF RESOURCE HARVESTS

Times of the year during which specific resources are obtained are variable in Akutan. During the household survey, harvest timing data were collected for birds, marine mammals, and land mammals only; key respondents provided additional information. Harvest timing data are also available for the

nearby community of Unalaska for 1982, when Doug and Mary Veltre were contracted by the Division of Subsistence to conduct the first detailed study of contemporary resource uses in that community (Veltre and Veltre 1982). Although described nearly 30 years ago, the pattern of harvest documented for Unalaska residents does not vary greatly from the patterns described by subsistence users in Akutan in 1990 and 2008. Many species can only be harvested during short time periods, such as bird eggs in the spring (late May through early June for gull eggs) and salmon in the summer and fall (sockeye salmon normally run in June, coho salmon in late September/October). According to local fishers, salmon movements are controlled by water temperatures. Salmon wait offshore until the temperature is right, then they all move inshore. Local fishers pointed out that during the spring of 2010, exceptionally cold water persisted into summer. This may help explain the very late sockeye salmon that year that arrived in late August and early September when they are normally expected in June.

Certain ducks and geese are only available in the winter near Akutan, others in spring or summer, and some year-round. Fur seals are seasonal, hunted as they migrate through Akun Pass in late September through November. Harbor seals and sea lions are available year-round, although some respondents reported a preference for taking harbor seals in the winter as a conservation measure—they said hunters traditionally avoid taking seals in the spring and summer when females are pregnant or accompanied by pups. Marine invertebrates may be available year-round but are avoided during "red tides"— periods when harmful algal blooms can occur in the summer when ocean plants produce toxic and sometimes fatal effects on people, and marine life.[11] Though marine fish are available year-round, halibut are primarily fished in the warmer months (April–September) because they move to shallower waters closer to the village at that time. In the winter, halibut are often too deep to be caught. Edible greens are available only in late spring and summer, and berries in late summer through fall. Octopuses are plentiful year-around, but generally taken while fishing for halibut in the warmer months. Weather and sea conditions play an enormous role in determining when resources can be harvested, because of safety issues or accessibility to hunting, fishing, or gathering areas. Storms sometimes will blow in resources closer to the village such as ducks seeking refuge from the storm.

Detailed subsistence harvest assessment information about harbor seals and sea lions was collected statewide for 16 years cooperatively by the Division of Subsistence and Alaska Native Harbor Seal Commission with funding from the National Marine Fisheries Service. The last year this research was funded was 2008. Information collected included amount harvested by month, sex, and age. In 2008, Akutan hunters reported harvests of seals throughout the year, but with most taken in June through September (Wolfe et al. 2009b), although, as noted above, some respondents objected to harvests outside of the winter season as a potential threat to females with pups. Sea lions were harvested June through September, although such harvests have been drastically curtailed in recent years due to local respondent/hunters perceptions as well as documented sharp declines in sea lion numbers.[12]

WILD RESOURCE HARVESTS AND USES IN 2008

In the 2008 study year, 100% of Akutan households received and used ("used" refers to if a household ate, processed, harvested, or received a resource from other households) at least one wild resource for subsistence. In addition, 97% of households engaged in fishing, hunting, or gathering activities, and 86% of households shared at least 1 resource with other households. Akutan households used an average of 17 resources and a maximum of 42 resources per household. On average households attempted to harvest 10 kinds of resources (with a maximum of 41) and succeeded in harvesting an average of 9 resources (with a

11. National Oceanic and Atmospheric Administration. A "red tide" is a common term used for a harmful algal bloom. http://oceanservice.noaa.gov/facts/redtide.html. (Accessed July 2012).

12. National Marine Fisheries Service, Alaska Regional Office. Steller Sea Lions. http://alaskafisheries.noaa.gov/protectedresources/stellers/default.htm. (Accessed July 2012).

maximum of 38 harvested). On average, households gave away 8 resources to others and received on average 12 (Table 2-7).

In 2008, Akutan households harvested an average 672.7 lb of wild foods, averaging 327.3 lb per capita (Table 2-8). Salmon made up the largest portion of this harvest and contributed 45% of the harvest and averaged 146 lb per person; followed by fish other than salmon (25%, 80 lb); shellfish (10%, 34 lb); marine mammals (8%, 26 lb); wild plants and berries (5%, 16 lb); land mammals (4%, 15 lb); and birds and eggs (3%, 10 lb) (Table 2-8, Figure 2-7).

Table 2-7.–Harvest and use characteristics, Akutan, 2008.

Mean number of resources used per household	17.0
Minimum	1.0
Maximum	42.0
95% confidence limit (±)	6.7%
Median	14.5
Mean number of resources attempted to harvest per household	9.5
Minimum	0.0
Maximum	41.0
95% confidence limit (±)	10.6%
Median	6.0
Mean number of resources harvested per household	8.8
Minimum	0.0
Maximum	38.0
95% confidence limit (±)	10.8%
Median	6.0
Mean number of resources received per household	11.5
Minimum	1.0
Maximum	35.0
95% confidence limit (±)	8.1%
Median	11.5
Mean number of resources given away per household	7.7
Minimum	0.0
Maximum	31.0
95% confidence limit (±)	10.8%
Median	5.0
Mean household harvest, pounds	672.7
Minimum	0.0
Maximum	2,843.3
Total pounds harvested	26,909.4
Community per capita harvest, pounds	327.3
Percent using any resource	100.0%
Percent attempting to harvest any resource	97.2%
Percent harvesting any resource	94.4%
Percent receiving any resource	100.0%
Percent giving away any resource	86.1%
Number of households in sample	36
Number of resources available	157

Source ADF&G Division of Subsistence household surveys, 2009.

Table 2-8.–Estimated harvests and uses of wild resources in Akutan, 2008.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
All resources	**100.0%**	**97.2%**	**94.4%**	**100.0%**	**86.1%**	**26,909.4**	**672.7**	**327.3**				**3.8%**
Fish	**94.4%**	**69.4%**	**69.4%**	**88.9%**	**72.2%**	**18,636.1**	**465.9**	**226.7**				**4.3%**
Salmon	88.9%	58.3%	58.3%	75.0%	55.6%	12,022.7	300.6	146.2	3,363.3	84.1	ind	4.8%
Chum salmon	22.2%	13.9%	13.9%	11.1%	8.3%	290.7	7.3	3.5	54.4	1.4	ind	11.4%
Coho salmon	63.9%	38.9%	38.9%	47.2%	38.9%	2,383.2	59.6	29.0	452.2	11.3	ind	7.5%
Chinook salmon	19.4%	5.6%	5.6%	16.7%	8.3%	9.1	0.2	0.1	2.2	0.1	ind	14.1%
Pink salmon	69.4%	47.2%	47.2%	47.2%	36.1%	3,413.9	85.3	41.5	1,365.6	34.1	ind	6.4%
Sockeye salmon	83.3%	50.0%	50.0%	69.4%	50.0%	5,925.8	148.1	72.1	1,488.9	37.2	ind	5.4%
Nonsalmon fish	86.1%	69.4%	63.9%	72.2%	63.9%	6,613.4	165.3	80.4	5,439.6	136.0		6.6%
Herring	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Herring roe	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Smelt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Cod	36.1%	16.7%	16.7%	22.2%	13.9%	925.9	23.1	11.3	296.5	7.4		12.7%
Pacific cod (gray)	33.3%	16.7%	13.9%	22.2%	11.1%	920.4	23.0	11.2	287.6	7.2	ind	12.8%
Pacific tomcod	5.6%	2.8%	2.8%	2.8%	0.0%	3.9	0.1	0.0	7.8	0.2	ind	20.3%
Walleye pollock (whiting)	8.3%	2.8%	2.8%	5.6%	2.8%	1.6	0.0	0.0	1.1	0.0	ind	20.3%
Flounder	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Greenling	8.3%	2.8%	2.8%	5.6%	2.8%	6.7	0.2	0.1	6.7	0.2		20.3%
Atka mackerel	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown greenling	5.6%	2.8%	2.8%	2.8%	2.8%	6.7	0.2	0.1	6.7	0.2	ind	20.3%
Greenling roe	8.3%	8.3%	8.3%	0.0%	2.8%	18.3	0.5	0.2	2.6	0.1	gal	17.3%
Pacific halibut	86.1%	55.6%	50.0%	63.9%	52.8%	4,216.0	105.4	51.3	4,216.0	105.4	lb	7.7%
Rockfish	33.3%	22.2%	19.4%	22.2%	11.1%	352.9	8.8	4.3	216.7	5.4		8.2%
Black rockfish	30.6%	19.4%	16.7%	19.4%	11.1%	308.4	7.7	3.8	205.6	5.1	ind	9.1%
Red rockfish	8.3%	2.8%	2.8%	5.6%	2.8%	44.4	1.1	0.5	11.1	0.3	ind	20.3%
Unknown rockfish	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Sablefish (blackcod)	13.9%	2.8%	2.8%	11.1%	5.6%	275.6	6.9	3.4	88.9	2.2	ind	20.3%

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Table 2-8.–Page 2 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Fish, continued												
Sculpin	13.9%	11.1%	11.1%	2.8%	5.6%	21.7	0.5	0.3	43.3	1.1		12.3%
Bullhead sculpin	8.3%	5.6%	5.6%	2.8%	2.8%	12.2	0.3	0.1	24.4	0.6	ind	18.5%
Irish lord	8.3%	5.6%	5.6%	2.8%	0.0%	3.3	0.1	0.0	6.7	0.2	ind	15.0%
Yellow sculpin	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown sculpin	5.6%	5.6%	5.6%	0.0%	2.8%	6.1	0.2	0.1	12.2	0.3	ind	14.2%
Sole	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0		
Yellowfin sole	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Char	63.9%	41.7%	41.7%	38.9%	30.6%	796.4	19.9	9.7	568.9	14.2		8.8%
Dolly Varden	58.3%	38.9%	38.9%	33.3%	27.8%	749.8	18.7	9.1	535.6	13.4	ind	9.4%
Lake trout	5.6%	2.8%	2.8%	5.6%	2.8%	46.7	1.2	0.6	33.3	0.8	ind	20.3%
Arctic grayling	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Land mammals	**63.9%**	**5.6%**	**5.6%**	**61.1%**	**8.3%**	**1,214.7**	**30.4**	**14.8**	**4.4**	**0.1**		**19.5%**
Large land mammals	**22.2%**	**2.8%**	**2.8%**	**22.2%**	**2.8%**	**48.0**	**1.2**	**0.6**	**1.1**	**0.0**		**20.3%**
Caribou	8.3%	0.0%	0.0%	8.3%	0.0%	0.0	0.0	0.0	0.0	0.0		
Deer	2.8%	2.8%	2.8%	0.0%	2.8%	48.0	1.2	0.6	1.1	0.0		20.3%
Moose	13.9%	0.0%	0.0%	13.9%	0.0%	0.0	0.0	0.0	0.0	0.0		
Small land mammals	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Fox	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Arctic fox	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Red fox	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Red fox–cross phase	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Hare	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Snowshoe hare	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Lemming	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Feral animals	52.8%	2.8%	2.8%	50.0%	5.6%	1,166.7	29.2	14.2	3.3	0.1		20.3%
Cattle–feral	52.8%	2.8%	2.8%	50.0%	5.6%	1,166.7	29.2	14.2	3.3	0.1	ind	20.3%
Rabbit–feral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 2-8.–Page 3 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Land mammals, continued												
Reindeer–feral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Sheep–feral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Marine mammals	**69.4%**	**27.8%**	**27.8%**	**58.3%**	**36.1%**	**2,151.1**	**53.8**	**26.2**	**40.0**	**1.0**		**7.3%**
Seal	61.1%	27.8%	27.8%	44.4%	36.1%	1,262.2	31.6	15.4	35.6	0.9		6.3%
Fur seal	30.6%	16.7%	16.7%	19.4%	22.2%	266.7	6.7	3.2	17.8	0.4		8.6%
Fur seal, male	–	–	–	–	–	66.7	1.7	0.8	4.4	0.1	ind	15.9%
Fur seal, female	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Fur seal, unknown sex	–	–	–	–	–	200.0	5.0	2.4	13.3	0.3	ind	10.6%
Harbor seal	52.8%	25.0%	22.2%	38.9%	30.6%	995.6	24.9	12.1	17.8	0.4		6.9%
Harbor seal, male	–	–	–	–	–	311.1	7.8	3.8	5.6	0.1	ind	11.9%
Harbor seal, female	–	–	–	–	–	435.6	10.9	5.3	7.8	0.2	ind	10.9%
Harbor seal, unknown sex	–	–	–	–	–	248.9	6.2	3.0	4.4	0.1	ind	14.1%
Sea otter	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Steller sea lion	47.2%	11.1%	8.3%	41.7%	8.3%	888.9	22.2	10.8	4.4	0.1		12.1%
Steller sea lion, male	–	–	–	–	–	666.7	16.7	8.1	3.3	0.1	ind	15.0%
Steller sea lion, female	–	–	–	–	–	222.2	5.6	2.7	1.1	0.0	ind	20.3%
Steller sea lion, unknown sex	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Walrus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Whale	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Birds and eggs	**83.3%**	**58.3%**	**55.6%**	**58.3%**	**50.0%**	**817.3**	**20.4**	**9.9**	**1,796.7**	**44.9**		**5.0%**
Migratory birds	47.2%	36.1%	36.1%	30.6%	30.6%	467.8	11.7	5.7	668.9	16.7		6.6%
Ducks	38.9%	27.8%	27.8%	22.2%	25.0%	337.8	8.4	4.1	494.4	12.4		7.8%
Bufflehead	8.3%	8.3%	8.3%	0.0%	8.3%	9.8	0.2	0.1	24.4	0.6	ind	12.6%

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Table 2-8.–Page 4 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Canvasback	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Eider	2.8%	2.8%	2.8%	0.0%	2.8%	3.5	0.1	0.0	4.4	0.1		20.3%
Common eider	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
King eider	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Spectacled eider	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Steller eider	2.8%	2.8%	2.8%	0.0%	2.8%	3.5	0.1	0.0	4.4	0.1	ind	20.3%
Unknown eider	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gadwall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Goldeneye	5.6%	2.8%	2.8%	2.8%	2.8%	0.9	0.0	0.0	1.1	0.0		20.3%
Common goldeneye	5.6%	2.8%	2.8%	2.8%	2.8%	0.9	0.0	0.0	1.1	0.0	ind	20.3%
Harlequin	25.0%	19.4%	19.4%	13.9%	16.7%	73.3	1.8	0.9	146.7	3.7	ind	9.2%
Mallard	8.3%	8.3%	8.3%	0.0%	2.8%	10.0	0.3	0.1	10.0	0.3	ind	14.2%
Merganser	5.6%	5.6%	5.6%	0.0%	5.6%	7.0	0.2	0.1	7.8	0.2		14.3%
Common merganser	5.6%	5.6%	5.6%	0.0%	5.6%	7.0	0.2	0.1	7.8	0.2	ind	14.3%
Red-breasted merganser	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Long-tailed duck (oldsquaw)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Northern pintail	0.0%	2.8%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Redhead duck	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Scaup	11.1%	11.1%	11.1%	2.8%	5.6%	8.0	0.2	0.1	8.9	0.2		11.6%
Greater scaup	11.1%	11.1%	11.1%	2.8%	5.6%	8.0	0.2	0.1	8.9	0.2	ind	11.6%
Scoter	27.8%	25.0%	22.2%	8.3%	19.4%	191.0	4.8	2.3	176.7	4.4	ind	8.2%
Surf scoter	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
White-winged scoter	22.2%	22.2%	19.4%	2.8%	16.7%	122.0	3.1	1.5	100.0	2.5	ind	8.3%
Northern shoveler	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Teal	25.0%	16.7%	16.7%	13.9%	13.9%	34.3	0.9	0.4	114.4	2.9		11.1%
European teal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 2-8.–Page 5 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Green-winged teal	25.0%	16.7%	16.7%	13.9%	13.9%	34.3	0.9	0.4	114.4	2.9	ind	11.1%
Wigeon	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown ducks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Geese	13.9%	13.9%	13.9%	0.0%	8.3%	50.0	1.3	0.6	20.0	0.5		9.2%
Canada geese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Aleutian Canada geese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown Canada geese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Emperor geese	13.9%	13.9%	13.9%	0.0%	8.3%	50.0	1.3	0.6	20.0	0.5	ind	9.2%
Snow geese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
White-fronted geese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Swan	0.0%	2.8%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Tundra swan (whistling)	0.0%	2.8%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Crane	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Sandhill crane	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Shorebirds	2.8%	2.8%	2.8%	0.0%	2.8%	19.0	0.5	0.2	33.3	0.8		20.3%
Common snipe	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Black oystercatcher	2.8%	2.8%	2.8%	0.0%	2.8%	19.0	0.5	0.2	33.3	0.8	ind	20.3%
Plover	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Sandpiper	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Seabirds and loons	30.6%	19.4%	19.4%	22.2%	16.7%	59.4	1.5	0.7	118.9	3.0		8.1%
Auklet	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Cormorants	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Fulmar	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Northern fulmar	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Guillemots	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gulls	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Glaucous gull	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 2-8.–Page 6 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Kittiwakes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Red-legged kittiwake	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Loons	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Murre	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Common murre	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown murre	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Murrelet	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Puffins	30.6%	19.4%	19.4%	22.2%	16.7%	59.4	1.5	0.7	118.9	3.0	ind	8.1%
Shearwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Tern	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Arctic tern	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown migratory birds	2.8%	2.8%	2.8%	0.0%	2.8%	1.6	0.0	0.0	2.2	0.1	ind	20.3%
Other birds	11.1%	11.1%	5.6%	8.3%	0.0%	17.9	0.4	0.2	25.6	0.6		14.2%
Upland game birds	11.1%	11.1%	5.6%	8.3%	0.0%	17.9	0.4	0.2	25.6	0.6		14.2%
Ptarmigan	11.1%	11.1%	5.6%	8.3%	0.0%	17.9	0.4	0.2	25.6	0.6		14.2%
Rock ptarmigan	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Willow ptarmigan	11.1%	11.1%	5.6%	8.3%	0.0%	17.9	0.4	0.2	25.6	0.6	ind	14.2%
Bird eggs	72.2%	41.7%	38.9%	50.0%	33.3%	331.6	8.3	4.0	1,102.2	27.6		6.3%
Duck eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Eider eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Mallard eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Teal eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Green-winged teal eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown duck eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Geese eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Brant eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown geese eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 2-8.–Page 7 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Shorebird eggs	5.6%	5.6%	5.6%	0.0%	2.8%	3.6	0.1	0.0	8.9	0.2		15.9%
Black oystercatcher eggs	5.6%	5.6%	5.6%	0.0%	2.8%	3.6	0.1	0.0	8.9	0.2	ind	15.9%
Seabird and loon eggs	72.2%	41.7%	38.9%	50.0%	33.3%	328.0	8.2	4.0	1,093.3	27.3		6.3%
Cormorant eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gull eggs	72.2%	41.7%	38.9%	50.0%	33.3%	328.0	8.2	4.0	1,093.3	27.3		6.3%
Glaucous gull eggs	66.7%	38.9%	36.1%	44.4%	30.6%	296.0	7.4	3.6	986.7	24.7	ind	6.8%
Unknown gull eggs	5.6%	2.8%	2.8%	5.6%	2.8%	32.0	0.8	0.4	106.7	2.7	ind	20.3%
Kittiwake eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Murre eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Puffin eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Tern eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Marine invertebrates	**63.9%**	**44.4%**	**33.3%**	**52.8%**	**36.1%**	**2,815.4**	**70.4**	**34.2**	**909.2**	**22.7**		**13.6%**
Chitons (bidarkis, gumboots)	44.4%	22.2%	22.2%	36.1%	19.4%	257.2	6.4	3.1	211.1	5.3		8.7%
Red (large) chitons	8.3%	5.6%	5.6%	5.6%	5.6%	83.9	2.1	1.0	167.8	4.2	ind	20.2%
Black (small) chitons	38.9%	19.4%	19.4%	30.6%	13.9%	173.3	4.3	2.1	43.3	1.1	gal	9.1%
Clams	5.6%	5.6%	5.6%	2.8%	5.6%	8.3	0.2	0.1	2.8	0.1		14.4%
Butter clams	2.8%	0.0%	0.0%	2.8%	2.8%	0.0	0.0	0.0	0.0	0.0	gal	
Horse clams (gaper)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Pacific littleneck clams (steamers)	2.8%	2.8%	2.8%	0.0%	0.0%	3.3	0.1	0.0	1.1	0.0	gal	20.3%
Razor clams	2.8%	2.8%	2.8%	0.0%	2.8%	5.0	0.1	0.1	1.7	0.0	gal	20.3%
Cockles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Crabs	36.1%	13.9%	2.8%	36.1%	11.1%	5.1	0.1	0.1	2.2	0.1		20.3%
Dungeness crab	8.3%	5.6%	0.0%	8.3%	2.8%	0.0	0.0	0.0	0.0	0.0	ind	
Hair crab	0.0%	2.8%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
King crab	27.8%	8.3%	2.8%	27.8%	5.6%	5.1	0.1	0.1	2.2	0.1	ind	20.3%

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Table 2-8.–Page 8 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Marine invertebrates, continued												
Tanner crab	19.4%	5.6%	0.0%	19.4%	8.3%	0.0	0.0	0.0	0.0	0.0		
Tanner crab (bairdi)	2.8%	5.6%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Snow crab (opillio)	16.7%	2.8%	0.0%	16.7%	8.3%	0.0	0.0	0.0	0.0	0.0	ind	
Jingles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Rock jingles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Limpets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Mussels	2.8%	0.0%	0.0%	2.8%	2.8%	0.0	0.0	0.0	0.0	0.0		
Blue mussels	2.8%	0.0%	0.0%	2.8%	2.8%	0.0	0.0	0.0	0.0	0.0	lb	
Brown mussels	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Octopuses	50.0%	19.4%	16.7%	47.2%	27.8%	2,517.8	62.9	30.6	629.4	15.7	ind	15.1%
Scallops	2.8%	2.8%	2.8%	0.0%	0.0%	0.7	0.0	0.0	11.1	0.3	ind	20.3%
Sea anemones	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Sea cucumbers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Sea urchins	30.6%	22.2%	19.4%	22.2%	11.1%	26.3	0.7	0.3	52.5	1.3	gal	17.2%
Shrimps	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Snails	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Squids	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Vegetation	**94.4%**	**83.3%**	**80.6%**	**52.8%**	**41.7%**	**1,274.9**	**31.9**	**15.5**	**338.3**	**8.5**		**5.7%**
Berries	94.4%	77.8%	77.8%	50.0%	33.3%	1,028.3	25.7	12.5	257.1	6.4		5.6%
Blueberry	63.9%	47.2%	47.2%	22.2%	19.4%	295.6	7.4	3.6	73.9	1.8	gal	7.6%
Lowbush cranberry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Salmonberry	80.6%	72.2%	69.4%	30.6%	30.6%	590.0	14.8	7.2	147.5	3.7	gal	5.6%
Strawberry	2.8%	2.8%	2.8%	0.0%	0.0%	0.6	0.0	0.0	0.1	0.0	gal	0.0%
Other wild berry	47.2%	36.1%	36.1%	16.7%	13.9%	142.2	3.6	1.7	35.6	0.9	gal	7.4%
Plants/greens/mushrooms	44.4%	44.4%	41.7%	13.9%	22.2%	246.5	6.2	3.0	75.1	1.9		13.0%

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Table 2-8.–Page 9 of 9.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Vegetation, continued												
Wild rhubarb	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Cow parsnip (wild celery)	38.9%	38.9%	38.9%	8.3%	13.9%	228.6	5.7	2.8	57.2	1.4	gal	13.9%
Fireweed	2.8%	0.0%	0.0%	2.8%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Wild parsley	19.4%	19.4%	16.7%	5.6%	11.1%	12.4	0.3	0.2	12.4	0.3	gal	9.0
Yarrow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Unknown greens from land	8.3%	8.3%	8.3%	0.0%	5.6%	5.6	0.1	0.1	5.6	0.1	gal	13.2%
Unknown greens from sea	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Seaweed/kelp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Bull kelp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Unknown seaweed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Wood	16.7%	16.7%	16.7%	0.0%	5.6%	0.0	0.0	0.0	6.1	0.2	cord	
Roots	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	

Source ADF&G Division of Subsistence household surveys, 2009.

a. Summary rows that include incompatible units of measure have been left blank.

– = Data not collected.

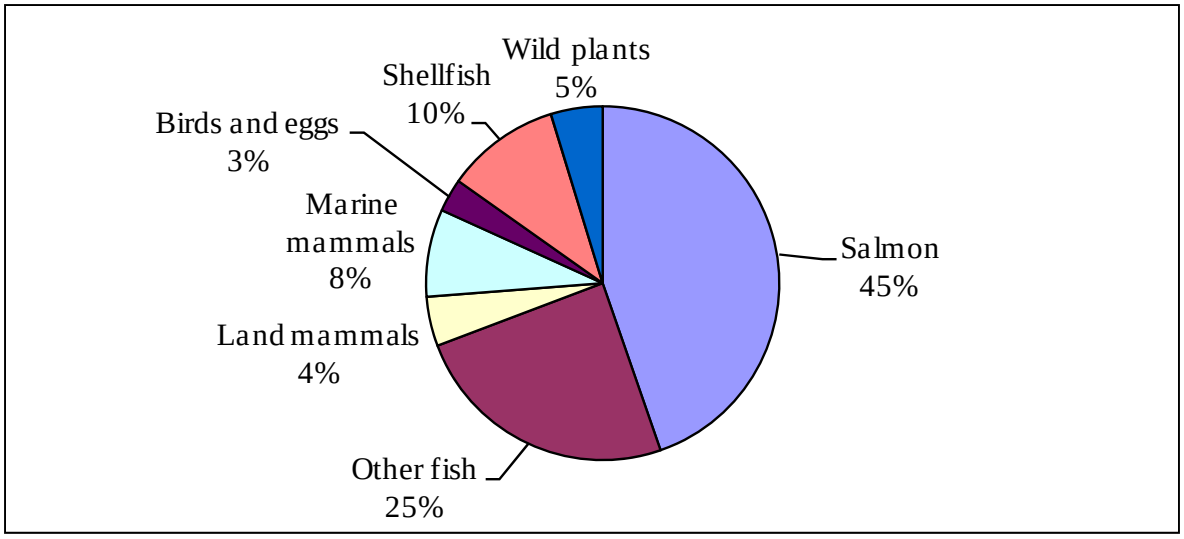

Figure 2-7.–Composition of harvest, Akutan, 2008.

The top 10 resources harvested made up about 87% of Akutan's total resource harvest in 2008, as measured in pounds usable weight per person. These were sockeye salmon (22% at 72 lb per person); halibut (16% at 51 lb); pink salmon (13% at 42 lb); octopus (9% at 31 lb); coho salmon (9% at 29 lb); feral cattle (4% at 14 lb); berries (4% at 13 lb); harbor seal (4% at 12 lb); Pacific cod (3% at 11 lb); and sea lion (3% at 11 lb) (Figure 2-8).

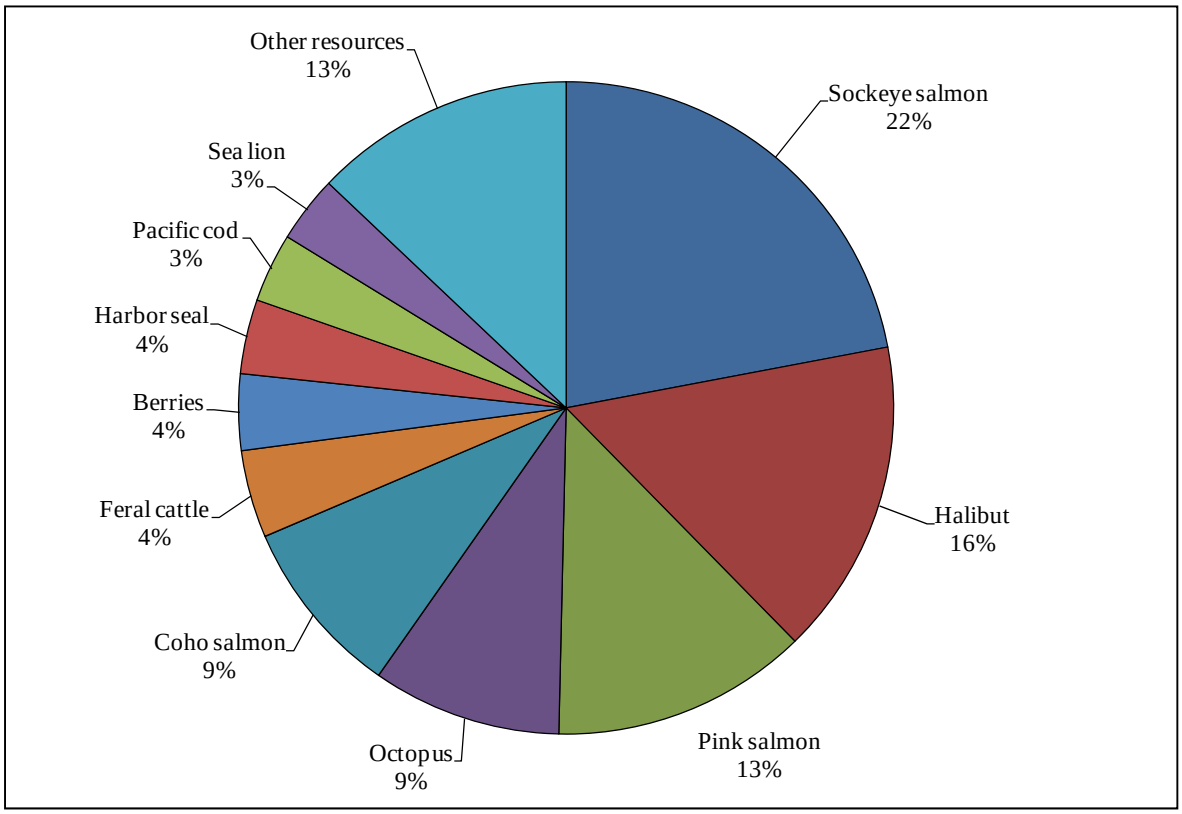

Figure 2-8.–Top 10 resources harvested ranked by estimated usable weight, Akutan, 2008.

Household Level Harvests and Patterns

As in most other rural Alaska communities (Wolfe 1987, Wolfe et al. 2010), specialization by households in subsistence harvesting was evident in Akutan in 2008. As shown in Figure 2-9, about 11% of Akutan households accounted for 71% of the community's total harvest of wild foods as estimated in usable pounds. These "super-households" shared their harvests with others in the community.

The 9 Akutan households in the survey sample who were involved in commercial fishing in 2008 harvested on average 941 lb of wild foods, compared to a mean of 583 lb for the other 27 surveyed households. This difference was not statistically significant. In addition, there were no categories of wild foods for which harvests by commercial fishing households were significantly different from other Akutan households in 2008 (Table 2-9, Figure 2-10).

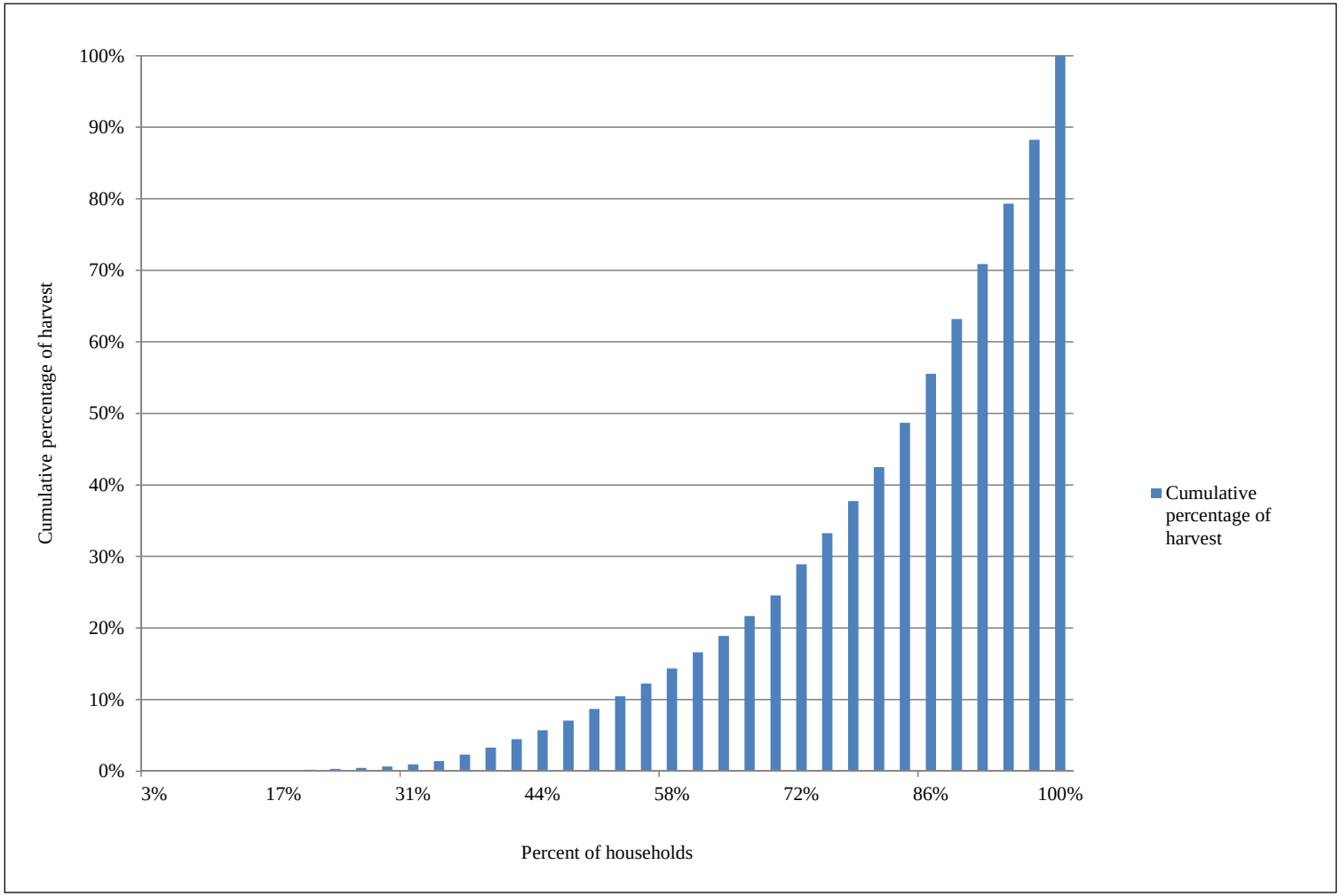

Figure 2-9.–Cumulative percentage of harvest, Akutan, 2008.

Table 2-9.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Akutan, 2008.

	Pounds harvested per household						
	Households not commercial fishing (n=27)		Households commercial fishing (n=9)				
Resource category	Mean	Percentage of total reported pounds	Mean	Percentage of total reported pounds	t	Significance	
Salmon	338.9	84.6%	185.6	15.4%	0.927	0.361	No
Other fish	85.1	38.6%	406.0	61.4%	-1.786	0.11	No
Large game	0.0	0.0%	4.8	100.0%	-1	0.347	No
Furbearers	38.9	100.0%	0.0	0.0%	0.572	0.571	No
Marine mammals	60.2	84.0%	34.4	16.0%	0.573	0.57	No
Birds and eggs	19.0	69.8%	27.8	30.2%	-0.478	0.636	No
Marine invertebrates	9.6	10.3%	252.6	89.7%	-1.33	0.1	No
Plants	31.6	74.3%	32.8	25.7%	-0.06	0.953	No
All resources	**583.3**	**65.0%**	**940.9**	**35.0%**	**-1.237**	**0.225**	**No**

Source ADF&G Division of Subsistence household surveys, 2009.

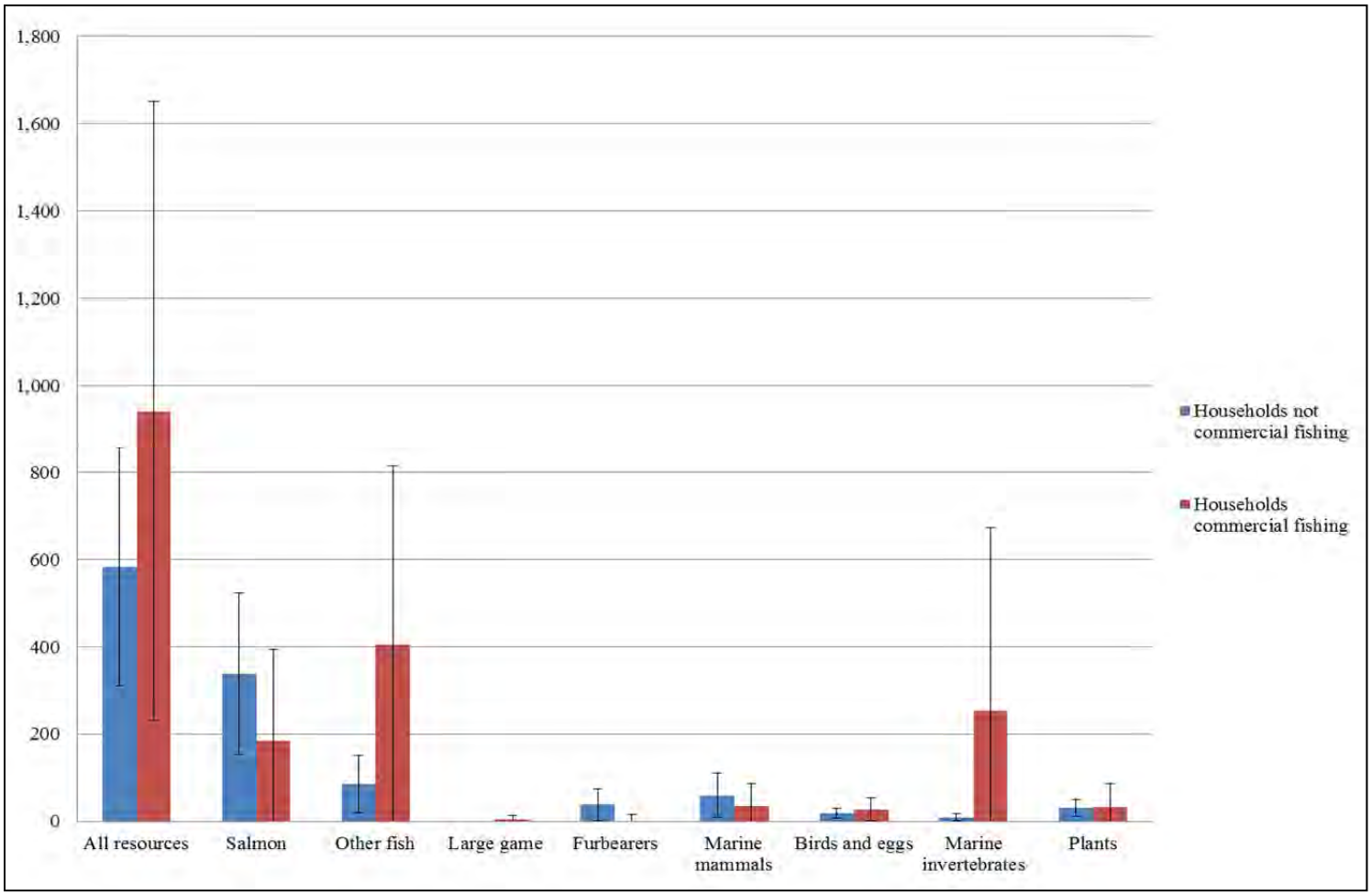

Figure 2-10.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Akutan, 2008.

Salmon and Other Fish: Harvest Methods

Akutan households in 2008 harvested salmon for home use by a variety of different methods and gear including subsistence nets, rod and reel or hook and line, other methods such as pots, or removal from commercial harvests for home use (tables 2-10 and 2-11, Figure 2-11). Akutan households reported harvesting a community total 3,363 salmon in 2008 (12,023 usable pounds). Subsistence nets accounted for 90% of salmon harvested (3,020 salmon). Rod and reel or hook and line gear were used to harvest 6% (209 salmon); followed by other methods, 4% (128 salmon), and removal from commercial harvest accounted for less than 1% of salmon harvested (7 salmon). As estimated in numbers of fish, sockeye salmon made up the largest portion of Akutan's home use salmon harvests at 48.2%, followed by pink (37%), coho (13%), chum (2%), and Chinook salmon (1%).

One-half of Akutan's households (50%) used subsistence nets to harvest salmon in 2008; 19% used rod and reel, 8% used other methods, and 3% (1 household) removed salmon for home use from a commercial harvest (Table 2-13).

Fish other than salmon were harvested by the same 4 general methods as salmon. "Other methods" (primarily longlines [skates] or pots) accounted for 48% (3,199 lb) of total harvests of nonsalmon fish for Akutan households in 2008 (Table 2-11, Figure 2-11). Removal from local commercial harvests accounted for 30% (1,979 lb) of nonsalmon fish harvests for home use; rod and reel or hook and line gear was used to harvest 17% (1,125 lb); and subsistence nets was used to harvest the least amount at 5% (311 lb). Halibut ranked first among nonsalmon fish harvests, at 4,216 lb for the community, 63.7% of all nonsalmon fish; Pacific cod ranked second with 920 total lb (149%) and various species of rockfish ranked third (353 total lb; 5%) of nonsalmon fish (Table 2-11).

Of all Akutan households, 44% used rod and reel to harvest nonsalmon fish, 39% used "other methods" (primarily longlines), 14% removed fish from commercial harvests, and 3% used subsistence nets (Table 2-12).

Table 2-10.–Estimated harvest of salmon and other fish by gear type, in numbers of fish, Akutan, 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
Resource name(s)	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
Fish	**1,749.6**	**19.9%**	**3,242.2**	**36.8%**	**1,029.5**	**11.7%**	**2,781.7**	**31.6%**	**8,803.0**
Salmon	**6.7**	**0.2%**	**3,020.0**	**89.8%**	**208.9**	**6.2%**	**127.8**	**3.8%**	**3,363.3**
Chum salmon	2.2	4.1%	52.2	95.9%	0.0	0.0%	0.0	0.0%	54.4
Coho salmon	2.2	0.5%	387.8	85.7%	23.3	5.2%	38.9	8.6%	452.2
Chinook salmon	0.0	0.0%	2.2	100.0%	0.0	0.0%	0.0	0.0%	2.2
Pink salmon	2.2	0.2%	1,122.2	82.2%	152.2	11.1%	88.9	6.5%	1,365.6
Sockeye salmon	0.0	0.0%	1,455.6	97.8%	33.3	2.2%	0.0	0.0%	1,488.9
Nonsalmon fish	**1,743.0**	**32.0%**	**222.2**	**4.1%**	**820.6**	**15.1%**	**2,653.9**	**48.8%**	**5,439.6**
Herring	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Herring roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Cod	22.2	7.5%	0.0	0.0%	61.0	20.6%	213.3	71.9%	296.5
Pacific cod (gray)	22.2	7.7%	0.0	0.0%	52.1	18.1%	213.3	74.2%	287.6
Pacific tomcod	0.0	0.0%	0.0	0.0%	7.8	100.0%	0.0	0.0%	7.8
Walleye pollock (whiting)	0.0	0.0%	0.0	0.0%	1.1	100.0%	0.0	0.0%	1.1
Flounder	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Greenling	0.0	0.0%	0.0	0.0%	6.7	100.0%	0.0	0.0%	6.7
Atka mackerel	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Unknown greenling	0.0	0.0%	0.0	0.0%	6.7	100.0%	0.0	0.0%	6.7
Greenling roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.6	100.0%	2.6
Pacific halibut	1,631.8	38.7%	0.0	0.0%	252.5	6.0%	2,331.6	55.3%	4,216.0
Rockfish	0.0	0.0%	0.0	0.0%	131.5	60.7%	85.2	39.3%	216.7
Black rockfish	0.0	0.0%	0.0	0.0%	131.5	64.0%	74.1	36.0%	205.6
Red rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	11.1	100.0%	11.1
Unknown rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Sablefish (blackcod)	88.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	88.9

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Table 2-10.–Page 2 of 2.

Resource name(s)	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
Nonsalmon fish, continued									
Sculpin	0.0	0.0%	0.0	0.0%	22.2	51.3%	21.1	48.7%	43.3
Bullhead sculpin	0.0	0.0%	0.0	0.0%	22.2	90.9%	2.2	9.1%	24.4
Irish lord	0.0	0.0%	0.0	0.0%	0.0	0.0%	6.7	100.0%	6.7
Yellow Sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Unknown sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	12.2	100.0%	12.2
Sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Yellowfin sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Char	0.0	0.0%	222.2	39.1%	346.7	60.9%	0.0	0.0%	568.9
Dolly Varden	0.0	0.0%	222.2	41.5%	313.3	58.5%	0.0	0.0%	535.6
Lake trout	0.0	0.0%	0.0	0.0%	33.3	100.0%	0.0	0.0%	33.3
Arctic grayling	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

Source ADF&G Division of Subsistence household surveys, 2009.

Table 2-11.–Estimated harvest in pounds of salmon and other fish, Akutan, 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
Resource name(s)	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Fish	**2,007.6**	**10.8%**	**11,241.3**	**60.3%**	**1,761.2**	**9.5%**	**3,625.9**	**19.5%**	**18,636.1**
Salmon	**29.1**	**0.2%**	**10,930.2**	**90.9%**	**636.2**	**5.3%**	**427.2**	**3.6%**	**12,022.7**
Chum salmon	11.9	4.1%	278.9	95.9%	0.0	0.0%	0.0	0.0%	290.7
Coho salmon	11.7	0.5%	2,043.6	85.7%	123.0	5.2%	204.9	8.6%	2,383.2
Chinook salmon	0.0	0.0%	9.1	100.0%	0.0	0.0%	0.0	0.0%	9.1
Pink salmon	5.6	0.2%	2,805.6	82.2%	380.6	11.1%	222.2	6.5%	3,413.9
Sockeye salmon	0.0	0.0%	5,793.1	97.8%	132.7	2.2%	0.0	0.0%	5,925.8
Nonsalmon fish	**1,978.5**	**29.9%**	**311.1**	**4.7%**	**1,125.0**	**17.0%**	**3,198.8**	**48.4%**	**6,613.4**
Herring	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Herring roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Cod	71.1	7.7%	0.0	0.0%	172.1	18.6%	682.7	73.7%	925.9
Pacific cod (gray)	71.1	7.7%	0.0	0.0%	166.7	18.1%	682.7	74.2%	920.4
Pacific tomcod	0.0	0.0%	0.0	0.0%	3.9	100.0%	0.0	0.0%	3.9
Walleye pollock (whiting)	0.0	0.0%	0.0	0.0%	1.6	100.0%	0.0	0.0%	1.6
Flounder	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Greenling	0.0	0.0%	0.0	0.0%	6.7	100.0%	0.0	0.0%	6.7
Atka mackerel	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Unknown greenling	0.0	0.0%	0.0	0.0%	6.7	100.0%	0.0	0.0%	6.7
Greenling roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	18.3	100.0%	18.3
Pacific halibut	1,631.8	38.7%	0.0	0.0%	252.5	6.0%	2,331.6	55.3%	4,216.0
Rockfish	0.0	0.0%	0.0	0.0%	197.3	55.9%	155.6	44.1%	352.9
Black rockfish	0.0	0.0%	0.0	0.0%	197.3	64.0%	111.2	36.0%	308.4
Red rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	44.4	100.0%	44.4
Unknown rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Sablefish (blackcod)	275.6	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	275.6
Sculpin	0.0	0.0%	0.0	0.0%	11.1	51.3%	10.6	48.7%	21.7

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Table 2-11.–Page 2 of 2.

Resource name(s)	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Nonsalmon fish, continued									
Bullhead sculpin	0.0	0.0%	0.0	0.0%	11.1	90.9%	1.1	9.1%	12.2
Irish lord	0.0	0.0%	0.0	0.0%	0.0	0.0%	3.3	100.0%	3.3
Yellow Sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Unknown sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	6.1	100.0%	6.1
Sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Yellowfin sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Char	0.0	0.0%	311.1	39.1%	485.3	60.9%	0.0	0.0%	796.4
Dolly Varden	0.0	0.0%	311.1	41.5%	438.7	58.5%	0.0	0.0%	749.8
Lake trout	0.0	0.0%	0.0	0.0%	46.7	100.0%	0.0	0.0%	46.7
Arctic grayling	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

Source ADF&G Division of Subsistence household surveys, 2009.

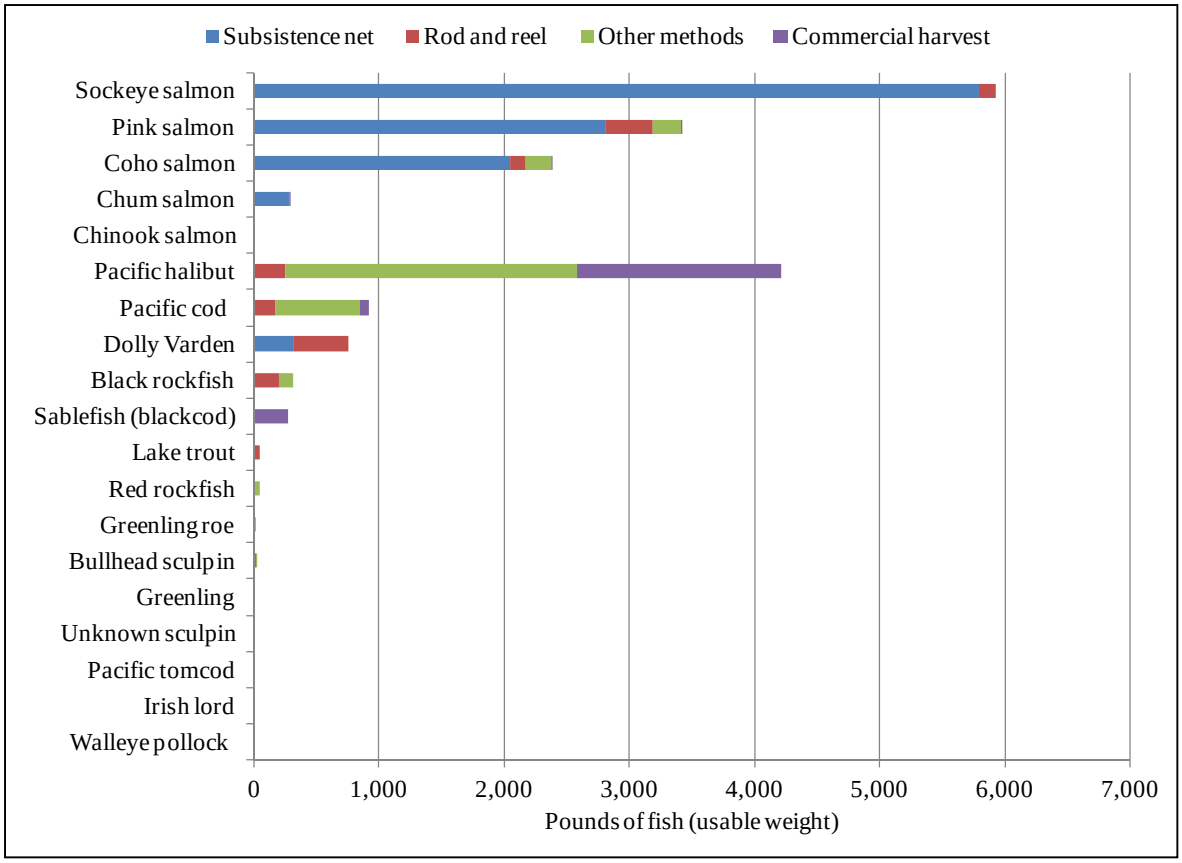

Figure 2-11.–Fish harvests by gear type, Akutan, 2008.

Table 2-12.–Percentage of households harvesting salmon and nonsalmon by gear type, Akutan, 2008.

Resource	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Fish	**5.6**	**13.9%**	**20.0**	**50.0%**	**18.9**	**47.2%**	**16.7**	**41.7%**	**27.8**	**69.4%**
Salmon	**1.1**	**2.8%**	**20.0**	**50.0%**	**7.8**	**19.4%**	**3.3**	**8.3%**	**23.3**	**58.3%**
Chum salmon	1.1	2.8%	4.4	11.1%	0.0	0.0%	0.0	0.0%	5.6	13.9%
Coho salmon	1.1	2.8%	10.0	25.0%	4.4	11.1%	2.2	5.6%	15.6	38.9%
Chinook salmon	0.0	0.0%	2.2	5.6%	0.0	0.0%	0.0	0.0%	2.2	5.6%
Pink salmon	1.1	2.8%	12.2	30.6%	4.4	11.1%	2.2	5.6%	18.9	47.2%
Sockeye salmon	0.0	0.0%	18.9	47.2%	3.3	8.3%	0.0	0.0%	20.0	50.0%
Nonsalmon Fish	**5.6**	**13.9%**	**1.1**	**2.8%**	**17.8**	**44.4%**	**15.6**	**38.9%**	**25.6**	**63.9%**
Herring	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Herring roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Cod	1.1	2.8%	0.0	0.0%	4.4	11.1%	4.4	11.1%	6.7	16.7%
Pacific cod (gray)	1.1	2.8%	0.0	0.0%	2.2	5.6%	4.4	11.1%	5.6	13.9%
Pacific tomcod	0.0	0.0%	0.0	0.0%	1.1	2.8%	0.0	0.0%	1.1	2.8%
Walleye pollock (whiting)	0.0	0.0%	0.0	0.0%	1.1	2.8%	0.0	0.0%	1.1	2.8%
Flounder	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Greenling	0.0	0.0%	0.0	0.0%	1.1	2.8%	0.0	0.0%	1.1	2.8%
Atka mackerel	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Unknown greenling	0.0	0.0%	0.0	0.0%	1.1	2.8%	0.0	0.0%	1.1	2.8%
Greenling roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	3.3	8.3%	3.3	8.3%
Pacific halibut	4.4	11.1%	0.0	0.0%	5.6	13.9%	14.4	36.1%	20.0	50.0%
Rockfish	0.0	0.0%	0.0	0.0%	5.6	13.9%	2.2	5.6%	7.8	19.4%
Black rockfish	0.0	0.0%	0.0	0.0%	5.6	13.9%	1.1	2.8%	6.7	16.7%
Red rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.1	2.8%	1.1	2.8%
Unknown rockfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Sablefish (black cod)	1.1	2.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.1	2.8%
Sculpin	0.0	0.0%	0.0	0.0%	1.1	2.8%	4.4	11.1%	4.4	11.1%

-continued-

Table 2-12.–Page 2 of 2.

Resource	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Nonsalmon fish, continued										
Bullhead sculpin	0.0	0.0%	0.0	0.0%	1.1	2.8%	1.1	2.8%	2.2	5.6%
Irish lord	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.2	5.6%	2.2	5.6%
Yellow sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Unknown sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.2	5.6%	2.2	5.6%
Sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Yellowfin sole	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Char	0.0	0.0%	1.1	2.8%	15.6	38.9%	0.0	0.0%	16.7	41.7%
Dolly Varden	0.0	0.0%	1.1	2.8%	14.4	36.1%	0.0	0.0%	15.6	38.9%
Lake trout	0.0	0.0%	0.0	0.0%	1.1	2.8%	0.0	0.0%	1.1	2.8%
Arctic grayling	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Source ADF&G Division of Subsistence household surveys, 2009.

Harvest Areas

A key respondent and lifelong Akutan resident declared: “We are sea hunters!” This suggests how the people of Akutan see themselves in relation to their Bering Sea environment. However, the geographic range of subsistence hunting and fishing activities is typically limited now to less than 10 miles from the village, or one hour by boat. This is due in part to fuel costs—for example, larger boats (there are 4 owned and operated by Akutan residents) burn 6–8 gallons of fuel per hour at cruising speeds. Otherwise, hunters and fishers use skiffs with outboard motors that limit travel to relative calm weather.

Subsistence resource harvest use areas were mapped in 2008 (figures 2-12 through 2-19) as well as 1990. (See Appendix C for maps based on data collected in 1990). Time periods and data collection methods differed between the 1990 and 2008 study years. The harvest area maps for 2008 show a one-year snapshot of combined household harvest areas by species. Quantities and seasons of harvests were also noted on the maps but these data were not added to the final maps in this report. Division of Subsistence information management staff digitized each of the household maps and created community use area maps showing all the combined household harvest areas in 2008 by resource category.

In 1990, harvest area maps were created to represent a general multi-year harvest area map by resource categories for the community as a whole. Mapping was done through a combined effort of several active and primary hunters and fishers and elders who together met with Division of Subsistence researcher Lisa Hutchinson-Scarbrough. She plotted their subsistence harvest areas by species on a larger U.S. topographic map using a separate mylar overlay per resource. Two time periods were mapped by resource: 1) “Lifetime to Current” (1990) (harvest areas used during lifetimes by living subsistence users in 1990) and 2) “Pre-World War II” areas of harvest. This second set of maps only shows additional subsistence harvest areas not depicted on the lifetime maps, which were used prior to 1942 when all Akutan residents were evacuated to internment camps in Ketchikan.

Harvest Areas in 2008

Figures 2-12 through 2-19 show areas Akutan residents used in 2008 for hunting, fishing, and gathering wild resources. In 2008, all subsistence hunting, gathering and fishing by Akutan subsistence hunters and fishers occurred on and between Akutan, Akun, Anatanak, and Rootok islands, with most resource harvesting for all species concentrated along the shores and within the waters of Akutan Bay and Akun Strait, located between Akutan and Akun islands.

Resources hunted and gathered from the land for subsistence, including gathering of eggs, berries, beach greens and other plants, freshwater fishing, and hunting of ptarmigan and some migratory waterfowl, took place primarily in the land near and hills behind the village, beach front areas surrounding Akutan Harbor, and throughout Akun Island including the rock outcrops south of Akun Island. Migratory waterfowl, geese, ducks, seabirds, and marine mammals (harbor seals, sea lions and migrating fur seals) were also hunted throughout Akutan Bay and in the waters of Akun Strait and on Akun Island. Gull eggs were taken primarily at Akun Head, the cliffs at the northeast point of Akun Island. In the past, Akutan residents traveled by boat to the Baby Islands in Akutan Straits to harvest eiders and seabird eggs. However, due to distance and the transfer of the Baby Islands to federal control (in exchange for Tigalda Island territories), there has been no recent use of these islands for egg harvests.

As indicated earlier, most of the wild resources obtained for subsistence by Akutan residents in both study years (1990 and 2008) were obtained from the sea or freshwater tributaries. In 2008, most species of salmon (sockeye, coho, Chinook, chum) were frequently caught with subsistence gillnets off the point of land just east of the village at the entrance to Akutan Harbor. Pink salmon were mostly taken at the head of Akutan Harbor above Trident. All other species of salmon were harvested in the bays and tributaries from Akutan Harbor and northwest to the island’s northern most point, called “North Head.” Sockeye and coho salmon were also caught near the old Unangan village of Chulka, located on the southwest side of

Akun Island, next to the long curved beach called “Surf Beach” or “Surf Bay,” where some people have cabins they use as fishing or hunting camps.

Akutan informants remarked that Akun Island is fairly flat, with lots of protected bays and streams and is far more productive in terms of harvestable subsistence resources than Akutan Island, which is mostly mountainous. When weather and tides permit, it is common for Akutan residents to boat to Akun Island (particularly near Surf Beach and Chulka) to have a picnic, camp, or hunt, fish, or gather a variety of subsistence resources including salmon, nonsalmon marine fish, freshwater fish, seals or sea lions, geese, ducks or other seabirds, berries, plants, bird eggs, firewood, or marine invertebrates. In addition, feral cattle live on Akun Island and about 2 are harvested annually for the village. This abundance of resources is undoubtedly why many ancestral Unangan people lived on Akun Island prior to moving to Akutan when cash economy was introduced with the arrival of the fur, whale, and fisheries businesses established in Akutan Bay starting in 1878. The proposed airfield on Akun Island could motivate residential shifts back to Akun Island.

Nonsalmon saltwater fish such as Pacific cod, sablefish (blackcod), and rockfish were generally harvested while targeting halibut. Greenling and greenling roe were obtained in Akutan Harbor and near the point of Akutan Harbor, and saltwater Dolly Varden were fished along the northern shores of Akutan Harbor and in 2 bays of Akun Island. Halibut fishing occurred in the broadest area from the northeastern end of Akutan Island in Hot Springs Bay, east to Lost Harbor on Akun Island, and south throughout Akutan Bay, Akun Strait, Avatanak Strait (between Akun Island and the 2 islands to the south, Avatanak and Rootok islands), as well as along the south side of Akutan Island and west to the Baby Islands. Key respondents in 2008 commented that halibut fishing has occurred in these areas, but if halibut are available they will fish (or hunt) as close to the village as possible, and generally in the waters of Akun Strait, just west of Akun Island. Informants described that in recent years, the cost of fuel to run their boats has been inhibiting, so they do not use or run their boats as much or far as they did in 1990.

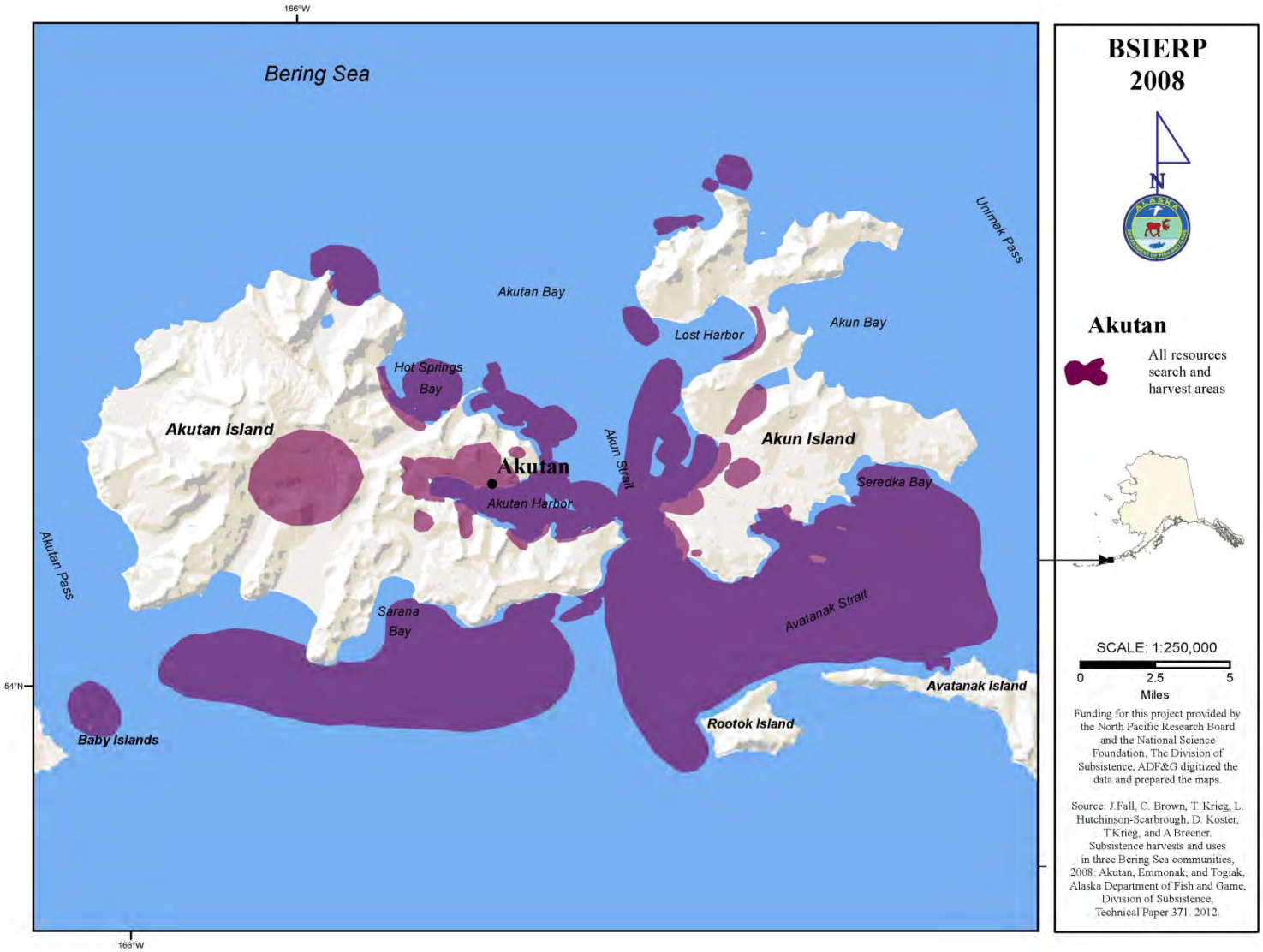

Figure 2-12.–Harvest locations and search areas, all resources, 2008, Akutan.

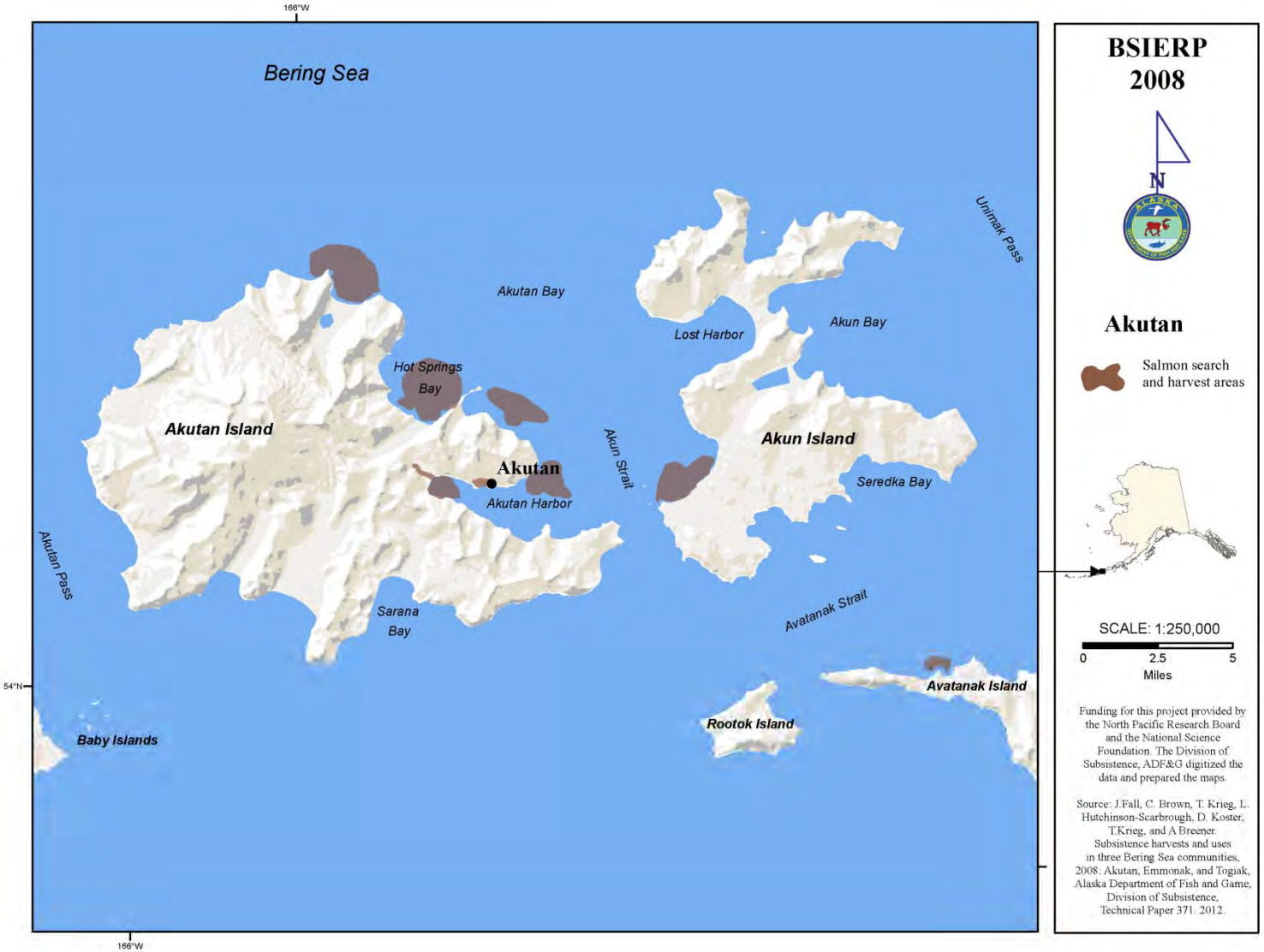

Figure 2-13.–Harvest locations and search areas, salmon, Akutan, 2008.

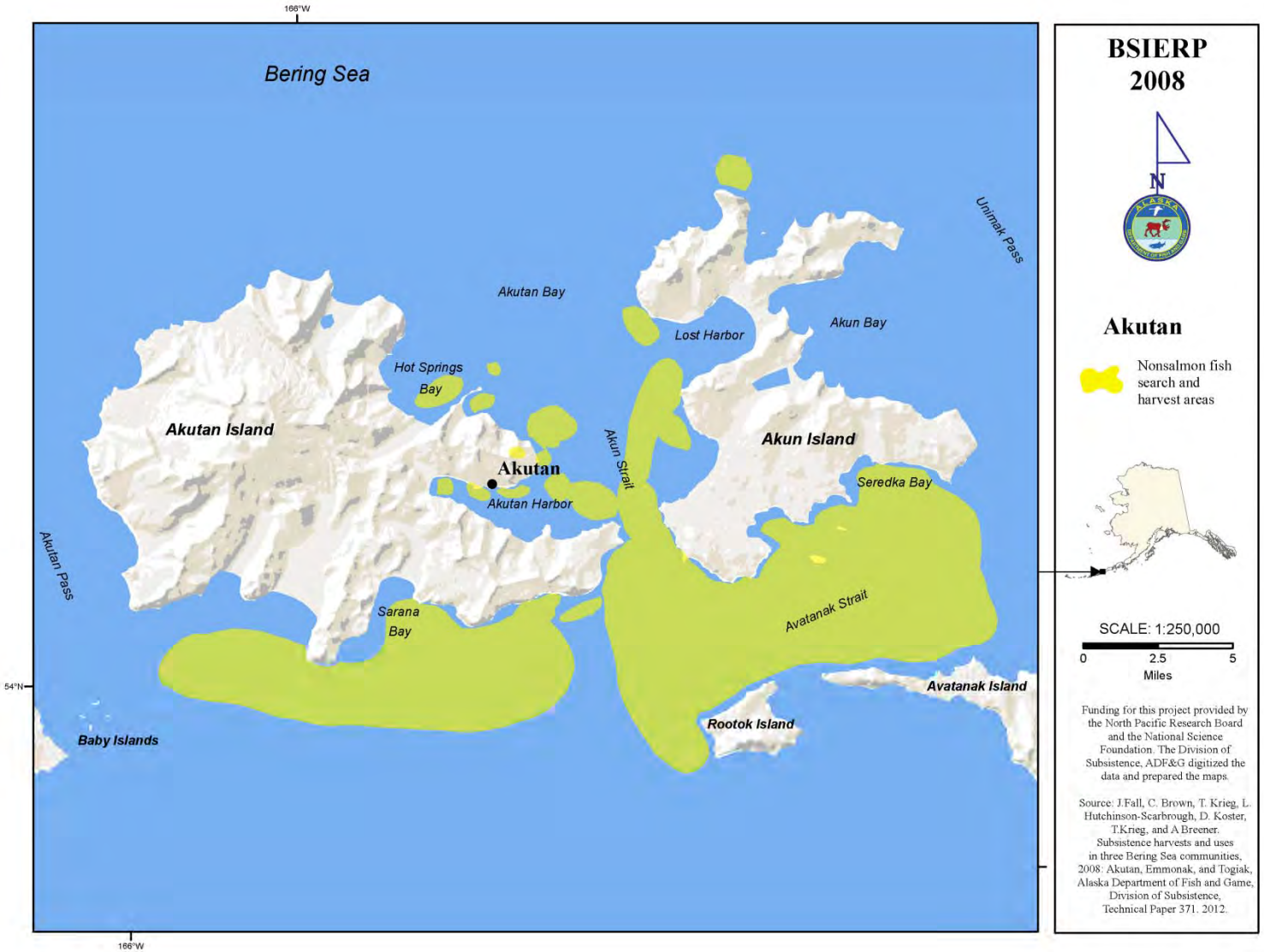

Figure 2-14.–Harvest locations and search areas, marine fish, Akutan, 2008.

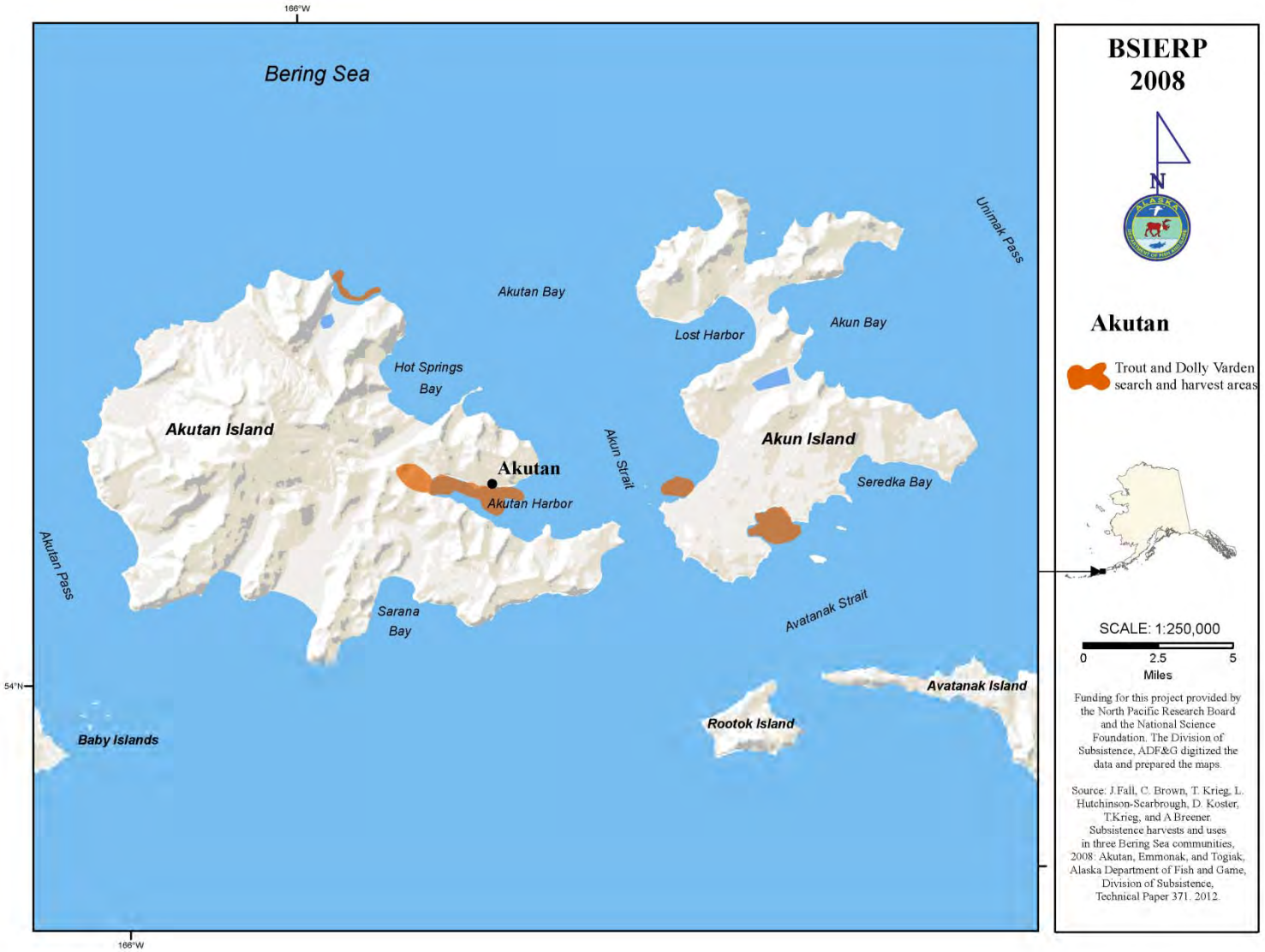

Figure 2-15.–Harvest locations and search areas, trout and Dolly Varden, Akutan, 2008.

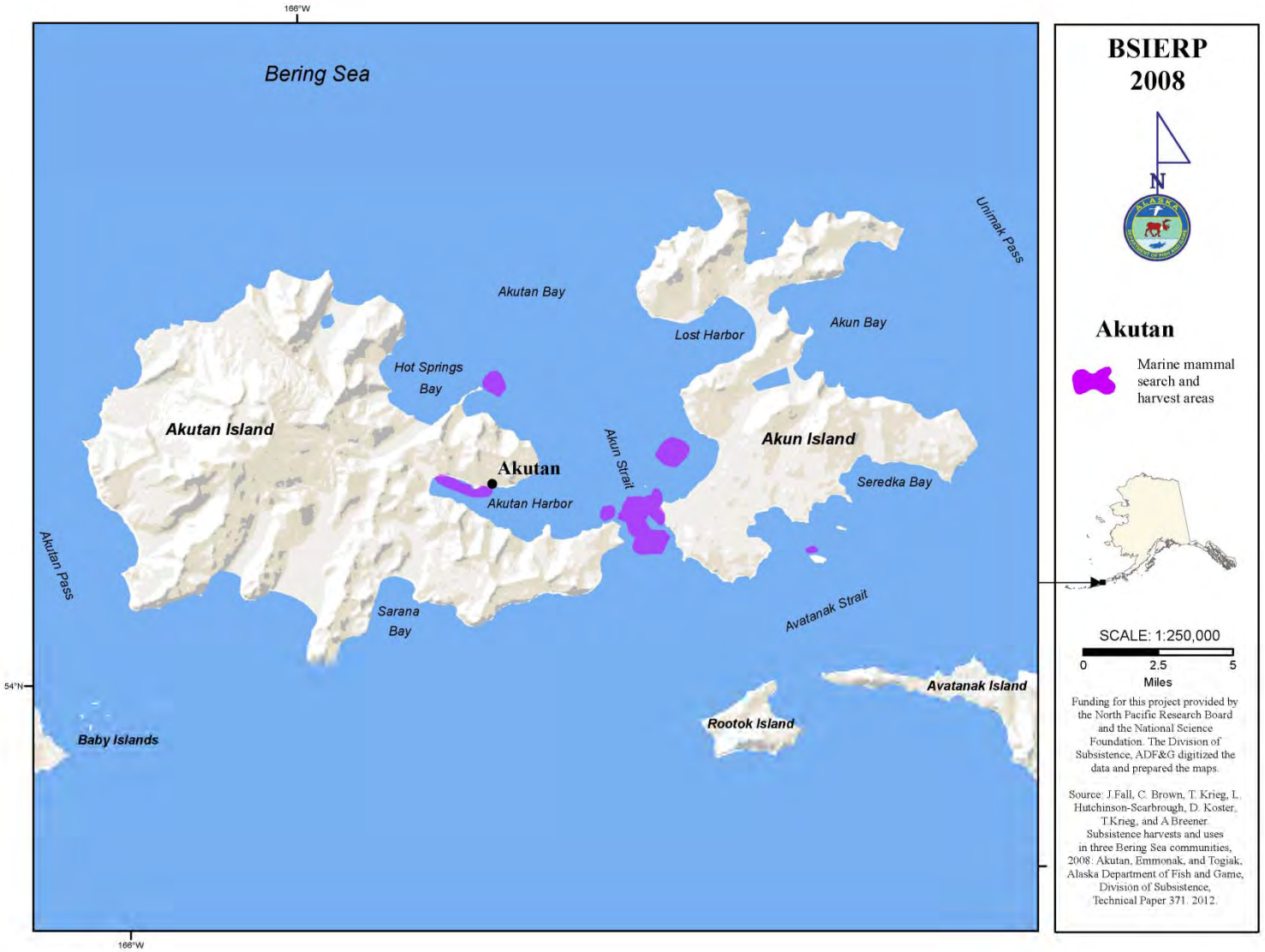

Figure 2-16.–Harvest locations and search areas, marine mammals, Akutan, 2008.

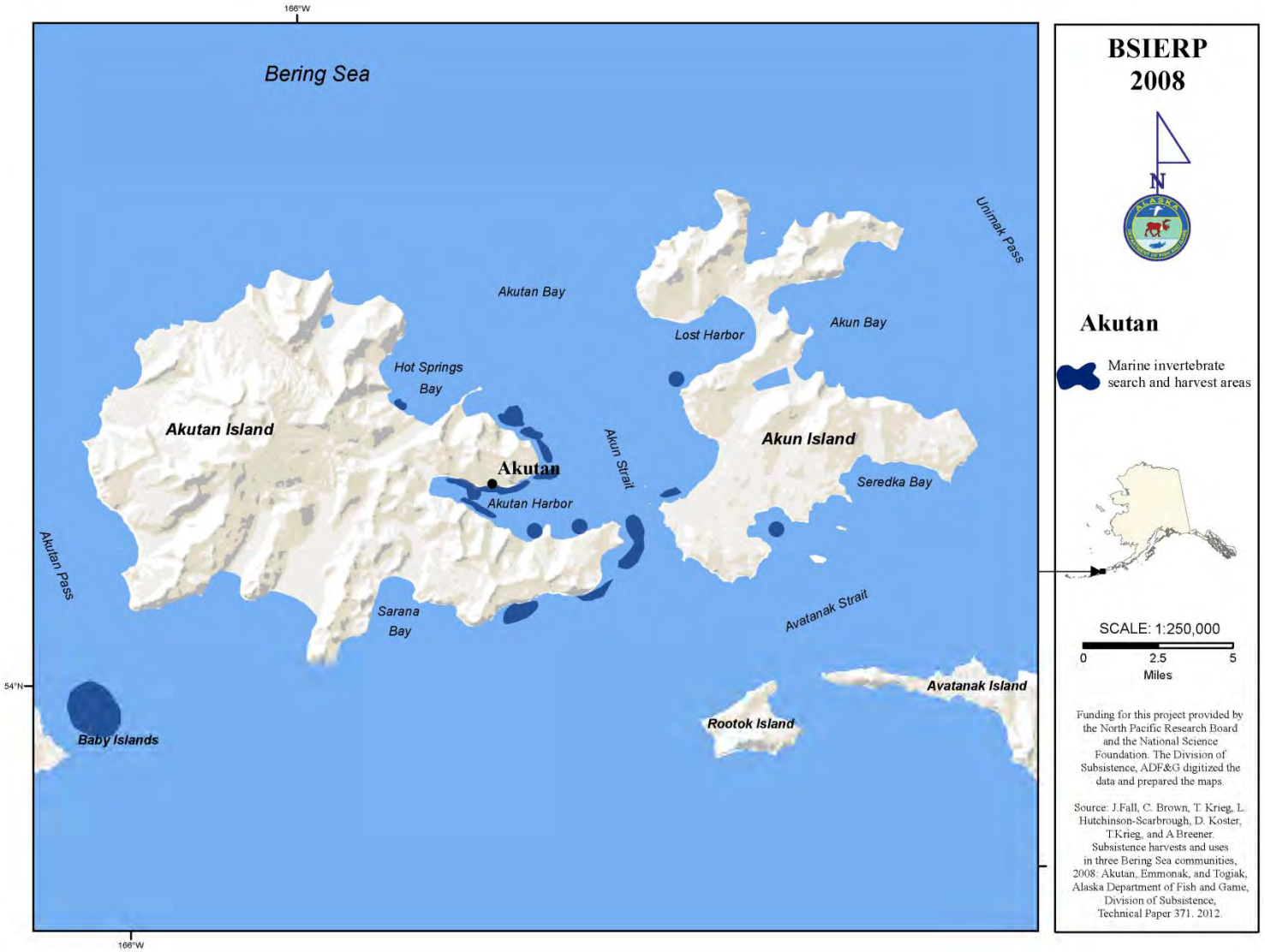

Figure 2-17.–Harvest locations and search areas, shellfish, Akutan, 2008.

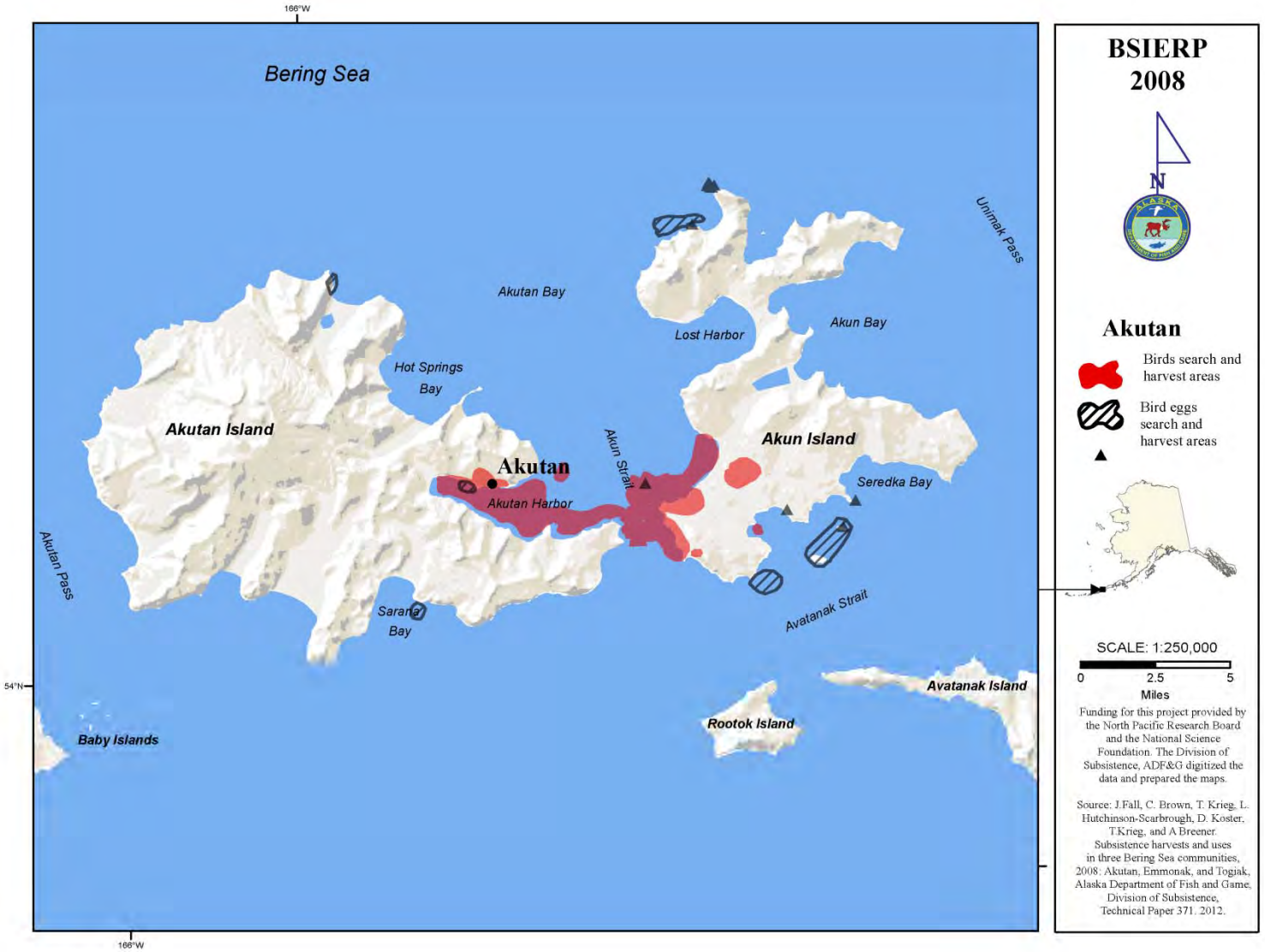

Figure 2-18.–Harvest locations and search areas, birds, Akutan, 2008.

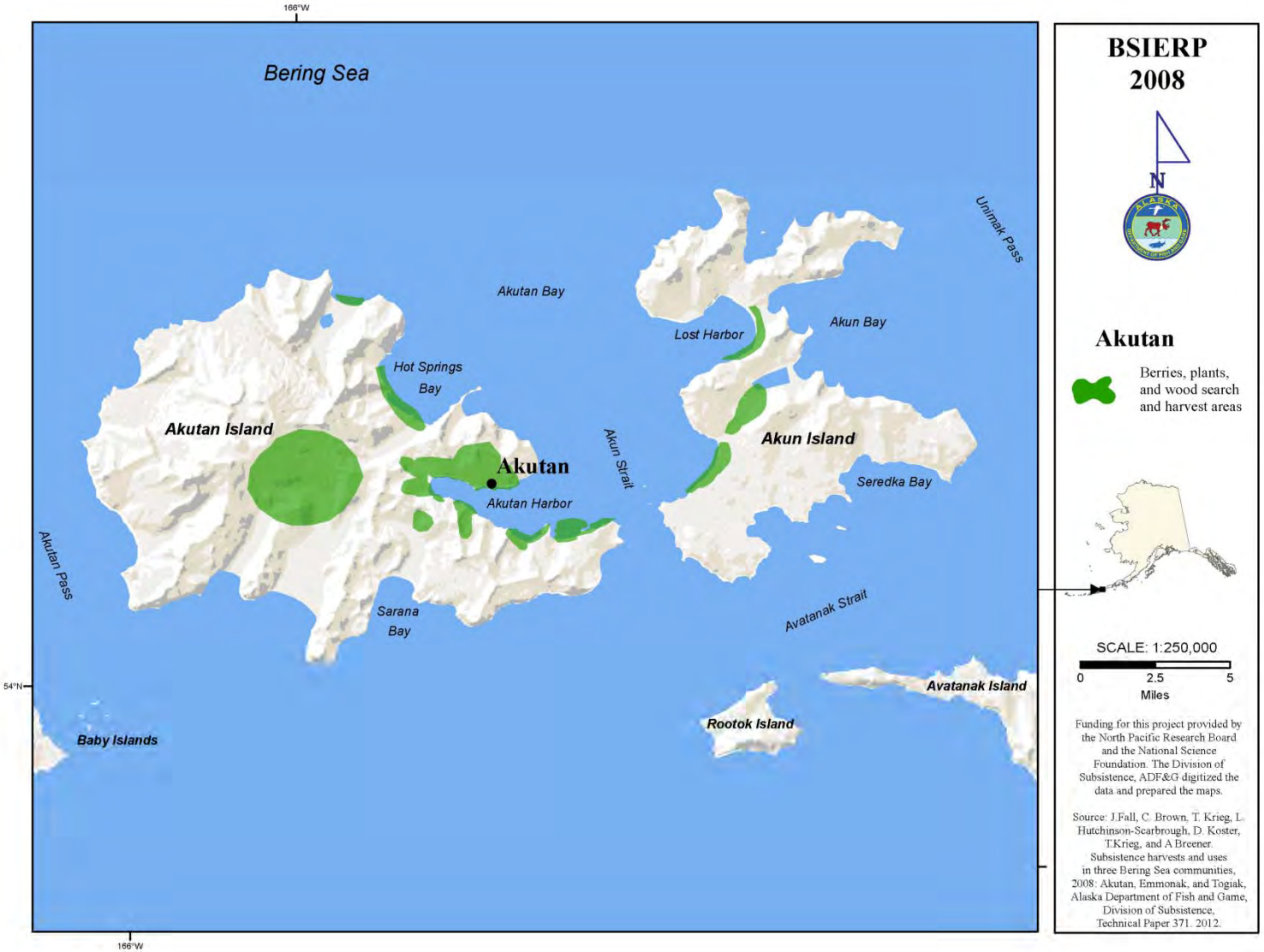

Figure 2-19.–Harvest locations and search areas, berries, plants, and wood, Akutan, 2008.

Comparisons of Harvest Areas Mapped in 2008 with 1990

From approximately 1950 to 1990, Akutan's hunters and fishers used much greater areas for their subsistence harvests than reflected in the maps for 2008 (See Appendix C for maps based on data collected in 1990). Though the primary harvest areas (the waters and shores of Akutan and Akun islands) as well as species harvested remained about the same during both study periods, in the 1990 study, local subsistence users traveled much farther at times to get subsistence resources. Areas used prior to 1990 but not used in 2008 include: the southern and western sides of Akutan Island (thus all of Akutan Island's shorelines were used prior to 1990); and the entire northern, eastern, and southern sides of Akun Island (thus all shoreline areas were used prior to 1990). In addition, the other small islands south of Akutan and Akun islands in the Krenetzin Island group were all used for subsistence in 1990 and during the lifetimes of contributing Akutan hunters and fishers. These islands west to east included: Unalga, Rootok, Avatanak, Tigalda, Kaligagan, Aiktak, Ugamak and Round islands.

As documented in the 1990 study, trapping of fox and other land furbearers occurred prior to 1990 and local people ran traplines around all of the islands. In addition, egg, plant, and berry gathering, and bird and marine mammal hunting, occurred most commonly in the areas where trapping occurred. Another major change was the use of the southeastern, eastern, and northern coastal areas of Akun Island. These areas were used for bird and marine mammal hunting, marine invertebrate gathering, and salmon fishing. Also prior to 1990, there were several camps around both Akutan and Akun islands, most likely used for shelter when running the fox traplines, or when traveling far for subsistence harvesting. When they returned from internment camps after World War II, Akutan people used most of the same harvest areas as before the war, although there were some changes. For example, prior to WWII, the east side of Akun Island (Akun Bay) was used for much of Akutan's salmon and bird harvests, and the north side of the island inside the bay was used for shellfish gathering. Also, the west side of Akutan Island was used largely for marine mammal hunting before WWII. Key respondents told researchers in 1991 that many people would often walk to the west side of Akutan Island rather than take a boat in order to do some hunting or fishing or to operate their traplines. The major Steller sea lion haulout areas on the south side of Akutan Island are no longer used for subsistence hunting because the sea lion populations there have crashed.

COMPARISONS WITH PREVIOUS FINDINGS

Overall Harvest Patterns

In October 1991, Division of Subsistence researchers Lisa Hutchinson-Scarbrough and Ronald Stanek conducted a comprehensive household harvest survey and harvest area mapping project very similar to that done in 2008. The study year was a 12-month period from October 1990 through September 1991. In 1990, Akutan households harvested an estimated average of 1,529 lb of subsistence resources, 461 lb per person (CSIS). For 2008, harvests showed a significant decline of 56% for mean household harvests (to 673 lb per household) and 29% for per person harvests (to 327 lb) since 1990. Demographic changes have occurred as well which likely had some influence on harvest levels and demand. Since 1990, the number of households increased from 31 households to 40 in 2008 but the total estimated population declined from 103 people in 1990 to 82 in 2008. In both study years, every household in Akutan used (harvested and/or consumed) as well as received (sharing from other household) at least 1 subsistence resource. Also in both years, almost all the community's households engaged in subsistence harvest activities (96% in 1990, 97% in 2008) and shared portions of their harvests with other households (92% in 1990, 86% in 2008). However, the range of resources used, harvested, and shared in 2008 was lower than in 1990. In 2008, Akutan households on average used 17 kinds of wild resources compared to 31 kinds in 1990; harvested about 9 kinds of resources compared to 20 kinds in 1990; received 12 kinds compared to 19 in 1990; and gave away 8 kinds compared to 14 kinds in 1990 (Figure 2-20).

In 1990, there were 27 resources that were used by 50% or more of Akutan households. As shown in Figure 2-21, the percentage of households using all of these resources decreased in 2008 compared to

1990. The percentage declined, slightly (less than 10%) for 4 of these resources (berries, sockeye salmon, pink salmon, and feral cattle). For 20 resources, there was a 25% or larger decrease in the percentage of households that used the resource in the 2008 study year compared to 1999. In 2008 compared to 1990, 65% fewer households used eiders, 61% fewer used ptarmigan, 57% fewer used plants other than berries, 52% fewer used buffleheads, 51% fewer used Pacific cod, and 50% fewer used emperor geese.

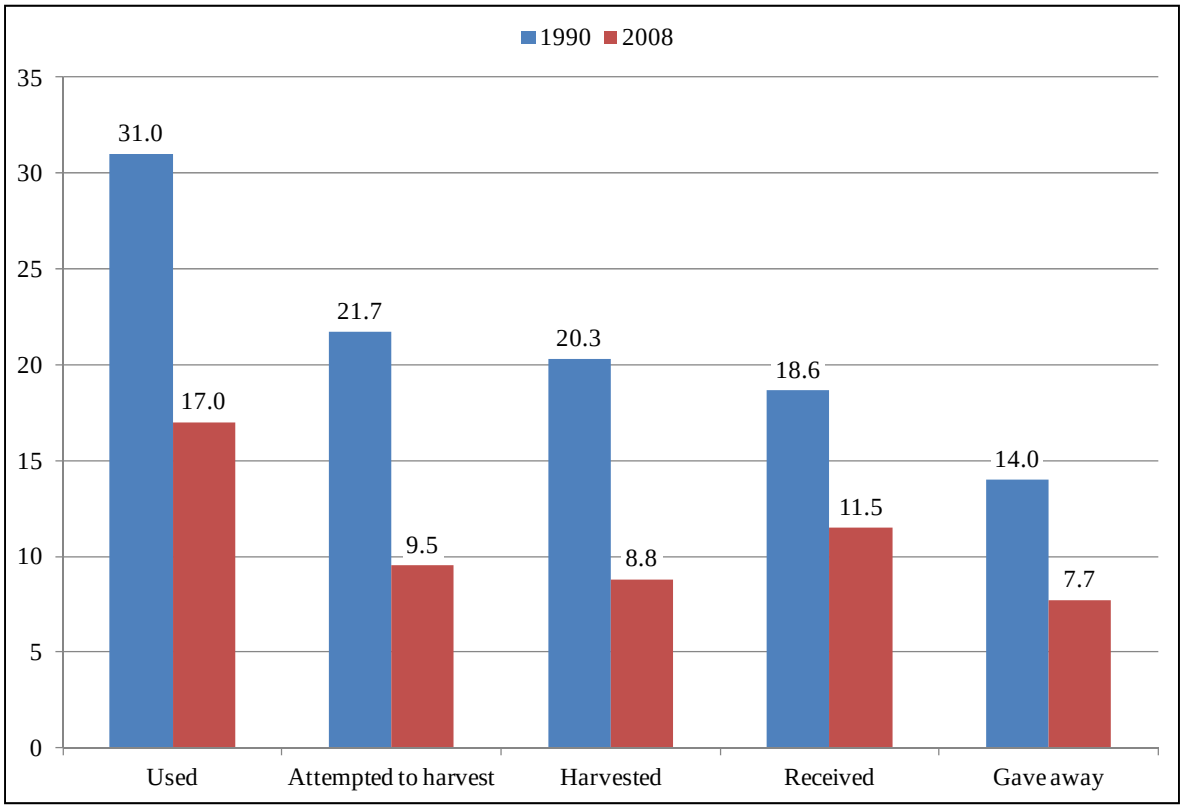

Figure 2-20.–Average number of resources used, attempted to harvest, harvested, received, and given away per household, Akutan, 1990 and 2008.

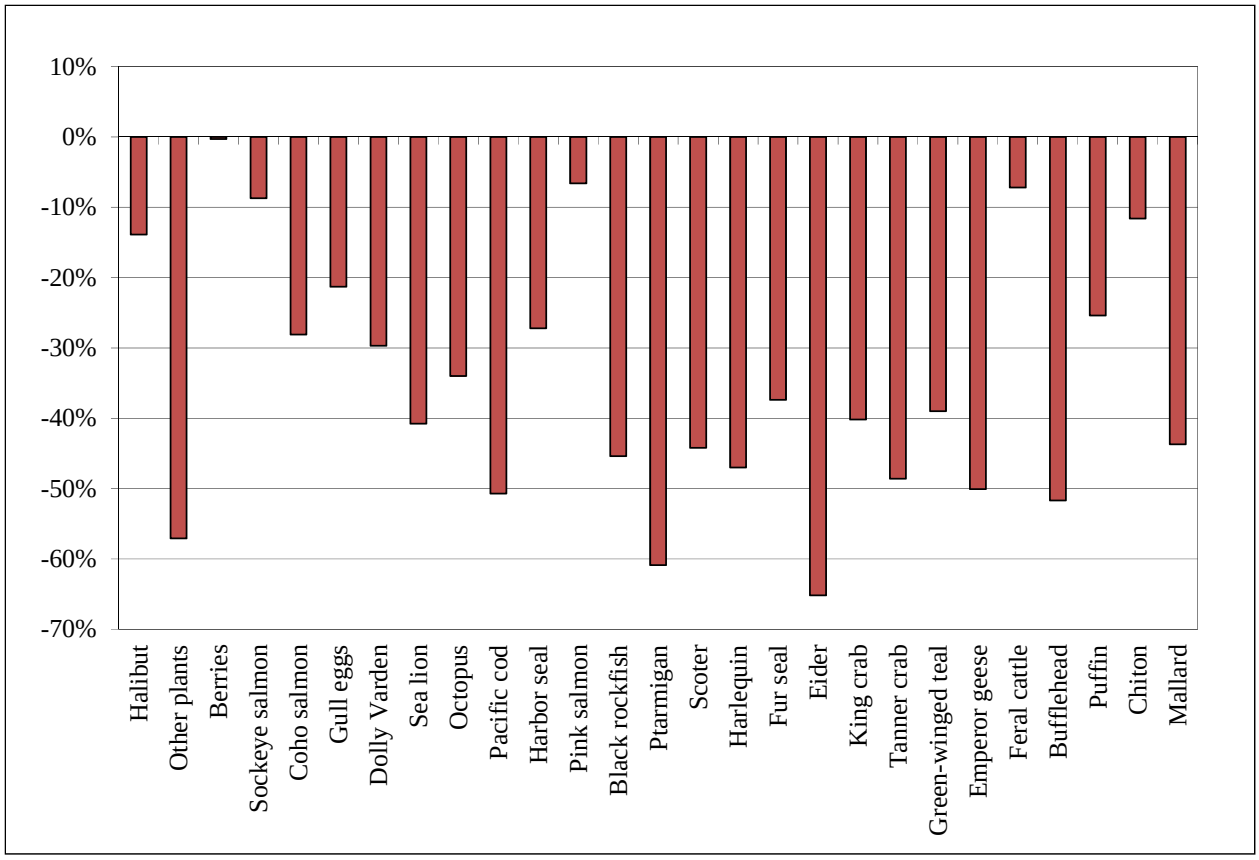

Figure 2-21.–Change in percentage of Akutan households using resources, 1990 and 2008.

Figure 2-22 compares per capita harvests for Akutan for 1990 and 2008 for 7 primary resource categories. Figure 2-23 shows the percentage of total harvest by resource category for the 2 study years. The primary differences between the years were lower harvests of marine mammals in 2008 (26 lb per person; 8% of the harvest) compared to 1990 (105 lb per person; 23% of the harvest); lower harvests of fish other than salmon in 2008 (80 lb per person; 25% of the harvest) compared to 1990 (142 lb per person; 31% of the harvest); lower harvests of birds and eggs in 2008 (10 lb per person; 3% of the harvest) compared to 1990 (28 lb per person; 6% of the harvest); and lower harvests of land mammals in 2008 (15 lb per person; 5% of the harvest) compared to 1990 (27 lb per person; 6% of the harvest). Conversely, the per capita harvest of salmon rose from 120 lb per person and 26% of the total harvest in 1990 to 146 lb per person and 45% in 2008. Harvests were also higher in 2008 compared to 1990 for 2 other categories: shellfish (28 lb per person in 1990, 34 lb in 2008), and wild plants (11 lb per person in 1999, 16 lb in 2008).

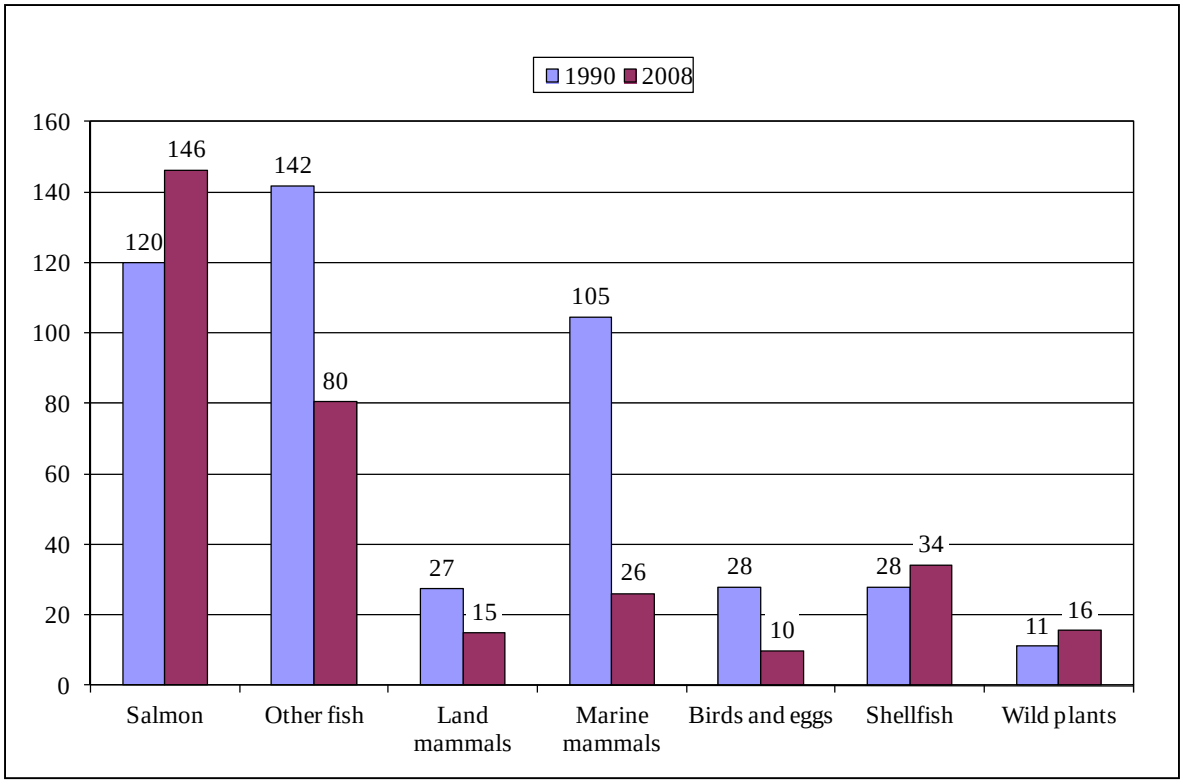

Figure 2-22.–Estimated harvests by resource category, pounds per person, Akutan, 1990 and 2008.

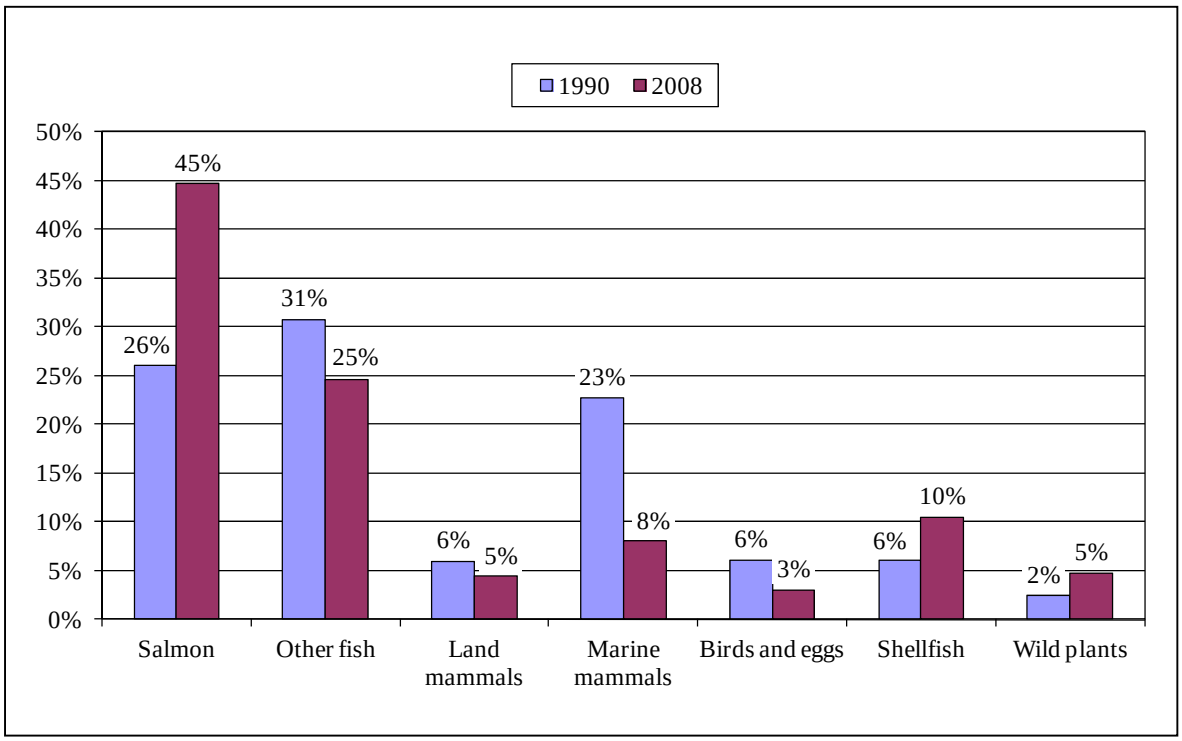

Figure 2-23.–Percentage of total resource harvest by category, Akutan, 1990 and 2008.

Figure 2-24 shows changes in harvests of the 10 resources taken in the largest quantities in 1990 compared to 2008. Per capita harvests dropped for 8 of these species. Halibut, harvested in the largest

quantities in 1990, dropped by 38%; harvests of sea lion, which ranked third in 1990, dropped by 85%; and harvests of Pacific cod, which ranked fourth in 1990, dropped 60% in 2008. Per capita harvests of 2 species of salmon were notably higher in 2008 compared to 1990: coho salmon (up 38%) and pink salmon (up 113%).

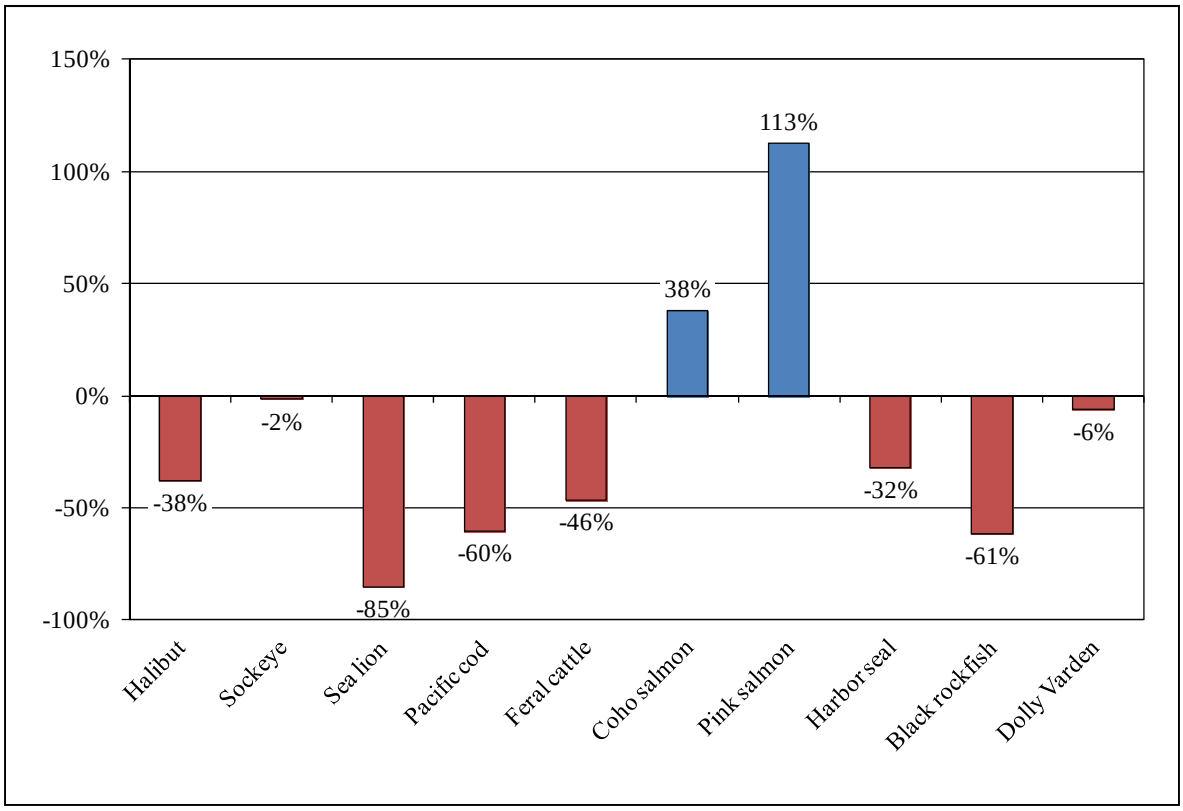

Figure 2-24.–Percentage change in 2008 in harvests (pounds usable weight per capita) of 10 resources harvested in the largest amounts in 1990, Akutan.

LTK and Changes in Harvest Patterns

Akutan LTK information helps understand these changes. For example, irregular weather patterns have created difficulties for traveling long distances, especially in skiffs. Primary hunters and fishers who have larger boats used for commercial longlining and cod pot fishing are faced with very high fuel costs to run their boats. In an effort to cut costs, these harvesters are fishing locally and limiting the time spent harvesting resources by only harvesting resources when someone in the community "places an order," for example, for a seal. They are also removing resources and incidental harvest from local commercial longlining instead of making individual subsistence halibut fishing trips. Incidental harvest is also obtained regularly from some of the smaller non-local fishing boats. More households are possibly relying more on store-bought foods available from the local store, or via cargo as well as from food from the new local restaurant or at the Trident mess hall. Factors that likely have contributed toward the decline of harvest levels and number of kinds of resources harvested and used include: Akutan people holding jobs outside fishing, population decline, fewer families with children, and fewer elders, all of which have occurred since 1990.

Salmon

Sockeye salmon, better known locally as "red salmon," are the preferred species of Akutan residents. They spawn in local streams with lakes, a requirement for this species' life cycle. The stream that enters Open Bight/Hot Springs Bay on the north shore of Akutan Island is the primary local spawning stream.

These salmon are mostly harvested by gillnets as they migrate north past the mouth of Akutan Bay. Pink salmon are considered by many to be inferior in taste and/or too small, though they spawn in abundance in streams at the head of Akutan Bay and are thus more easily harvested. Racks of drying salmon are conspicuous in Akutan village in late summer and fall (Figure 25).

Photo courtesy of Antone Shelikoff

Figure 2-25.–Sockeye salmon drying on racks, Akutan, 2008

Subsistence salmon permits are not required for salmon fishing in and around Akutan; therefore, there is no annual harvest monitoring or harvest estimates. Harvest data for salmon for Akutan are available for 1991 and 2008 from the comprehensive household surveys, and for 2002 and 2003 from surveys specifically targeting salmon harvests, also conducted by the Division of Subsistence. As shown in Table 2-13, total salmon harvest estimates for 1991 and 2008 were very similar, but both were notably higher than was estimated for 2002 and 2003. The reasons for these differences are uncertain. For every year, and for the 4 years combined, sockeye salmon were harvested in the largest numbers, with a 4-year average of 58% of the total. In 3 of the 4 years, pink salmon ranked second, with 28% of the 4-year average. Pink salmon harvests in 2008 were by far the highest of the 4 study years. In most years, coho salmon ranked third, with 12.3% of the annual average, followed by chum (1.4%) and Chinook (less than 1%).

Table 2-13.–Estimated subsistence harvests of salmon, Akutan, 1991, 2002, 2003, and 2008.

		Estimated salmon harvest						
Year	Estimated number of fishing households	Chinook	Sockeye	Coho	Chum	Pink	Unknown	Total
1991	24	10	1,872	429	36	915	6	3,268
2002	NA	0	809	147	44	70	0	1,070
2003	NA	3	1,270	127	0	275	0	1,675
2008	28	2	1,489	452	54	1,366	0	3,363
Average		4	1,360	289	34	656	2	2,344
Percentage of total		0.2%	58.0%	12.3%	1.4%	28.0%	0.1%	

Source CSIS; ADF&G Division of Subsistence household surveys, 2009.

NA = data not available.

Fish Other than Salmon

Halibut are harvested predominantly by longline and rod and reel in the subsistence fishery, and by local longline boats in conjunction with commercial harvests. A key respondent noted that fishers check halibut stomach contents carefully to determine what they are eating and thus where they are most likely to be found. He also described how halibut are pushed into deeper water by concentrations of spawning Atka mackerel, particularly south of Akun Strait. Halibut fishers, both local and non-local commercial boats, cooperate to locate the best fishing areas.

Federal regulations (68 FR 18145, April 15, 2003) recognize the rural community of Akutan and the Akutan Tribe has having traditional uses of halibut. Community residents and tribal members are eligible to participate in the federal subsistence halibut fishery after they obtain a Subsistence Halibut Registration Certificate (SHARC) from the National Marine Fisheries Service. The Division of Subsistence, through a grant from NOAA, conducts an annual survey of SHARC holders to estimate the subsistence halibut harvest in Alaska (e.g., Fall and Koster 2011). On average, about 37 Akutan residents have held SHARCs since 2003 (Table 2-14). However, the number dropped from 46 SHARC holders in 2007 to 17 in 2008, likely due to individuals who do not participate in the fishery not renewing their SHARC. Harvest estimates based on the mailed SHARC survey varied widely from year to year and were likely affected by the response rate, which averaged only 27% from 2003 to 2006, and may be high for those years based on overrepresentation of active fishers in the sample. The response to the SHARC survey for 2008 was 100% because it was coordinated with the comprehensive household survey. The halibut harvest of 2,705 lb was the lowest of all available study years up to that point, and notably lower than the estimated harvest of 6,488 lb (±20.6%) based on the household surveys for 1990. For 2009, the return rate for the SHARC survey in Akutan dropped to 41%, and the estimated harvest was of 2,993 lb was similar to that of 2008. For 2010, only 4 of 16 SHARC holders from Akutan returned surveys (25%), and the estimated harvest dropped to 1,659 lb. It is uncertain if these low harvest estimates in 2009 and 2010 were a result of the low response rate or document an actual decline in harvests.

Table 2-14.–Estimated subsistence harvests of halibut, Akutan, 2003–2010.

Year	SHARCs issued[a]	SHARCs returned	Estimated fishers	Estimated harvests[d]	
				Number of fish	Usable pounds
1990	NA	NA	19 households[b]	NA	6,488[c]
2003	50	17	39	313	9,612
2004	50	11	41	347	12,184
2005	49	13	47	611	15,284
2006	47	11	38	633	12,779
2007	46	34	16	187	3,603
2008[e]	17	17	13	105	2,705
2009	17	7	9	146	2,993
2010	16	4	9	90	1,659
7-year average	37	14	27	304	7,602

Sources ADF&G Division of Subsistence CSIS; Fall et al. 2007a; Fall et al. 2005b; Fall et al. 2006a; Fall et al. 2004a; Fall and Koster 2008, 2010b, 2011.

a. SHARC program began in 2003. NA = not applicable.

b. Estimated number of households harvesting halibut with "subsistence gear"—number of individuals not available.

c. Estimated harvest with "subsistence methods" and rod and reel. An additional 2,200 pounds was removed from commercial harvests for home use.

d. For 2003–2010, includes all noncommercial harvests for home use, including harvests the respondents classified as "sport."

e. Harvest values for 2008 have been corrected, and differ from those reported in Fall and Koster 2010a.

Survey results for 2008 found that of the estimated 4,216 lb of halibut harvested by Akutan residents in 2008, 55% was harvested with "other methods" (longlines), 39% was removed from commercial harvests, and 6% was harvested with rod and reel (Table 2-11). The noncommercial harvest estimate from the household surveys of about 2,584 lb was similar to the 2,705 lb based on the SHARC survey returns. A few SHARC holders did not participate in the household surveys, accounting for the difference in the estimates.

Some local subsistence and commercial fishers commented in 2008 that the average size of halibut has declined in the recent past. They reported that the larger halibut are living in deeper waters and not coming into the shallower areas in the summer, perhaps due to warmer ocean temperatures. They also reported that there are fewer larger halibut available for harvest and fishers are now taking the smaller "hatchery" halibut[13] and they worry that if the larger breeding fish are depleted, and the hatchery fish are being overharvested, this could have a long term long-term detrimental effects on the availability of halibut for harvest for subsistence uses as well as for the commercial fishery.

Pacific or gray cod, better known locally as P-cod, are mostly harvested as bycatch in the halibut fishery or by jigging from skiffs. Dried or salted cod were an important winter staple in the past when they could be harvested with a handline right off the village. However, local respondents indicated that these species are no longer present in waters near the village. Greenling, also known as "pogies," are harvested primarily for their eggs in late spring from bull kelp beds. The eggs are eaten raw and are described as "crunchy."

13. Local fishers use the term "hatchery halibut" to describe small halibut from a nursery location where they stay until large enough to be on their own.

Birds and Eggs

Waterfowl harvests have decreased since 1990. Sea ducks are hunted with shotguns from skiffs in winter. Freshwater ducks, such as green-winged teal, are hunted by foot up creeks, such as at the head of Akutan Bay.

Glaucous-winged gull eggs are targeted when nesting begins, in late May to early June, at colonies, notably on Akun Head. The traditional strategy was to harvest from nests with 1 or 2 eggs but to destroy full clutches of 3 or 4, then wait a week to return and harvest fresh eggs from relaying. Due to rough spring weather and distance, visits by skiff (45 minutes from Akutan) are limited. Nesting gulls are allowed to finish nesting later on. Harvests of several hundred eggs are possible. The eggs are widely shared, and used for custards and pies as well as omelets.

Tufted puffin ("sea parrot") eggs used to be harvested from their burrows. Black oystercatchers lay a single egg right on the rocks, such as at Jackass Point, but are no longer harvested.

One local hunter specializes in duck hunting. He prefers "rock ducks" (harlequin ducks), targeting males to allow the ducks to repopulate. He may harvest 15 a year. He also huts "coots" or "scooters," the local terms for scoters, especially the white-winged scoter, which is large and tasty. He also takes "sawbills" (red-breasted and/or common mergansers), perhaps 3 or 4 a year.

Eiders are no longer hunted, although they can be common in Akutan Bay in winter. More often, they concentrate in Akun Straits. Eiders are now avoided in part because they are said to be protected but also because they must be skinned rather than plucked, which is perceived as too much work. Akutan hunters used to travel to the Baby Islands to harvest eider eggs in spring, but have not done so in recent years.

Harvests of geese at Akutan dropped substantially from 1990 (when 221 geese were harvested) to 2008, when the harvest totaled 20. Hunting effort has declined because several species (Aleutian cackling geese, emperor geese) are said to be protected but also because some people consider them to be too dry.

Rock ptarmigan nest high above the village. They are common in winter, and hunted right in town with shotguns. They are skinned, not plucked. Ptarmigan subsist on mossberries (*Empetrum nigrum*) dug from under the snow in winter.

Marine Invertebrates

Marine invertebrates played a prominent role in subsistence harvests and uses in Akutan in 2008, with a harvest of 34 lb per person, 6% of the community total. Marine invertebrates used by the most households included octopus (50% use), black chitons, better known locally as "gumboots" (39%), sea urchins (31%), and king crab (28%). Sea urchin gonads, known locally as "sea eggs," are still a favorite, though sea otters have decimated local populations. Razor clams may be harvested on sandy beaches. Butter and littleneck clams and mussels are no longer harvested in Akutan Bay due to pollution from the fish processing operations. Paralytic shellfish poisoning is also a concern. A local resident regularly collects samples for testing.

Octopuses, at 31 lb per person, made up 89% of the marine invertebrate harvest. In 1990, the estimated harvest of octopuses was 8 lb per person. Interviews with key respondents explored possible reasons for the much higher harvest of octopuses in 2008 compared to 1990. Most octopuses are retained as bycatch from commercial longline fisheries, from subsistence halibut longlines, crab pots or sometimes obtained at low tide by beachcombing. Octopuses are favored as bait because the meat remains fresh on hooks longer than other fish, up to 6 days, reducing the need to rebait hooks.

One key respondent suggested that some of the octopus harvests reported in the survey was commercial bycatch that was subsequently used for bait in commercial fisheries. Use of bycatch in a commercial fishery is not a subsistence use and survey protocols exclude such harvests from community totals. However, in retrospect it was not possible to estimate how much of the octopus harvests reported in the

survey might have been used as commercial bait, although this respondent guessed that perhaps one-half of his bycatch went to commercial bait and the other one-half to subsistence bait and food. The respondent also noted that he shared his incidental harvest of octopuses widely in the community, where it is a favorite subsistence food. In summary, the estimated community harvest of about 2,518 lb (31 lb per capita) is likely high as an estimate of subsistence harvests. Nevertheless, octopuses are a key subsistence resource in the community and are used in relatively large quantities. Octopuses are boiled whole and eaten with seal oil. After boiling, the membrane is removed by rubbing with rock salt. Some people also pickle octopuses or marinate them in soy sauce. Only the entrails are discarded.

Black chitons or gumboots are harvested at low tide on rocky shores. Harvesters prefer minus tides associated with the new moon. Black chitons are boiled whole, and then eaten with seal oil.

Marine Mammals

Annual subsistence harvest surveys of harbor seals and sea lions were conducted from 1992 through 2008 (except 1999), in Akutan as well as 60 other coastal communities by the Division of Subsistence and the Alaska Native Harbor Seal Commission (ANHSC). Estimates of sea lion and harbor seals harvests for 1991 and for fur seals for 1991 and 2008 for Akutan are based on the comprehensive household surveys conducted by the Division of Subsistence in 1991 and 2009.

Harvests of Steller sea lions by Akutan residents ranged from about 38 animals in 1991 to about 3 in 2002, with an annual average during the years of the joint ADF&G/ANHSC survey of 8 sea lions (Table 2-15, Figure 2-25). Harvests have dropped over time, with an annual average of 12 sea lions from 1992–1998 and an average of 6 sea lions from 2000–2008. Subsistence harvests declined due to reduced hunting effort as a conservation measure in response to declining sea lion populations. Akutan residents attribute this population decline to killer whale predation.

Harvests of harbor seals by Akutan residents ranged from 36 seals in 1991 to about 2 seals in 2006. The annual average from 1992 through 2008 was 12.2 seals, with similar annual averages for the 1990s (12 seals) and the 2000s (12 seals) (Table 2-14, Figure 2-26).

Table 2-15.–Estimated subsistence harvests of harbor seals, sea lions, and fur seals, Akutan, 1991–2008.

	Estimated number		
Year	Sea lions[a]	Harbor seals[a]	Fur seals[a]
1991	38.4	36.0	67.0
1992	25.7	12.9	
1993	14.5	15.6	
1994	12.7	13.8	
1995	6.0	7.0	
1996	11.0	8.0	
1997	6.4	14.0	
1998	6.4	14.0	
1999			
2000	4.1	25.7	
2001	15.0	13.6	
2002	2.9	10.2	
2003	8.7	10.8	
2004	4.8	9.5	
2005	4.8	8.5	
2006	2.4	2.4	
2007	5.1	11.5	
2008	4.2	17.0	17.8
Annual average, 1992–1999	11.8	12.2	
Annual average, 2000–2008	5.8	12.1	
Annual average, 1992–2008	8.4	12.2	

Sources Wolfe et al. 2009 for sea lions and harbor seals, 1992–2008; Division of Subsistence household surveys for 1991 and for fur seals in 2008.

a. Blank cells = data not available.

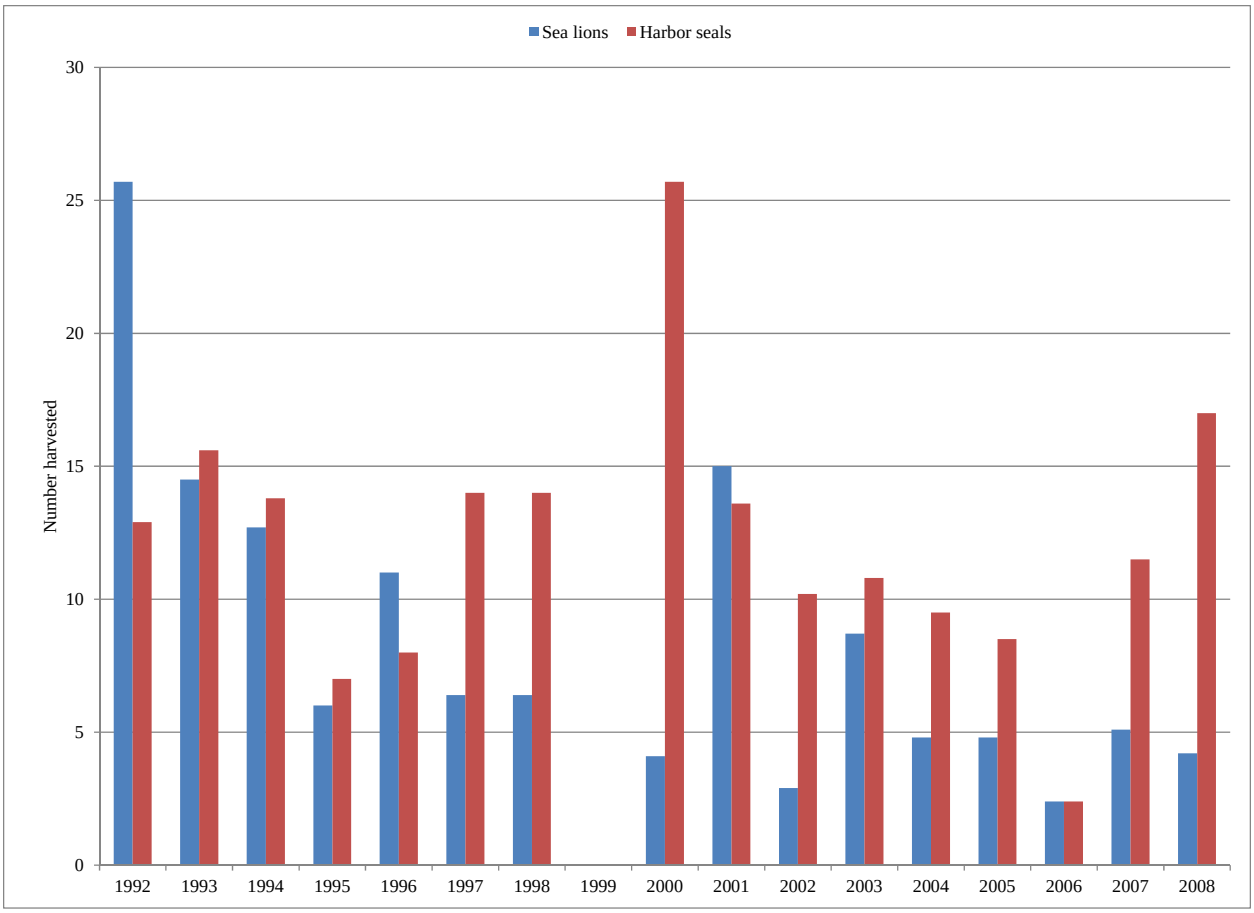

Figure 2-26.–Estimated harvests of sea lions and harbor seals, Akutan, 1991–2008.

Key respondents reported that sea lions are declining despite less hunting. One hunter stated that the major Cape Morgan haulout population on the south shore of Akutan Island declined precipitously since the late 1960s, from some 75,000 to just about 2,500 in 2010. The growing killer whale population, responding to legal protection, is widely cited as the cause of the decline in sea lions. Sea lion meat—called "black meat" locally—is widely appreciated. Sea lion flipper was a traditional delicacy. Sea lions are hunted opportunistically, by herding them close to shore so they will not be lost if they sink because they can be spotted close to shore. A special hand-carved wooden tool, called a *qáyux* in Unangan, is used to recover the carcass from the bottom. When a sea lion is killed, the entire village will be invited to share the bounty.

By contrast, harbor seal populations are increasing in the view of key respondents, who report that killer whales generally do not take seals, perhaps because harbor seals more readily shelter on rocks on shore. One hunter described how he was taught to hunt seals: never shoot at a seal while it is looking at you, because you will miss every time; the seals are just too fast; wait for them to turn their heads to the side, and then kill them with one shot. Seal oil is highly appreciated as a condiment, for example, with gumboots or octopus (Figure 2-27).

Figure 2-27.–Jars of oil rendered from sea lion (left) and harbor seal (right), Akutan, 2009.

Akutan residents also hunt fur seals, usually pups in Akun Strait, in the late summer and early fall months. Some local hunters believe these pups are migrating from their breeding grounds on the Pribilof Islands. Two harvest estimates are available: 67 fur seals for 1991 and about 18 fur seals for 2008 (Table 2-15).

Whales and porpoises are not hunted but may be salvaged on rare occasions. A key respondent reported that the last time a whale was salvaged was over 10 years ago. Elders particularly like the blubber and meat.

During the 2008 study period, sea otters were not hunted. Akutan residents report that sea otters are numerous and voracious, and are considered competitors with local subsistence harvesters for sea urchins, crab, and clams. There is no longer a local commercial Dungeness crab fishery and according to local respondents this is due to depletions caused by sea otters. A group of 40–60 sea otters comes to Akutan Bay to feed but mostly stays out by Akun Pass. They are not killed, just chased off, according to local respondents.

Large Land Mammals

There are no indigenous large land mammal populations within Akutan residents' traditional hunting areas. In 2008, as in 1990, some Akutan households received gifts of caribou or moose from residents of other communities. One Akutan household harvested a deer in 2008; the nearest deer population is on Kodiak Island (Table 2-8).

Feral cattle presently range on Akutan Island near Hot Springs Bay and on Akun Island. There were once feral sheep on both Akutan and Akun islands as well. These cattle were privately owned and were introduced to be ranched on the productive grass that is native to the Aleutian Islands. Local residents state that cattle also feed on kelp. Other advantages to cattle ranching were the absence of predators of the cattle, and the availability of land that could be leased very inexpensively. About 30 years ago, the cattle were being transported to another island farther west, but the ship that was carrying them was delayed by a large prolonged storm. The cattle were without water and could not survive if they remained onboard. They were therefore unloaded on Akun Island as well as at Akutan Valley in Hot Springs Bay on Akutan Island. The company that brought the cattle eventually abandoned them since it was too hard to manage the herd without fences or facilities to work the cattle or butcher them, and shipping costs to market the meat depleted the profits. In recent years, the herd, consisting of about 1,000 head of mixed breed cattle was purchased by an individual who is trying to manage the cattle operation on Akun Island in partnership with the Akutan Corporation, which owns the land. In 2008, the corporation financed local people, supervised by the new owner, to build a fence that will prevent the cattle from falling off the cliff on the south side of the island (which is also the location for the proposed airport). The owner of the cattle and the Akutan Corporation in 2008 were also investigating a USDA approved slaughter facility that could potentially be brought to Akun Island to help make the meat marketable for sale as "organic" in the local store, to Trident to feed their employees, and for export as well (Keith Roylance, cattle owner, personal communication, 2009). Every year a few of these cattle are harvested and distributed to the community.

Over half the households in Akutan (53%) used feral cattle in 2008, as did 60% in 1990. Three animals were harvested in 2008, compared to 8 in 1990.

Harvests of Plants for Food, Medicine, and Materials

Berries remain by far the most important and favored plant resource in Akutan. The most important berries are salmonberries, which are abundant in town, eaten fresh or made into jelly and or wine. Most berries are harvested on tundra above town; e.g., mossberries favored for pies and jellies, and highbush and lowbush blueberries. Less important species are cloudberries (locally called "strawberries"), which are widely scattered. Crowberries are plentiful, but not generally harvested for subsistence because they are dry and bitter.

Akutan households surveyed about 2008 harvests reported that berry harvests were good. However, due to a long cold spring and summer, 2010 was a very bad year for berries, according to subsequent key respondent interviews. All species were late and scarce due to lack of sun.

Akutan residents still harvest other edible greens including *petruski* (wild parsley) and *putchki* (wild celery) both best known by their Russian names. Harvesters peel the young stems then eat them raw, or dipped in seal oil. The large leaves are used to wrap fish for cooking or serving. Both species are abundant near town.

Fireweed is abundant in and around town in late summer. The petals are used to flavor and color homemade jelly, or dried for tea. Some respondents recalled harvesting chocolate lily to eat the bulbs, also known as "rice roots." The blubs are gathered in the fall, and are soaked to remove the bitter taste and then can be boiled, roasted or fried. Like putchki, these roots can be dipped in seal oil to give them a sweeter taste (Golodoff 2003).

Some medicinal plants are still recognized; e.g., yarrow, said to be helpful for colds, and wormwood, likewise used to treat a cold. A "swamp grass," also known as "minkin grass" (likely a species of sedge), is harvested to make a sort of broom for brushing the body in the steam bath. Flowers are widely appreciated as decoration and for their scent. One favorite is white orchid. (For a more comprehensive guide to Aleutian Island wildflower plants, including common, botanical, and Unangan names; and medicinal attributes practiced and passed on over time by Unangan people see Golodoff 2003.)

Driftwood is a key resource. Several species are distinguished according to their proper use, and people are quite selective; for example, cottonwood is preferred for smoking fish. Other species are preferred for heating the steam bath or for firewood. All species of driftwood originate from forested habitats well to the east of Akutan. In addition to cottonwood, driftwood also includes yellow and red cedar, Sitka spruce, perhaps also birch and alder. Driftwood is concentrated by currents on certain beaches, washed up in winter near town.

HARVEST COMPARISON: EVALUATION OF 2008 HARVEST COMPARED TO OTHER RECENT YEARS

Respondents were asked to compare their harvests and uses of 10 resource categories in 2008 with other recent years (Table 2-16, Figure 2-28). (An assessment of changes in use patterns for "all resources" was not asked in Akutan.) If they indicated a change, they were asked to provide a reason. The only category for which the largest number of respondents indicated lower uses was salmon (53% of all respondents who usually use salmon; 47% of all respondents). For the other 9 categories, the largest number of respondents (at least 47% or more of those who regularly used the category) said uses were about the same. However, at least 24% of respondents who were regular users of large game, marine mammals, migratory birds, bird eggs, marine invertebrates, and plants and berries said uses were lower in 2008. On the other hand, 29% of regular users of plants and berries said their uses/harvests of this category were higher than other recent years, as did 16% of regular users of fish other than salmon.

Table 2-16.–Changes in patterns of use, Akutan, 2008.

		Compared to recent years, the household's use of resource was …[c]							
		Less		Same		More		No response/unknown	
Resource category[a]	Use or attempt[b]	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Salmon	32	17.0	53.1%	12.0	37.5%	3.0	9.4%	0.0	0.0%
Nonsalmon	31	4.0	12.9%	22.0	71.0%	5.0	16.1%	0.0	0.0%
Large game	8	2.0	25.0%	4.0	50.0%	2.0	25.0%	0.0	0.0%
Furbearers	0	0.0	N/A	0.0	N/A	0.0	N/A	0.0	N/A
Marine mammals	25	9.0	36.0%	15.0	60.0%	1.0	4.0%	0.0	0.0%
Migratory birds	16	5.0	31.3%	8.0	50.0%	2.0	12.5%	1.0	6.3%
Other birds	6	1.0	16.7%	5.0	83.3%	0.0	0.0%	0.0	0.0%
Bird eggs	26	8.0	30.8%	15.0	57.7%	2.0	7.7%	1.0	3.8%
Marine invertebrates	25	7.0	28.0%	18.0	72.0%	0.0	0.0%	0.0	0.0%
Plants and berries	34	8.0	23.5%	16.0	47.1%	10.0	29.4%	0.0	0.0%

Source ADF&G Division of Subsistence household surveys, 2009.

a. Assessment for “all resources” not asked in Akutan.

b. 36 households were interviewed.

c. Percentage based on number of households usually using or attempting a harvest.

N/A = not applicable.

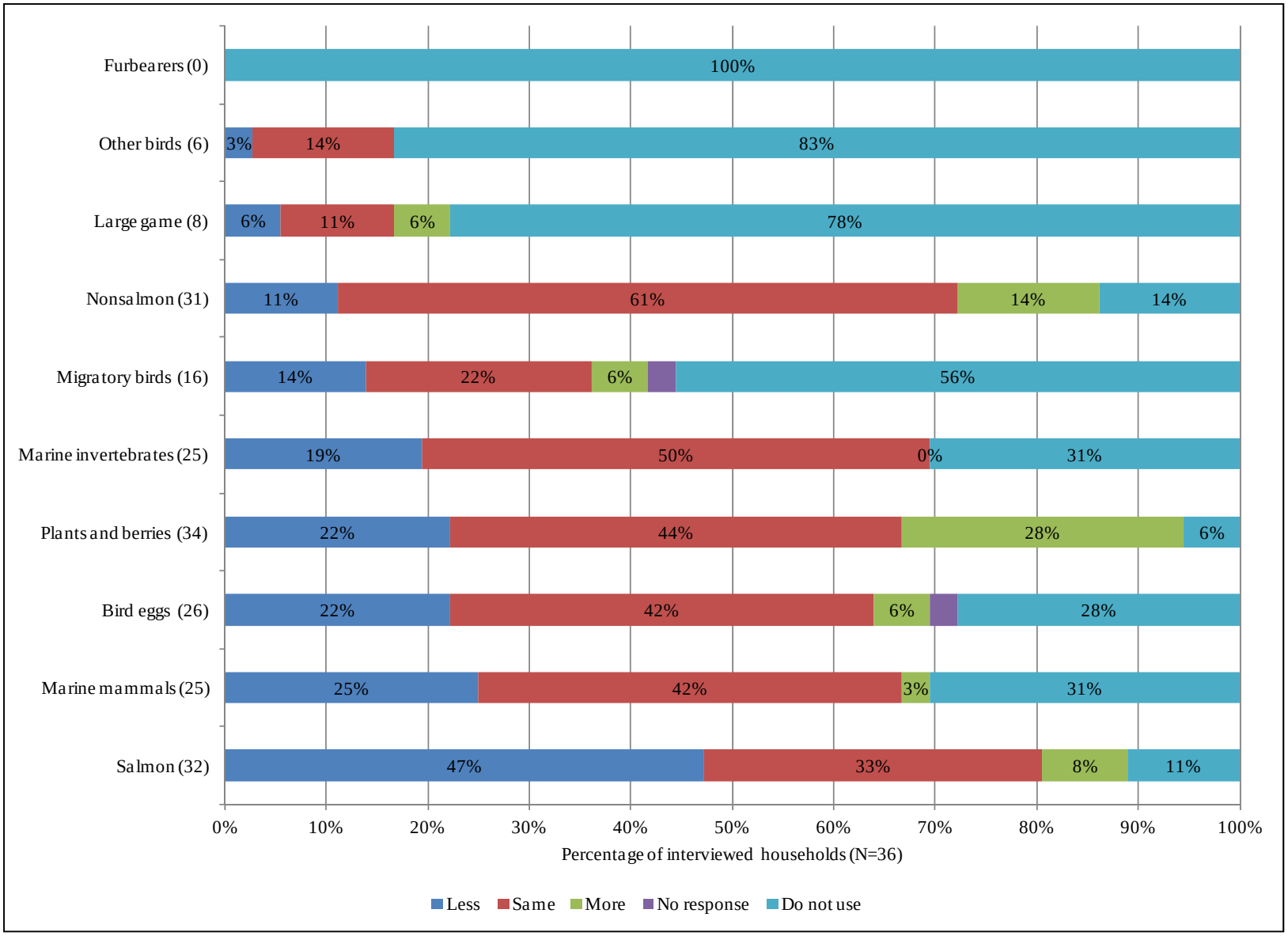

Figure 2-28.–Akutan households' assessments of uses in 2008.

If respondents reported a change in their uses/harvests of a resource category, they were asked to provide an explanation for the change. This question was designed for open-ended responses, and the responses were coded into categories for analysis. As shown in Table 2-16, there were 69 cases in which households reported reduced use of a resource category in 2008 compared to other recent years. In 54% of these cases, personal reasons were cited for the reduced use/harvest (Table 2-17, Figure 2-29). Personal reasons included illness or injury, age, being too busy, less effort, or disinterest, among other things. Receiving fewer resources from other households ranked second, at 29%, and reductions in animal populations ranked third at 20%. In 15% of the cases of lower uses, Akutan respondents cited poor weather or a changing climate as the cause of the change. Examples included:

> There were less migratory birds because of the weather. The wind patterns changed so birds don't show up in areas where we usually get them. It's too windy for them.
>
> There are less salmon because of warmer waters.
>
> There is more damp and less sun in June. There are good [abundant] berries if it doesn't rain in June.

Table 2-17.–Reasons for changes in subsistence uses, Akutan, 2008.

	Reasons for lower levels of use	Reasons for higher levels of use
	Any resource category[a]	Any resource category[b]
Climate/weather	14.5%	28.0%
Economic factors	4.3%	8.0%
Given less/more	29.0%	16.0%
Personal factors	53.6%	32.0%
Population factors	20.3%	36.0%
Other reasons	13.0%	4.0%

Source ADF&G Division of Subsistence household surveys, 2009.

Note Respondents could provide more than one reason for the change.

a. N = 69 cases in which households reported using/harvesting less of a resource category and who provided reasons for the change.

b. N = 25 cases in which households reported using/harvesting more of a resource category and who provided reasons for the change.

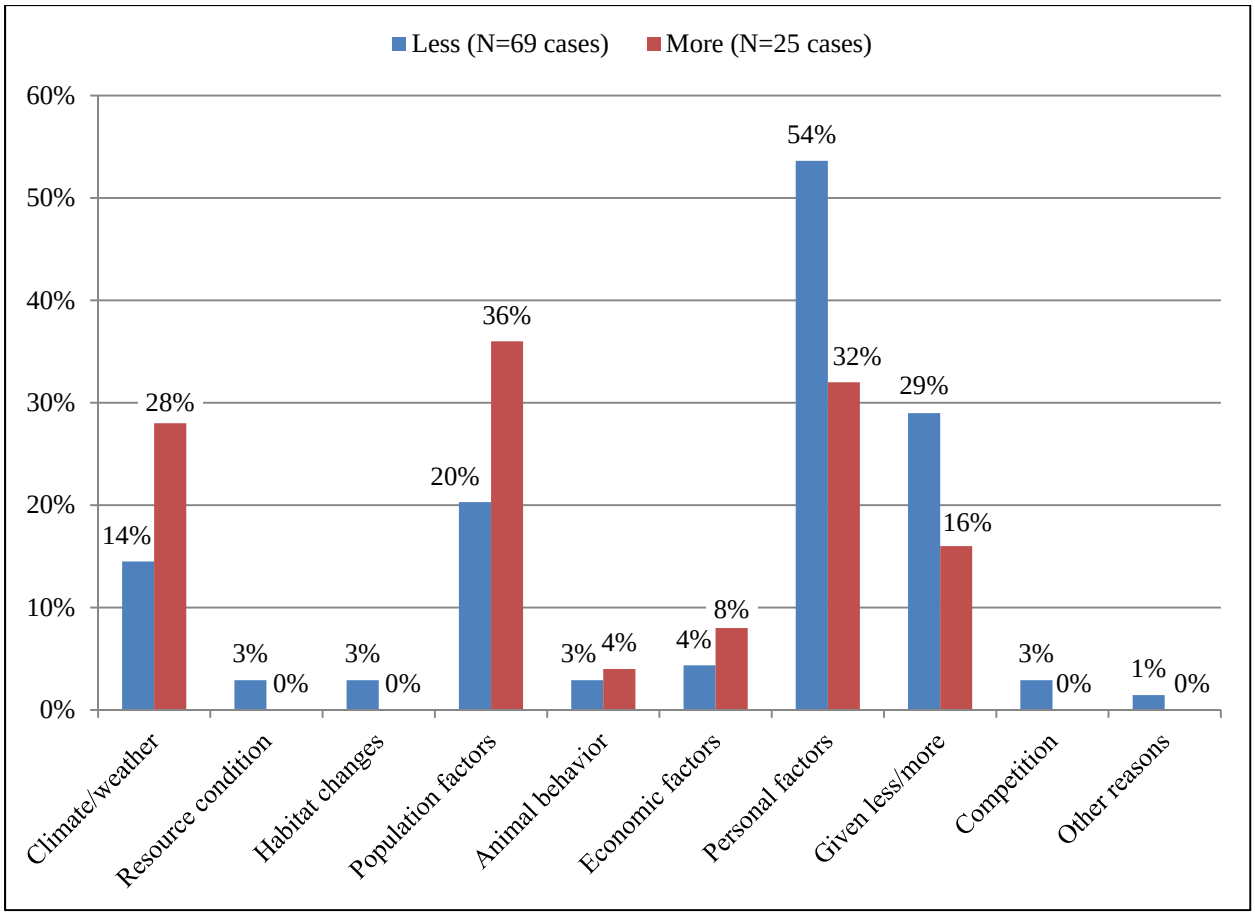

Figure 2-29.–Reasons for change in use/harvest of any resource category in 2008 compared to other recent years, Akutan.

As shown in Table 2-17, there were 25 cases in which interviewed Akutan households reported higher uses or harvests of a resource category in 2008 compared to other recent years. More abundant animal populations was cited most often as a cause of higher harvest levels, in 36% of the cases (Table 2-17, Figure 2-28). For example:

> It was a good year for fish but halibut were a lot smaller.
>
> The Northwest Tip was loaded with seals.
>
> We used more birds because there were a lot of birds and not so many people hunting them.
>
> It was a good berry year and we found some new spots on Akun Island.

Personal factors were cited as a cause of higher levels of use in 32% of the cases, including comments such as:

> I bought a skiff and was able to go hunting more.
>
> We used more birds because my son hunted more.

In 28% of the cases of higher use levels, climate and or weather factors were cited as a cause. Most commonly, people commented on favorable weather for berries in the 2008 study year. Key respondents reported, however, that 2010 was a poor year for berries.

Receiving more gifts of wild foods from other households accounted for 16% of the cases of higher levels of use. Economic factors were cited in 8% of the cases of higher levels of use in 2008, with the following comments:

> I fished more for salmon to cut down on the food bill. Groceries are getting expensive.
>
> We're fishing more [for nonsalmon fish]because groceries are getting expensive and subsistence fishing cuts down on food costs.

As shown in Figure 2-29, personal reasons were given often as an explanation for both reduced use/harvest and increased use/harvest in Akutan in 2008 (54% and 32%, respectively, of all cases of a lower or higher use). Changes in sharing patterns, either less sharing (29% of cases) or more sharing (16%) were cited frequently, as were changes in animal populations (often not explained) and changes in resource populations. A changing climate or weather conditions were cited as a factor explaining differences between use and harvest levels in 2008 and other recent years in 14% of the cases involving a lower resource use rate and 28% of cases of higher use rates. Key respondents were more likely to cite changing climate patterns as a cause of more long-term changes to subsistence uses, related to resource abundance and travel conditions, for key resources such as marine mammals and birds. One respondent stated: "Wind patterns have changed and birds are not showing up in the usual places that they used to be hunted. They will haul up in other places or get blown elsewhere."

Respondents frequently commented that the weather has become more unpredictable. In the past, after a major storm, there would be a few breaks in the weather that would allow people a chance to get out to hunt or fish. Respondents indicated that now the storms are coming more frequently and it has become dangerous to travel far during breaks in the weather. One respondent said:

> [There is an] indication that storms are more frequent and less predictable. For example, the usual pattern, up to a few years ago, would be a big storm with lots of wind that would stay a few days, then would clear for a few days before the next would come. Lately, last couple of years, the storms seem to come back-to-back and are mixed with each other. This makes it harder for locals to get out and hunt because the storms make the sea too dangerous. Also evident by the goose [float plane] going more and more days without being able to come to Akutan than [in] the past.

Increasing gas prices have forced fewer people to venture out on their own, and to make fewer trips. Instead, there has been an increased reliance on local commercial fishers to provide subsistence foods for others.

JOBS AND INCOME

Of all Akutan's adults (age 16 and over), 90% earned cash through employment in the 2008 study year (Table 2-18). For most employed adults, cash employment was year-round: on average, employed adults worked 11 months, and 74% worked year-round. Most households (94%) included at least one member with cash employment. Most jobs in Akutan in 2008 were related to local government (this includes the school) (42.5%), followed by services (21%), and commercial fishing (19%) (Table 2-19). Local government also ranked first as a source of earned income (46%), followed by commercial fishing (26%), and services (16%) (Table 2-19, Figure 2-30).

Table 2-18.–Employment characteristics, Akutan, 2008.

Characteristics	Akutan
Adults	
Number	66.7
Mean weeks employed	38.4
Employed adults	
Number	60.0
Percentage	90.0%
Jobs	
Number	117.8
Mean	2.0
Minimum	1
Maximum	5
Months employed	
Mean	10.9
Minimum	4
Maximum	12
Percent employed year-round	74.1%
Mean weeks employed	21.7
Households	
Number	40
Employed	
Number	37.8
Percentage	94.4%
Jobs per employed household	
Mean	3.1
Minimum	1
Maximum	8
Employed adults	
Minimum	1
Maximum	3
Mean	
Employed households	1.6
Total households	1.5
Mean person weeks of employment	50.3

Source ADF&G Division of Subsistence household surveys, 2009.

Table 2-19.–Employment by industry, Akutan, 2008.

	Jobs	Households	Employed individuals	Percentage of income
Estimated total number	**117.8**	**40**	**60**	**100%**
Federal government	**6.6%**	**19.4%**	**13.0%**	**5.7%**
Executive, administrative, and managerial occupations	0.9%	2.8%	1.9%	1.9%
Administrative support occupations, including clerical	0.9%	2.8%	1.9%	0.3%
Mechanics and repairers	0.9%	2.8%	1.9%	0.3%
Construction and extractive occupations	1.9%	5.6%	3.7%	1.9%
Transportation and material moving occupations	0.9%	2.8%	1.9%	0.8%
Handlers, equipment cleaners, helpers, and laborers	0.9%	2.8%	1.9%	0.5%
State government	**0.9%**	**2.8%**	**1.9%**	**0.8%**
Agricultural, forestry and fishing occupations	0.9%	2.8%	1.9%	0.8%
Local government	**42.5%**	**72.2%**	**63.0%**	**45.7%**
Executive, administrative, and managerial occupations	4.7%	13.9%	9.3%	3.4%
Engineers, surveyors and architects	0.9%	2.8%	1.9%	0.6%
Natural scientists and mathematicians	0.9%	2.8%	1.9%	1.6%
Teachers, librarians, and counselors	4.7%	8.3%	9.3%	6.7%
Registered nurses, pharmacists, dietitians, therapists, and physician's assistants	0.9%	2.8%	1.9%	1.9%
Administrative support occupations, including clerical	5.7%	16.7%	11.1%	5.6%
Service occupations	6.6%	19.4%	13.0%	5.8%
Mechanics and repairers	0.9%	2.8%	1.9%	0.8%
Construction and extractive occupations	1.9%	5.6%	3.7%	3.4%
Precision production occupations	4.7%	13.9%	9.3%	6.7%
Transportation and material moving occupations	1.9%	5.6%	3.7%	1.3%
Handlers, equipment cleaners, helpers, and laborers	7.5%	22.2%	14.8%	7.2%
Miscellaneous occupations	0.9%	2.8%	1.9%	0.8%
Agriculture, forestry and fishing	**23.6%**	**33.3%**	**31.5%**	**28.1%**
Administrative support occupations, including clerical	0.9%	2.8%	1.9%	0.6%
Service occupations	1.9%	5.6%	3.7%	0.6%
Agricultural, forestry and fishing occupations	18.9%	33.3%	29.6%	25.9%
Construction and extractive occupations	0.9%	2.8%	1.9%	0.8%
Precision production occupations	0.9%	2.8%	1.9%	0.2%
Transportation, communication and utilities	**4.7%**	**11.1%**	**9.3%**	**3.2%**
Administrative support occupations, including clerical	1.9%	2.8%	3.7%	1.7%
Transportation and material moving occupations	0.9%	2.8%	1.9%	0.2%
Handlers, equipment cleaners, helpers, and laborers	1.9%	5.6%	3.7%	1.3%
Retail trade	**0.9%**	**2.8%**	**1.9%**	**0.8%**
Marketing and sales occupations	0.9%	2.8%	1.9%	0.8%
Services	**20.8%**	**50.0%**	**38.9%**	**15.7%**
Executive, administrative, and managerial occupations	2.8%	8.3%	5.6%	2.0%
Registered nurses, pharmacists, dietitians, therapists, and physician's assistants	0.9%	2.8%	1.9%	1.9%
Technologists and technicians, except health	1.9%	5.6%	3.7%	2.1%
Marketing and sales occupations	0.9%	2.8%	1.9%	1.1%
Administrative support occupations, including clerical	0.9%	2.8%	1.9%	0.3%
Service occupations	6.6%	19.4%	13.0%	4.2%
Handlers, equipment cleaners, helpers, and laborers	5.7%	16.7%	11.1%	3.2%
Miscellaneous occupations	0.9%	2.8%	1.9%	0.8%

Source ADF&G Division of Subsistence household surveys, 2009.

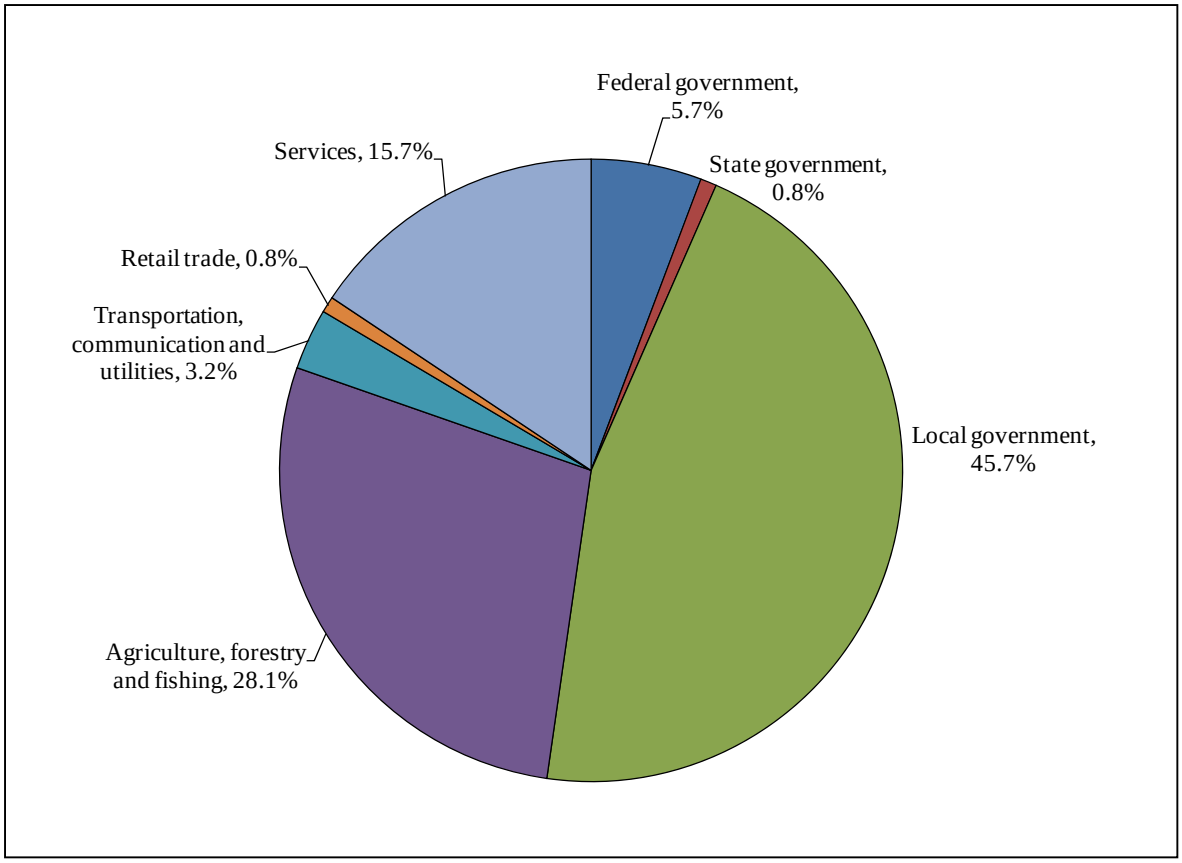

Figure 2-30.–Sources of earned income, Akutan, 2008.

Of sources of income other than jobs, the Alaska Permanent Fund dividend (PFD) ranked first by far, contributing 62% of all income from this category (Table 2-20). Alaska residents received a record PFD and energy rebate in 2008 of $3,267 per person. Other major sources of other income included Social Security (10% of other income), Native corporation dividends (8%), and rental assistance (7%).

Household cash income in Akutan in 2008 from all sources averaged $67,120, or $32,653 per capita (Table 2-21). Of this, 86% derived from jobs and 14% from other sources. Figure 2-31 shows the top 10 sources of income for Akutan in 2008. Local government ranked first (40%), followed closely by the agriculture, forestry and fishing category (which is mostly commercial fishing) (24%), services (14%), and the Alaska PFD (8%).

Table 2-20.–Akutan income from sources other than employment, Akutan, 2008.

	Households				
Income source	Number	Percentage	Total for community	Mean per household	Percentage of total
Alaska Permanent Fund Dividend	35.6	88.9%	225,805.6	5,645.1	61.7%
Social Security	4.4	11.1%	36,352.9	908.8	9.9%
Native corporation dividend	32.2	80.6%	28,473.6	711.8	7.8%
Rental assistance	38.9	97.2%	24,111.1	602.8	6.6%
Other	2.2	5.6%	20,377.8	509.4	5.6%
Pension/retirement	3.3	8.3%	12,705.9	317.6	3.5%
Unemployment	3.3	8.3%	8,010.0	200.3	2.2%
Adult public assistance	1.1	2.8%	6,266.7	156.7	1.7%
Food stamps	2.2	5.6%	2,537.1	63.4	0.7%
Workers' compensation/insurance	1.1	2.8%	1,226.7	30.7	0.3%
Longevity bonus	0.0	0.0%	0.0	0.0	0.0%
Supplemental Security Income	0.0	0.0%	0.0	0.0	0.0%
Child support	0.0	0.0%	0.0	0.0	0.0%
Foster care	0.0	0.0%	0.0	0.0	0.0%
Total	38.9	97.2%	365,867.3	9,146.7	100.0%

Source ADF&G Division of Subsistence household surveys, 2009.

Table 2-21.–Comparison of selected study findings for Akutan, 2008.

Demography	
Population	82.2
Percent Alaska Native	81.1%
Percent of household head born in Alaska	73.1%
Average length of residency, household heads (years)	31.2
Cash economy	
Percent of jobs located in community	95.3%
Average number of months employed	11.0
Percent of employed adults working year-round	74.1%
Average household income	$67,120
Per capita income	$32,653
Percent of household income from employment	86.4%
Percent of household income from other sources[a]	13.6%
Resource harvest and use	
Per capita harvest, pounds usable weight	327.3
Average household harvest, pounds usable weight	672.7
Number of resources used by 50 percent or more of households	12
Average number of resources used per household	17.0
Average number of resources attempted to harvest per household	9.5
Average number of resources harvested per household	8.8
Average number of resources received per household	11.5
Average number of resources given away per household	7.7
Percent of total harvest taken by top 25 percent	66.7%
Percent of households taking 70 percent of harvest	27.8%
Per capita harvest of lowest 50 percent of households, pounds per person	58.4
Average number of resources used by lowest 50 percent of households	14.5
Average number of resources used by top 25 percent of households	22.8

Source ADF&G Division of Subsistence household surveys, 2009.

a. Includes record Alaska Permanent Fund Dividend and Energy Rebate of $3,267 per person.

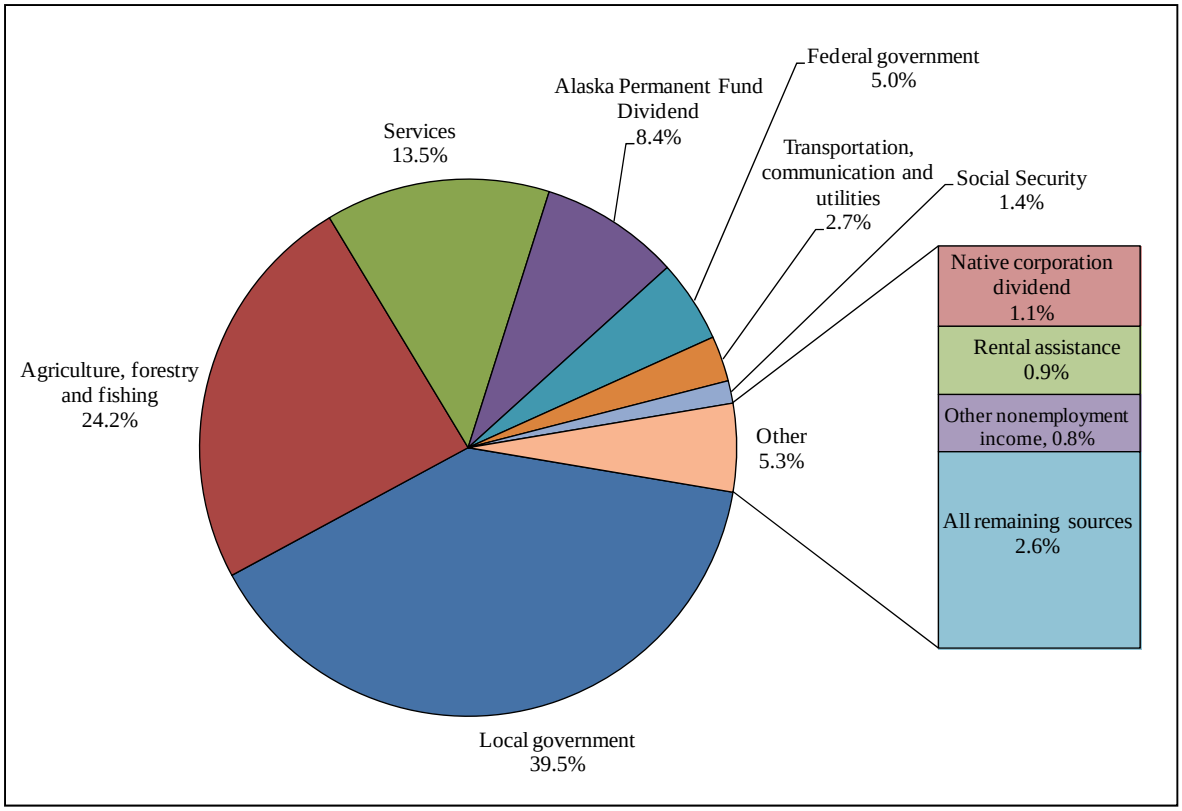

Figure 2-31.–Top 10 income sources ranked by estimated amount, Akutan, 2008.

The results for U.S. Census Bureau's American Community Survey (ACS) for the period 2005–2009 for Akutan are complicated by the inclusion of the large group quarters population in many of the findings (U.S. Census Bureau 2010). Also, based on its sampling in Akutan, the ACS appears to have underestimated the number of households (18) and population living in households (37). The division's census in early 2009 (conducted "on the ground") counted 40 households with an estimated population of 82. This comparison calls into question other data in the ACS regarding household characteristics in Akutan. For example, the ACS estimated a mean household income for Akutan of $35,667 (±$13,912), a median household income of $31,250 (±$11,948), and a per capita income of $21,567 (±$1,203). These estimates are substantially lower than those based upon the division survey; $67,120 per household and $32,653 per capita. According to the ACS, the mean household income for Alaska for 2005–2009 was $79,908 (±1,128), the median household income was $64,635 (±747) and the per capita income was $29,382 (±357) (U.S. Census Bureau 2010). Thus, based solely on ACS data, Akutan's per capita cash income was just 73% of the state average for this 5-year period. However, the division survey estimate of $32,653 per capita is 11% higher than the ACS per capita income estimate for the state.

Commercial fishing played an important role in the local economy of Akutan in 2008, although in terms of participation and, less so, of income, the role was diminished compared to 1990 (Figure 2-32). Commercial fishing jobs (this does not include processing jobs) represented 19% of all jobs held by Akutan residents in 2008, compared to 37% of all jobs in 1990. Of all Akutan households, 33% in 2008 had at least 1 member employed in commercial fishing, compared to 73% of households in 1990. For Akutan households with any cash employment, 35% in 2008 and 75% in 1990 had members involved in commercial fishing. Of all Akutan adults who had employment in 2008, 30% worked in commercial fishing jobs (about 18 individuals), compared to 44% (44 individuals) in 1990. Commercial fishing jobs produced 26% of the earned income and 22% of all income in Akutan in 2008; in 1990, 35% of earned income and 29% of all income derived from commercial fishing.

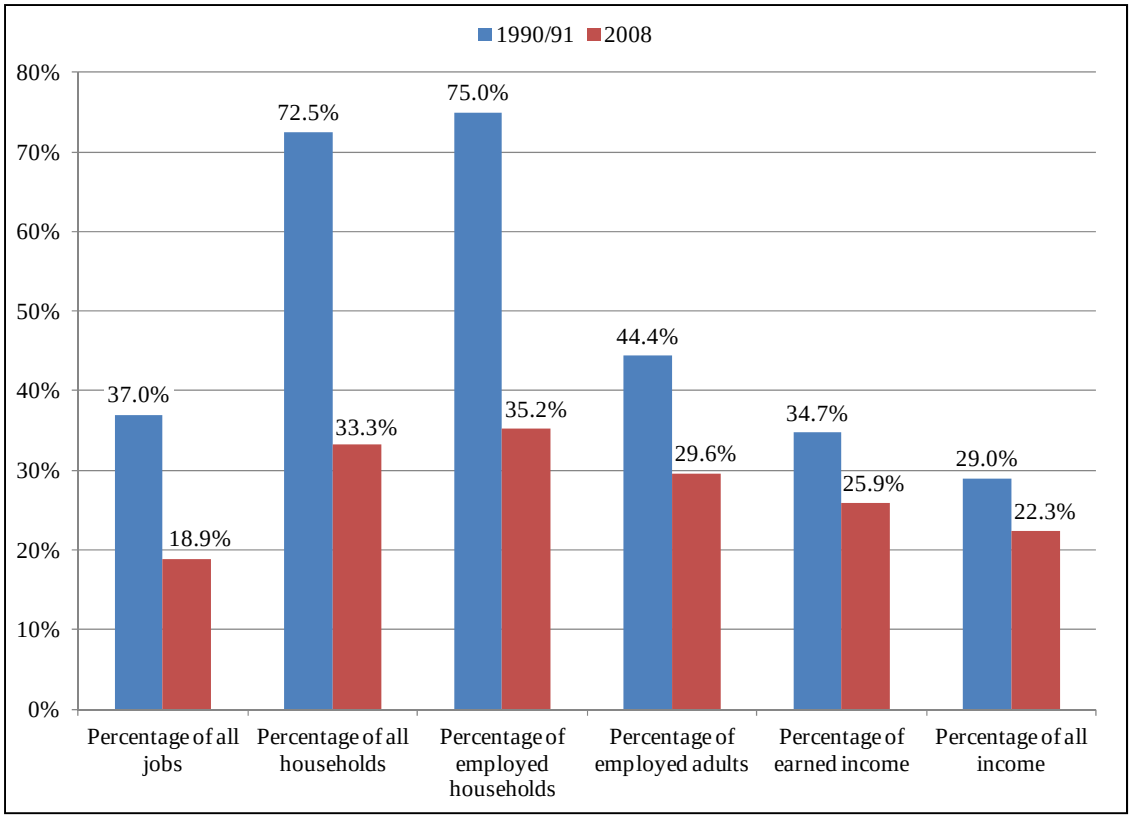

Figure 2-32.–Role of commercial fishing in local economy, Akutan, 1990 and 2008.

No Akutan residents have owned limited entry permits for salmon fishing since 1989 (when one resident owned a permit). Figure 2-33 shows trends in the number of permits for commercial halibut fishing (primarily with longlines) held by Akutan residents from 1980 through 2010. There was little participation in this fishery until the late 1980s. Since then, about 7 Akutan residents have held commercial halibut permits. Income data are limited due to confidentiality rules. For 4 available years in the early 1980s, no income was reported. For 5 available years from1988 through 1994, the annual total gross income was $37,749 for all 7 permitees. Gross income was notably high for the 2 most recent years for which data are available (2005 and 2006) at an annual average of $181,164.

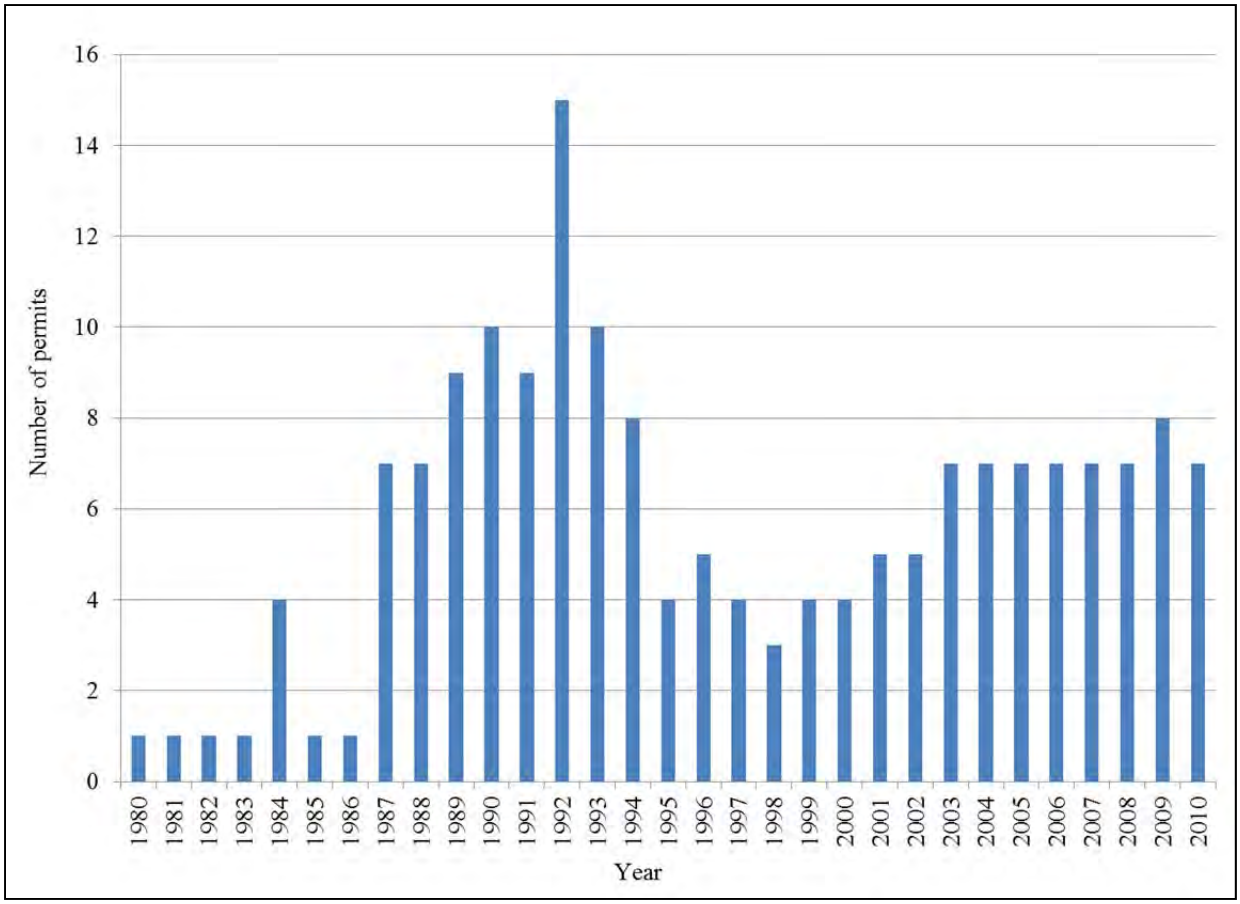

Figure 2-33.–Number of commercial halibut fishery permits held by Akutan residents, 1980–2010.

DISCUSSION AND CONCLUSIONS

Local and traditional knowledge interviews conducted in 2008 as well as in 2010 affirmed that numerous Akutan residents are highly knowledgeable about their local marine environment and continue many of traditional harvest practices of their ancestors.[14] Fish and marine mammals form the bulk of the subsistence diet, but observations about the broader environment indicate an interest in the ecosystem and the interdependencies of the organisms within it. The information summarized below represents the experiential knowledge of persons who have been able to observe the ecosystems up close for their entire lives and who often depend on that knowledge for their survival. Subsistence harvests remain important, though declining; geographic range is typically limited to less than 10 miles from the village, or 1 hour by boat. This is due in part to fuel costs—for example, larger boats (there are 4 owned and operated by Akutan residents) burn 6–8 gallons/hour at cruising speeds. Otherwise, hunters and fishers use skiffs with outboard motors that limit travel to relatively calm weather.

Some household survey respondents in 2008 commented that the Aleutian weather has become very unpredictable in recent years, with back-to-back storms as opposed to the once rhythmic pattern of a few stormy days followed by a few calm days. When storm patterns were more predictable, a hunter or fisher would generally trust that he/she would have a couple of days of good weather to hunt, fish, gather, or travel to more distant harvesting areas and return before the next storm would arrive.

14. The conclusions section draws from Hunn, E. and J. Sepez, Akutan field report for the Local and Traditional Knowledge component of the Bering Sea Integrated Ecosystem Research Program (BSIERP-LTK), draft report, September 21, 2010.

Other observations included:

> Wind pattern changes: will sometimes blow uncommon seabirds into the area or blow local birds away.
>
> Some seabirds are starving [such as shearwaters] that are divers and not finding their prey.
>
> Mackerel are very thick in Akun Pass. When we have to get halibut, mackerel will cover the whole bay with spawn in September and we have to fish away from it to get our halibut.
>
> Foreign species: algae, leopard seal.

Pollution from fish processing in Akutan Bay widely was considered by some Akutan key respondents to have "killed the bay." Others felt that Akutan Bay is healthy, and king crab appear to be returning; however, octopuses and shellfish are rare now in the bay. Respondents reported that the pollution has not affected pink salmon runs into streams at head of bay, which remain abundant. Local people believe that pink salmon do not feed at the head of the bay so they are safe for consumption. Village residents no longer harvest shellfish or octopuses from the bay because they do not trust their quality or they believe pollution has killed off these resources.

Local concerns about pollution were substantiated in September 2011, when an Alaska fish processor, Trident Seafoods, was issued the largest water-pollution fine ever handed down by the Environmental Protection Agency (EPA) for fish waste pumped into the ocean, including from Trident's seafood processing plant at Akutan. Waste reported from EPA investigations in Akutan Bay was described as "a massive carpet of gelatinous goo, covering about 8 acres of waste on the seafloor" that, according to EPA, can create dead zones that suffocate sea life in the area (Hopkins 2011).

Additionally, a diesel spill on the southeast shore of Akun Island destroyed local shellfish populations which, after many years have not returned.[15] After an underground nuclear bomb test on Amchitka Island in 1965, one local respondent interviewed in 2008 said that he noticed that sea otters started showing up in increased abundance and have since eaten all the sea eggs (urchins), but that residents did not hunt them because was illegal at the time.

Speaking to the importance of subsistence resources to the Unangan people, Barbara Švarný Carlson, originally from Unalaska, wrote[16]:

> The *Unangam* foods are elemental to our culture. To have our Native foods sent to us when we are away is one of the most vitalizing, identity-rich gifts one's friends or family can bestow. Some of our traditional subsistence foods include *aala{* (whale), *isu{* (hair seal), *aanu{* (red salmon), and *qa{* (any kind of fish). From the beaches some favorites are *chiknan* (limpets), *way}in* (blue mussels), *agu}aadan* (sea urchins), *qasiikun* (chitons or gumboots), *chuxlan* (clams), and *kahngadgin* (seaweed). *Saaqudan* (aka Puuchkiis (R)), *qaniisan* (aka petrushkies (R)), fiddle head ferns, and other native vegetables seem to make one feel healthier. My favorite is *uda{*, dried fish with *chadu{*, seal oil. When we eat these foods we know more strongly who we are.

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15. The respondent did not provide a specific time fram for this incident, but it likely took place in the last 20 years.
16. Carlson, Barbara Švarný. "There is no such thing as an Aleut." UAA–ISER. http://www.alaskool.org/language/Aleut/No_Such1.html (Accessed 2012). Please note that the use of the character "{" is equivelant to the Unangam Tunuu font of "x̂" and the use of the character "}" is equivelant to the Unangam Tunuu font of "ĝ."

Study results demonstrate the importance of healthy ecosystems, fish, and animal populations to the subsistence harvests of Unangan communities in general and to Akutan in particular.

CHAPTER 3: EMMONAK

In April of 2009, researchers surveyed 109 of 179 households (61%) in Emmonak. Expanding for the unsurveyed households, the results show that residents of Emmonak harvested an estimated 379,803 edible lb of wild fish, land mammals, marine mammals, birds, and vegetation in 2008, which provided 482 edible lb per capita. Table 3-1 provides a list of resources used in Emmonak, including Central Yup'ik names, scientific names and commonly used names. The diversity of subsistence resources harvested in Emmonak may be seen in Figure 3-1. Salmon (chum and Chinook), nonsalmon fishes (sheefish, northern pike, burbot, and broad whitefish), marine mammals (bearded seal and beluga whale), and land mammals (moose) all contributed to Emmonak's top 10 species harvested by edible weight in 2008. During the study year, households in Emmonak harvested an average of 15 different kinds of wild resources (Table 3-2).

Figure 3-2 shows the composition by edible weight of subsistence resources harvested by the average household in Emmonak in 2008; fish species (salmon and nonsalmon) comprised the majority of wild resource harvests (57%) for the community. Five species of salmon, Chinook, sockeye, pink, coho, and chum, comprised 70% of the total fish harvest. Sheefish, whitefish, northern pike, burbot, and Alaska blackfish comprised most of the remaining 30% of harvested fish species. Emmonak hunters' land and marine mammal harvests contributed another 26% and 11%, respectively, to the total wild food harvests by edible weight, and was made up mostly of moose, beluga whale, and bearded seal. Birds and eggs contributed another 3%, berries and plants supplied 2%, and marine invertebrates made up less than 1% of Emmonak's wild food harvest by edible weight in 2008.

This chapter summarizes findings from the household surveys, including demographic characteristics, harvest estimates, employment, income, and harvest use areas. Additional tables and maps appear in the appendices. Results from this survey are available online in the Division of Subsistence CSIS. The chapter also examines, in detail, some examples of change in the harvesting practices of Emmonak residents as they are related to environmental and possible climate shifts, as well as social and economic influences.

Table 3-1.–Resources used for subsistence purposes in Emmonak, 2008.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Fish			
Chinook salmon	*Oncorhynchus tshawytscha*	*Kiagtak*	King salmon
Sockeye salmon	*Oncorhynchus nerka*	*Cayak*	Red salmon
Coho salmon	*Oncorhynchus kisutch*	*Uqurliq*	Silver salmon
Chum salmon	*Oncorhynchus keta*	*Uqurliq*	Dog salmon
Pink salmon	*Oncorhynchus gorbuscha*	*Cuqpeq*	Humpies
Pacific halibut	*Hippoglossus stenolepis*	*Naternarpak*	
Pacific herring–all life stages	*Clupea pallasi*	*Iqalluarpak*	
Herring spawn on kelp		*Melucuaq*	
Herring sac roe		*Meluk*	
Smelts		*Iqalluaq*	
Capelin	*Mallotus vilosus*	*Cikaq*	
Cods			
Pacific tomcod	*Microgadus proximus*	*Iqalluaq*	
Saffron cod	*Eleginus gracilis*		
Sculpin (unknown)[b]	*Cottus* spp.	*Kayutak*	
Flounders/soles			
Starry flounder	*Platichthys stellatus*	*Naternaq*	
Trout			
Rainbow trout	*Oncorhynchus mykiss*	*Talaariq*	
Chars			
Dolly Varden	*Salvelinus malma*	*Yugyaq*	
Arctic grayling	*Thymallus arcticus*	*Nakrullugpak*	
Northern pike	*Esox lucius*	*Cuukvak/Keggsuli*	
Burbot	*Lota lota*	*Manignaq*	Lingcod[c]
Whitefishes			
Round whitefish	*Prosopium cylindraceum*	*Cingikeggliq*	
Humpback whitefish	*Coregonus pidschian*	*Uraruq*	
Broad whitefish	*Coregonus nasus*	*Quartuq*	
Least cisco	*Coregonus sardinella*	*Cavirutnnaq*	
Bering cisco	*Coregonus laurettae*	*Imarpinraq*	
Sheefish	*Stenodus leucichthys*	*Ciiq*	Inconnu
Alaska blackfish	*Dallia pectoralis*	*Imangaq*	
Marine invertebrates			
Crabs			
Red king crab	*Paralithodes camtschaticus*	*Pupsulegpak*	
Clams			
Razor clams		*Aliruaq*	
Alaska razor clam	*Siliqua alta*		
Pacific razor clam	*Siliqua patula*		
Butter clam	*Saxidomus gigantea*		
Snail	*Gastropoda*		Sea snails

-continued-

Table 3-1.–Page 2 of 3.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Land mammals			
Large land mammals			
Caribou	*Rangifer tarandus*	*Tuntuq*	
Moose	*Alces alces*	*Tuntuvak*	
Small land mammals/furbearers			
Beaver	*Castor canadensis*	*Paluqtaq*	
Porcupine	*Erethizon dorsatum*	*Iisaluuq*	
Mink	*Neovison vison*	*Imarmiutag*	
Red fox	*Vulpes vulpes*	*Kaviaq*	
Red fox–cross phase	*Vulpes vulpes*	*Tunguliayaaq*	
Arctic fox	*Vulpes lagopus*	*Uliiq*	
Wolverine	*Gulo gulo*	*Qavciq*	
River otter	*Lutra canadensis*	*Cenqak*	Land otter
Muskrat	*Ondatra zibethicus*	*Kanaqllak*	
Lynx	*Lynx canadensis*	*Tertuli*	
Arctic hare, Alaska hare	*Lepus othus*	*Tundra*	Jackrabbit
Snowshoe hare	*Lepus americanus*	*Ciriiq/Nullutuuyak*	
Marine mammals			
Harbor seal/spotted seal	*Phoca vitulina, Phoca largha*	*Issuriq*	
Ringed seal	*Pusa hispida*	*Nayiq/Qasrule*	
Bearded seal	*Erignathus barbatus*	*Maklak*	
Birds			
Geese			
Canada geese	*Branta hutchinsii* spp.	*Tutangayak*	Cacklers
Lesser Canada goose	*Branta canadensis*	*Dinmakbik*	
White-fronted geese	*Anser* spp.	*Neqlernaq*	Specklebelly
Brant	*Branta bernicla*	*Neqlernaq*	Sea geese
Emperor goose	*Chen canagica*	*Nacaullek*	
Snow goose	*Chen caerulescens*	*Kanguq*	
Swans (unknown)[b]		*Qugyuk*	
Tundra swan	*Cygnus columbianus*	*Qugyuk*	
Trumpeter swan	*Cygnus buccinator*		
Sandhill crane	*Grus canadensis*	*Quteraq*	
Ducks			
Mallard	*Anas platyrhynchos*	*Uqulkatagpak*	
Northern pintail	*Anas acuta*	*Uqulkataq*	
Goldeneyes (unknown)[b]	*Bucephala* spp.	*Anarnissakaq*	
Barrow's	*Bucephala islandica*	*Anarnissakaq*	
Common	*Bucephala clangula*	*Anarnissakaq*	
Northern shoveler	*Anas clypeata*	*Sugg'Erpak*	
Gadwall	*Anas strepera*		
Green-winged teal	*Anas crecca*	*Tengesqaar(aq)*	
Harlequin duck	*Histrionicus histrionicus*	*Cetusqaar*	

-continued-

Table 3-1.–Page 3 of 3.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Birds, continued			
Scaup (unknown)[b]	*Aythya* spp.	*Kip'Alek*	
Wigeon (unknown)[b]	*Anas* spp.	*Qatkegaliq*	
Long-tailed duck	*Clangula hyemalis*	*Aarraangiiq*	Oldsquaw
Canvasback	*Aythya valisineria*		
Black scoter	*Melanitta nigra*	*Kukumyar*	Black duck
King eider	*Somateria spectabilis*	*Qenallek*	
Shorebirds			
Common snipe	*Gallinago gallinago*	*Kukukuaq*	
Upland game birds			
Ptarmigan	*Lagopus* spp.	*Aqesgiq*	
Spruce grouse	*Dendragapus canadensis*	*Egtuk*	
Eggs			
Gull eggs	*Larus* spp.	*Naru'Yaq*	
Crane eggs[b]			
Geese eggs[b]		*Neqleq*	
Duck eggs[b]		*Yaqulek*	
Swan eggs[b]		*Qugyuk*	
Tern eggs[b]		*Tekiyaar*	
Loon eggs	*Gavia* spp.		
Common snipe eggs[b]	*Gallinago gallinago*	*Kukukuaq*	
Cormorant eggs[b]	*Phalacrocorax* spp.	*Uyalek*	
Unknown eggs[b]		*Kayanguq*	
Wild plants			
Berries			
Blueberry	*Vaccinium* spp.	*Suraq*	
Lowbush cranberry	*Vaccinium vitis idaea*	*Tumagliq*	
Highbush cranberry	*Viburnum edule*	*Kitngpak*	
Crowberry	*Empetrum nigrum L.*	*Tan'Gerpak*	Blackberry
Cloudberry	*Rubus chamaemorus*	*Atsalugpiaq*	Salmonberry
Gooseberry	*Ribes* spp.		
Strawberry	*Fragaria virginiana*		
Raspberry	*Rubus idaeus*		Red raspberry
Other plants			
Fiddlehead ferns	*Dryopteridaceae* spp.	*Ceturkaaq*	
Sourdock	*Rumex arcticus*	*Quagciq*	
Hudson's Bay tea	*Ledum palustre*	*Ayuk*	Labrador tea, Muskeg tea
Stinkweed	*Artemisia Tilesii*	*Naunerrluk*	
Cow parsnip	*Heracleum lanatum*	*Tarnaq*	Wild celery
Wild rhubarb	*Polygonum alpinum*		Alpine knotweed

Source ADF&G Division of Subsistence household surveys, 2008.

a. Blank cell indicates that a specific Central Yup'ik name was not verified.

b. A specific species was not identified.

c. Although the fresh water species *Lota lota* (burbot) is sometimes referred to as “lingcod,” it should not be confused with the marine species *Ophiodon elongatu*s, commonly called “lingcod.”

Table 3-2.–Harvest and use characteristics of Emmonak, 2008.

Mean number of resources used per household	21.5
Minimum	2.0
Maximum	49.0
95% confidence limit (±)	5.5%
Median	21.0
Mean number of resources attempted to harvest per household	17.2
Minimum	0.0
Maximum	47.0
95% confidence limit (±)	7.7%
Median	17.0
Mean number of resources harvested per household	15.4
Minimum	0.0
Maximum	43.0
95% confidence limit (±)	8.0%
Median	15.0
Mean number of resources received per household	11.2
Minimum	0.0
Maximum	41.0
95% confidence limit (±)	8.1%
Median	10.0
Mean number of resources given away per household	9.0
Minimum	0.0
Maximum	41.0
95% confidence limit (±)	11.8%
Median	6.0
Mean household harvest, pounds	2,121.8
Minimum	0.0
Maximum	7,327.2
Total pounds harvested	379,803.0
Community per capita harvest, pounds	481.8
Percent using any resource	100.0%
Percent attempting to harvest any resource	94.5%
Percent harvesting any resource	93.6%
Percent receiving any resource	96.3%
Percent giving away any resource	84.4%
Number of households in sample	109
Number of resources available	130

Source ADF&G Division of Subsistence household surveys, 2009.

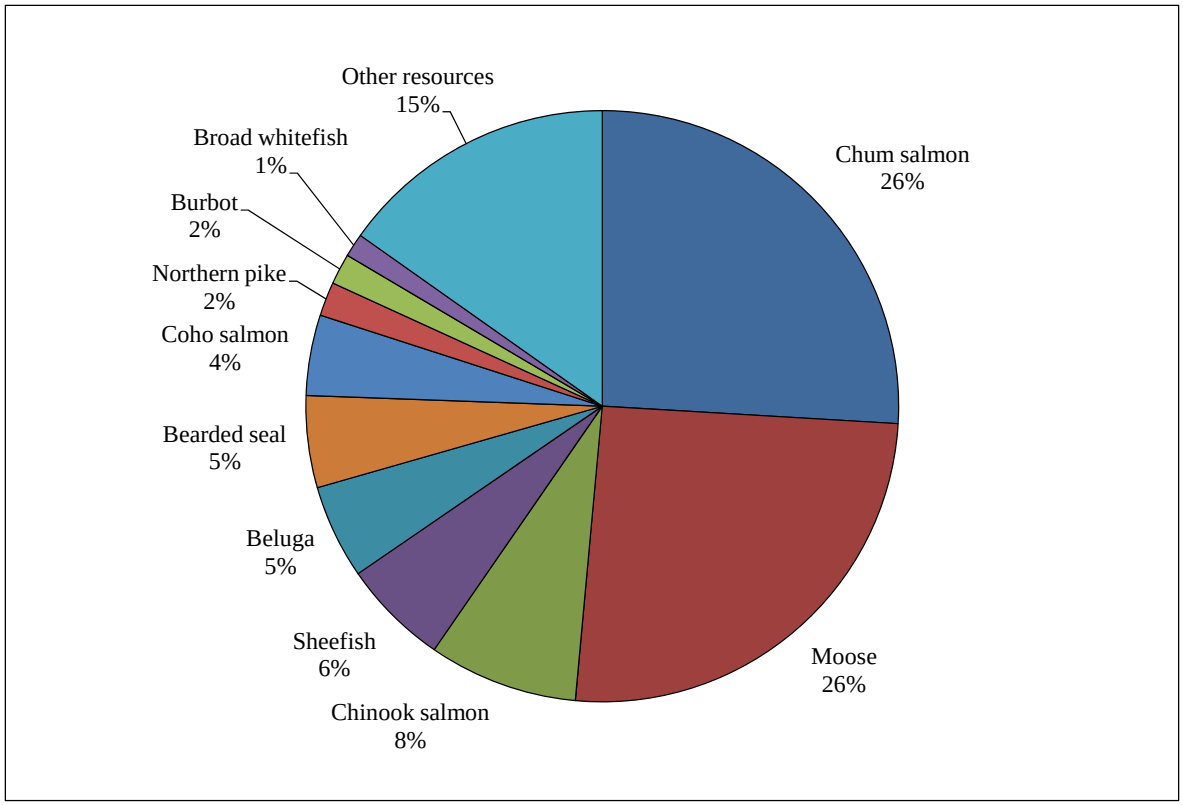

Figure 3-1.–Top 10 resources harvested ranked by estimated usable weight, Emmonak, 2008.

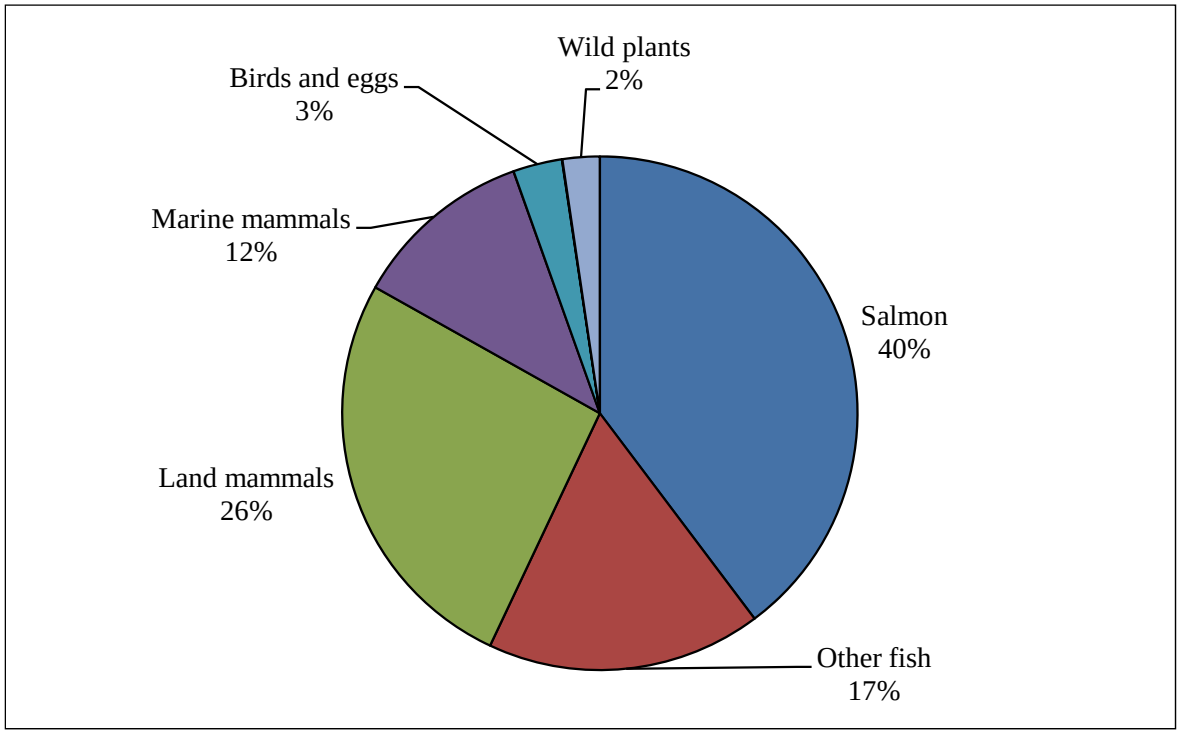

Figure 3-2.–Composition of harvest, Emmonak, 2008.

RESEARCH METHODS

The human dimensions component of BSIERP included local partnering through Community Advisory Boards (CAB). The CAB in Emmonak included 5 individuals who were active subsistence hunters: Gordon Westlock, Evan Hamilton, Jr., Harold Gregory, Ray Waska, and Michael Jimmy. The project was introduced to the CAB on January 13, 2009 through a detailed presentation and researchers discussed the project components and the survey protocol with CAB members. Researchers met with CAB members again at the beginning of the April 2009 survey implementation trip. Finalized survey findings and ethnographic analysis were sent to the Emmonak Tribal Council shortly after completion in September 2011 and a community review meeting is planned for fall 2012.

In April 2009, a research team of 4 ADF&G staff (Caroline Brown, Nikki Braem, James Van Lanen, and Josh Wisniewski) traveled to Emmonak to conduct the survey over 11 days. Each ADF&G researcher worked with a local research assistant to conduct the surveys. Emmonak residents Daisy Lamont, Fortuna Manumik, Louis Immamak, William Jimmy, and Louis Kelly were hired to review household lists and conduct surveys. These teams worked together to document the harvests of each surveyed household, trading off roles such as asking questions and mapping land use areas. Teams utilized a survey instrument that included a core harvest module that collected, for example, the number of salmon or bearded seals harvested, along with basic information about sharing or distribution of the harvest. For some species, the survey also gathered information on seasonality of harvest, sex of the animals, and units harvested. Additional modules collected demographic, economic, and harvest assessment data. Research teams mapped "search areas" (the entire area a household used to look for a particular species) and in some cases, actual harvest areas. Only search areas are reported in the mapping component of this report.

Emmonak was a large community with 179 households when the survey was conducted in April 2009. The study design called for a minimum 50% random sample; the research team achieved a 61% sample, surveying 109 households. Surveys were coded in the field and reviewed by the team leads, Caroline Brown and Nikki Braem.

Ethnographic interviews were conducted during two separate trips (September 2010 and April 2011) to document local and traditional knowledge (LTK) and contextualize the survey results. Thirteen individuals were interviewed in 11 interviews. Respondents were mostly men (11), along with 2 elder women. Respondents ranged in years of age from 55 to 82. Most were active marine mammal hunters, fishers, or both.

ABOUT EMMONAK

Emmonak, a Yup'ik Eskimo community, is located 12 miles upriver of the Bering Sea coast on the north bank of Kwiguk Pass of the Yukon River. Emmonak experiences daily tidal variations because of its proximity to the sea. Situated on the Yukon River delta, it is approximately 120 miles northwest of Bethel and 490 miles west of Anchorage. The Yukon River delta is located within the 19 million acre Yukon Delta National Wildlife Refuge, and land ownership is characterized by a combination of wildlife refuge (federal) and private land ownership, primarily by Alaska Native corporate organizations. The name *Emmonak* translates as "blackfish" in Central Yup'ik.

The community is surrounded by a complex, 6.5 million acre network of sloughs, river passes, and 3 main outlets that create the mouth of the Yukon River. The land surrounding Emmonak is characterized by poorly drained soil with a high permafrost table. The vegetation is a mix of herbaceous tundra and wooded wetlands dominated by willow, alder and stunted birch. Emmonak was originally called *Kwiguk*, a Central Yup'ik word meaning "big stream," and was located 1.4 miles south of its present location. Due to flooding and erosion, the community was moved north in 1964–65 and renamed Emmonak. At a mere

13 feet above sea level, the community continues to be prone to flooding in its new location. In the vicinity of Emmonak, the Yukon River ice breakup usually occurs in late May and the freeze-up occurs in October.[17]

With a relatively large population of approximately 788 people, Emmonak serves as the subregional hub for the nearby communities of Alakanuk, Kotlik, and Nunam Iqua. Emmonak is incorporated as a second class city within the Wade Hampton census area. Electricity is generated locally by the Alaska Village Electric Cooperative and there is an above ground water and sewage system. Emmonak is not a road system community and can only be reached by air or water. A state owned airstrip is available. Winter trails, used by snowmachines and dog teams, connect Emmonak with Kotlik, Alakanuk, and Nunam Iqua. In addition to 179 households, Emmonak also has a health clinic, 2 grocery stores, a large community center, a public school, a post office, several city and tribal government buildings, a seasonal ADF&G office, a small restaurant, and Kwik'pak, a commercial fish processing plant. Emmonak is represented by the federally recognized Emmonak Tribal Council (Moncrieff et al. 2009).

Emmonak has a mixed subsistence/cash economy, consisting of largely seasonal cash employment and year-round subsistence activities. In 2008, 53% of adults in Emmonak reported having some type of wage employment at some point during the year. Also in 2008, 95% of residents reported attempting to harvest at least one subsistence resource, and 100% reported the use of at least one subsistence resource. The salmon fisheries in the Lower Yukon River exemplify the concept of a mixed subsistence and cash economy. Prior to recent changes in salmon abundance, the major sources of income in Emmonak consisted of commercial fishing, purchasing, and processing. In 2009, 103 residents held commercial fishing permits. Several salmon processors and exporters, including Kwik'pak Fisheries—a subsidiary of the Yukon Delta Fisheries Development Association, a Native–owned community development quota (CDQ) non-profit organization—process and export salmon from Emmonak (Moncrieff et al. 2009). For the most part, fishing areas are shared between subsistence and commercial fisheries for salmon. Commercial fishing and subsistence fishing in Emmonak are interrelated, because commercial fishing is oftentimes used as a way for fishers to earn cash income for purchasing gear for subsistence fishing (Wolfe 1981).

The costs of living in Alaska's small communities located off the road system continue to be substantially higher than those seen in urban areas of the state like Juneau, Anchorage, and Fairbanks (Fried 2012). Due largely to transportation costs, it has always cost more to live in rural areas, but recent, rapid changes[18] in the price of petroleum products (gasoline, heating stove oil, and diesel) have rippled through rural economies. Compared to communities on Alaska's road system, it costs more to heat one's home, more to generate electricity, more to fly groceries from regional hubs to villages served by small planes, and more to travel by snowmachine and boat in pursuit of subsistence resources. As noted in July 2008 by the Alaska Department of Labor:

> Energy and transportation costs are the culprit, and since those costs continue to rise, the disparity may continue to grow. Those costs are also of special interest statewide. For the majority of the state's population, the gap between the cost of living in Alaska and other parts of the country has gradually fallen over time, but that trend may not continue if the cost of transporting goods and services continue to rise with fuel costs. (Fried and Robinson 2008:15)

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17. Alaska Department of Community and Regional Affairs (ADCRA). 2012. Alaska Community Database Community Information Summaries, Emmonak. http://commerce.state.ak.us/dcs/commdb/CIS.cfm. (Accessed 2012).

18. "…for most of the 1980s and 1990s, gas prices changed very little and were actually lower in 1999 than they were in the 1980s. It was a long period of calm before the storm, as it turned out. Since 1999, gas prices have soared more than 120 percent and don't appear to be coming back down any time soon." (Fried and Robinson 2008:6).

In September 2008, food costs in the regional hubs nearest Emmonak, Bethel and Nome far exceeded those seen in Anchorage. According to data gathered by the University of Alaska Fairbanks Cooperative Extension Service (UAFCES), in Nome it cost $222.83 weekly to feed a family of 4 with 2 school-age children and $270.34 to do so in Bethel—compared to $126.81 in Anchorage.[19] Costs in Emmonak were likely even higher. While no food cost survey has been conducted in Emmonak itself, occasionally food costs have been collected by the Division using UAFCES methods. In September 2011, for example, food cost for an Anchorage family of 4 with 2 school-age children were an estimated $144.81 weekly compared to $365.57 in Selawik.[20] In March 2007, weekly food costs for an Anchorage family of 4 with school-age children were $117.23, compared to $305.44 in Kiana.[21]

In November 2007, Emmonak residents paid $4.85 for a gallon of heating oil and $5.91 for a gallon of gasoline (Fried and Robinson 2008:11). In March 2009, in Emmonak, heating oil cost $8.71/gallon and gasoline $7.25/gallon (Fried et al. 2009:9).

A subsistence way of life underlies most cultural and economic activity in Emmonak, and subsistence remains a priority for many residents. The subsistence economy in Emmonak has historically been based on a seasonal round of harvest and production by family and extended family groups. Historically, the *Kwikpagmiut*, or "people of the big river" who were living in the lower Yukon River region at historical contact (ca. 1833), moved seasonally from place to place within the region according to the availability of a variety of resources (Wolfe 1981). In 2008, most residents of Emmonak lived a less nomadic life, basing their subsistence activities out of their homes in Emmonak for much of the year, although travel to seasonal camps for fishing, hunting, and gathering plants remained important to many residents.

The following brief description of the general seasonal round for Emmonak residents draws largely from key respondent interviews recorded during this research and Wolfe (1981); some patterns of the seasonal round Wolfe described may have changed, as will be explored in a later section comparing 2008 results with those of previous studies. It should be noted that although a resource may be available year-round, it might only be targeted during particular seasons and be harvested incidentally with other resources at other times. In addition, the timing of harvest efforts in Emmonak may vary slightly from year to year, occurring relatively late or early depending on environmental, economic, or management factors. Although many of the patterns described by Wolfe in 1981 remained similar to patterns found in 2008, residents of Emmonak demonstrate considerable flexibility in their subsistence activities on an annual and long-term basis; this should be kept in mind throughout the following description of the traditional yearly cycle of subsistence activities.

The seasonal round in Emmonak begins in the late spring in May just before breakup of the Yukon River ice. Emmonak residents target migratory waterfowl and eggs, a late spring and early summer run of sheefish, smelt, and various other nonsalmon fish species such as northern pike, broad whitefish, Bering cisco, burbot, and saffron cod (known locally as "tomcod") at this time. An elder interviewed recalled spring activities that occurred when he was a child:

> During the spring, they would hunt the birds, and if they would catch too much, they would just take the skin off and cut it up and hang it. Left the birds for them to dry, sun dry for later use. The other things were taken, like blackfish, was also dried. And whatever we catch like pike and whitefish, cisco fish.

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19. Cooperative Extension Service Alaska Food Cost Survey, September 2008. http://www.uaf.edu/ces/hhfd/fcs/. (Accessed 2012).

20. Cooperative Extension Service Alaska Food Cost Survey, September 2011. http://www.uaf.edu/ces/hhfd/fcs/. (Accessed 2012).

21. Cooperative Extension Service Alaska Food Cost Survey, March 2007. http://www.uaf.edu/ces/hhfd/fcs/. (Accessed 2012).

In addition, furbearers such as snowshoe hare, mink, and beaver are harvested in spring. Preparations for the coming summer salmon season take place concurrently with these harvests (Wolfe 1981).

Salmon is the most reliable and significant subsistence resource on the Yukon River. The first run of salmon available to Emmonak residents usually occurs in very late May or early June when a run of Chinook salmon or "kings" begins. Emmonak residents recognize 2 phenotypic types of Chinook salmon: "blackback or blacknose" that arrive first, and "whitenose," generally larger fish that arrive later (cf. Moncrieff et al. 2005)

Residents have reported that their elders taught them that seasonal indicators such as the direction of the winter wind and presence of other fish species, such as smelt, can help local fishers determine salmon run timing and sometimes abundance (Moncrieff et al. 2009). Many families and individuals move to summer fish camps. Some residents occupy their fish camps for only part of the summer, while others may move their family to fish camps for the entire summer (Wolfe 1981). Fish camp sites for residents of Emmonak are in large part located along Kwiguk Pass and the southern shore of Kawanak Pass. Although some fish camp locations change through time due to erosion, "silting up" (changes to the camp location or net sites due to excessive silt build up), and changes in the course of the Yukon River, some fish camps have been in the same location for generations. The fish camp of *Nilaraq*, near the south mouth of the Yukon River and used by an Emmonak resident in the 1980s, was reported to have been used as far back as anyone could remember (Wolfe 1981). One respondent interviewed in 2009 recalled the variety of activities that could occur at fish camp in earlier decades:

> If any family has too much, they went around the fish camp and asked if they have enough fish or other species or not. If not, they were given some. Nothing was ever wasted…And that would be an activity, egg hunting. And at the same time, bird hunting, too. And sometimes a man would, there would be only one man with a shotgun while the rest of us go out and look for eggs… And then, they would hunt beluga whales there too. And other species of marine mammals. No matter how much animals, marine mammals, when they have enough, they stop. Take it home and share with their neighbors, especially the elders, people who can't go out anymore.

Summer is normally a time of intense harvesting for both commercial and subsistence fishing (see "Wild Food Harvests" below for a description of changes to this pattern in 2008). The commercial and subsistence fisheries often involve the same fishers, harvest areas, and gear. Most fishers have become adept at balancing fishing for subsistence and fishing for commercial sale (Brown et al. *In prep*). Both fisheries target successive runs of Chinook salmon, chum salmon, coho salmon , and to a lesser degree, pink salmon as they move upriver to their spawning areas. There are 2 distinct runs of chum salmon—a summer run locally referred to as *teggmaarrluk*, and a fall run known as *uqurliq* (Walkie Charles, personal communication, April 16, 2012). Emmonak residents have historically focused their efforts on the summer chum run. Subsistence fishing effort occurs during open periods or "windows" established by regulations; open periods are determined separately for subsistence and commercial fishing. Wolfe (1981:67) states, "For most households, salmon represented the largest single source of food and monetary income. Of all resources, it might be considered the staple food and primary market product of the region." Salmon are harvested primarily by 2 main techniques: by drift gillnets from boats along straight, snag-free stretches of river and by set gillnets ("setnets") along river banks, along coastal channels, in eddies, and in midriver along submerged sand bars (Wolfe 1981). While fishing for salmon during the summer months, residents may also opportunistically harvest other resources, such as beluga whales or seals on the Yukon River or at one of its mouths (Wolfe 1981). In 2008, beluga whales were harvested in June through October. The occasional river otter, muskrat, and beaver may also be taken at this time. Salmon fishing and processing usually continues through August and the first part of September. As fall approaches, salmon fishing occurs along with the harvest of blueberries, cloudberries ("salmonberries"), crowberries ("blackberries"), and lowbush cranberries. Berry picking frequently involves entire families because children, young adults, and elders alike can participate.

As the salmon season comes to an end, some families begin to concentrate on fall waterfowl or migratory bird hunting, nonsalmon fishing, sealing activities along the coast, and beluga whale hunting from boats. Bird hunting begins in August, after a pause during the nesting and molting season, and continues into October for certain species. This hunting activity sometimes takes place from fall camps where fishing for broad whitefish, Bering cisco and round whitefish also occurs. Fishing for these nonsalmon fish species continues through early November.

In September, moose hunting becomes a focal subsistence activity. Moose harvesting in 2008 occurred in the months of August and September, with a much smaller harvest occurring in December. Moose have become more plentiful near Emmonak in recent years, as evidenced in the 2008 harvest data. However, as one interview respondent stated,

> My dad never used to hunt moose because there wasn't any around here. We had to go upriver above Holy Cross, above Holy Cross some people went there. I went out with a couple of men who were experienced moose hunters. And again, I had to learn that just like I was doing with the seal hunting. Safety comes first, that's what one of the things I got scolding from. When I first went up to *Paimiut* area [upriver near Holy Cross], man, there were so many moose. When it was calm, no wind, you could hear people shooting downriver and upriver too.

The fall months are also the beginning of intense seal hunting. One interview respondent explained:

> Fall time is when we normally really concentrate on harvesting seals for the winter time. When starts getting cold, like September may next month, people start going to coast to hunt seals, up until freeze-up when can't go river. Then after, maybe January or February, go to coast, wait for cold weather, when ice is nice and thick. When good weather we go out.

One elder respondent recalled watching the tide cycle to help determine when to go seal hunting:

> Then when they're not *maqi*-ing (to take a steam bath), they told us to watch out for the tide, if it comes up to tell them. And they go down by *qayaq* very quietly; you could hardly hear the noise they made from paddle. Cause they take their time and follow the bends. And when they get to the mouth [of the river],…everybody was told to be quiet. If we eat something, man, they scold us. And they would be, they would have those scopes. They would look for seals or whales. Then when they get close they take off with smoke behind!

Large broad whitefish can also be taken in the fall months with nets as the fish migrate from lakes. In October and November, nonsalmon fishing becomes a major subsistence priority. At this time, fishers target runs of broad whitefish, Bering cisco, sheefish, and saffron cod (tomcod). The harvesting of furbearers such as muskrats, red foxes, and snowshoe hares also occurs in October and November. December sees the continuation of small furbearer and moose harvesting.

During the winter months of January, February, March, and early April, residents rely on their "put away" stores of subsistence foods, foods acquired from town grocery stores, hares, and ptarmigan. Throughout the late fall through winter to early spring, some residents "jig" for fish under the ice or set nets under the ice to catch nonsalmon fish such as northern pike, tomcod, burbot, and whitefish. Also, traps are sometimes placed under the ice to harvest Alaska blackfish.

In late winter and early spring, hunters return to the Bering Sea to hunt marine mammals again, primarily seals (i.e., bearded, ribbon, ringed, and spotted), although spring seal hunting is highly dependent on weather and sea ice conditions. Wolfe (1981) describes the timing of seal hunting from the edge of the land-fast ice pack; spring seal hunting can occur from approximately January to May, but in most years it occurred from February to May due to ice conditions. More recently, a 2009 interview respondent stated

that, “Timing depends on ice conditions, if there is open water at which to hunt the seals. Sometimes a south wind will open a lead in February and you can go get them.” Seals provided more than just meat. According to another respondent,

> There wasn’t much containers from stores. Nowadays you have pail or plastic 5-gallon buckets. But in those days when I was growing up, women would separate the skin from the oil (blubber) using a special kind of tool...if the seal is too big, they move the skin back. And then after that they’d blow air in it, the skin side. Inside out. And then they hang it where it was outdoors (dry it). Then they, when the fish is ready, they put their smoked salmon in the smoke house, into this container.

In 2008, the majority of seal hunting occurred in the summer and fall in the Yukon River and open water of the Bering Sea, with relatively little hunting occurring from sea ice. One older respondent recalled camping out on the ice when hunting seals in the spring when he was a young man:

> They used to camp out, away from the shorefast ice. They’d go to icebergs. Closer to the icebergs, because the icebergs are like anchors. They’re big and they anchor to the bottom. They don’t move. When the ice is gonna drift, you know. You could hear it, cracks moving, it sounds like little puppies or sounds like cows. You could barely hear it, the ice, that’s when the men will say, “Time to go. Let’s go home.” I experienced that before. We were out there, my uncle and I, we were out there, and I asked, “What’s that sound?” I had good hearing then. “What is that sound?” “Oh,” he said, “the ice is gonna break up.” He says, “Time for us to go home.” Sure enough, I kind of stayed up a little while anyway, but next thing I know the ice just…Next thing we know all the, some of the guys were drifting away.

In spring, early runs of broad whitefish, sheefish, and saffron cod begin to run again as migrating waterfowl return to the Yukon River delta and the subsistence cycle begins once again.

If harvest methods and fishing technologies have evolved through time, there has been one constant: the passing on of local and traditional knowledge (LTK) by elders to successive generations of subsistence harvesters. As noted above, Alaska Native salmon harvesters on the lower Yukon River have long relied on their elders’ knowledge of “natural indicators,” or empirical observations of changes in the environment such as weather, wind direction, behavior of other animals, or other environmental conditions that correlate with the arrival of salmon, changes in salmon behavior, or the prediction of salmon run strength (Moncrieff et al. 2009).

For Emmonak, several natural indicators are observed to correlate with animal behavior and abundance. For example, Emmonak fishers recognize a strong relationship between fish behavior and certain wind conditions. Emmonak fishers take note of wind conditions prior to salmon runs to predict where to set their nets as certain wind conditions can affect which mouth the salmon enter in their upstream migration. According to one Emmonak fisher, a southwest wind will bring the salmon to the south mouth to fishing areas close to the community. An east wind tends to push the salmon away from the Yukon River toward Norton Sound. A west wind can push the salmon into Kwiguk Pass or the middle mouth. Heavy or frequent north winds can push salmon south to the south mouth and to the Black River. A west wind after a south wind can push the salmon into the middle mouth. Other natural indicators for Emmonak fishers include a heavy snowfall correlating with years of strong salmon returns; late bird migrations correlating with late salmon arrivals; the arrival of large groups of birds indicating large groups of salmon will follow; and abundant mosquitoes correlating with an abundance of salmon (Moncrieff et al. 2009). In addition to informing about animal behavior and abundance, natural indicators are used by subsistence harvesters to inform them about environmental conditions. For example, a respondent noted “If you look at the clouds [near the coast], you can tell if there is open water, see a reflection, or not.”

Despite this generational transmission of knowledge, Emmonak residents are coping with a dramatically and rapidly changing environment:

> The ice used to be very thick, those days, very thick in those days because it used to be very, very cold. Now, we have very mild winters. The elders have noticed that quite a bit. They have been telling us from way back, way, way back that this is going to actually happen. I don't know how in the world they know. Even my uncle, he is 93 year old, he say, those days he used to hear elders saying, "How come the world, our environment is changing?" They already know. They already know it is going to change….

These changes affect both local residents' predictive understanding and capabilities and, as the above quote indicates, the actual processes of hunting and gathering. However, as many Emmonak respondents noted, ecological or environmental change is not necessarily remarkable in itself, nor is the need to adapt. Change is a constant.

Another important component of the subsistence economy in Emmonak is food distribution. Harvested subsistence foods are freely given to family members, friends, and community elders who need help providing for themselves. This sharing or *chigiq*, is an integral part of the cultural and economic lives of Emmonak residents. *Chigiq*, meaning "to give," helps to strengthen cooperation between community members, preserve cultural identity, and provide for those in need (Wolfe 1981). In addition to *chigiq*, subsistence foods may be distributed through *navolhotug* and *tungyiaq*, or exchanges of one resource for another, or bartering. Wolfe (1981) gives the example of one hunter who exchanged or "swapped" seal oil, *uquq*, and *mangtak*[22] for "upriver" items such as wolverine skins, moose meat, and even groceries. In this manner, subsistence resources move between not only residents of the community, but between residents of different communities as well. Subsistence resources rarely stay solely within the family or social unit that harvests them; rather, they flow outward to others in often complex networks of distribution (Wolfe 1981). The average number of kinds of subsistence resources given away per household in Emmonak according to the 2008 comprehensive survey was 9. The average number of kinds of subsistence resources received per household in 2008 was 11.

DEMOGRAPHY

The 109 surveyed households included 480 people, and represented 61% of the 179 total households in Emmonak. The 2008 estimated total population was 788 with a sex ratio of 56% males and 44% females (Figure 3-3). This compares to the 2008 Alaska Department of Labor estimated population of 792 (ADLWD 2009). Nearly all (98%) 2008 Emmonak residents were Alaska Native. Household sizes ranged from 1 to 10 members, with a mean of 4.4 people per household. The average age was 28 years, and the oldest resident was 84 years old. Residents of Emmonak had lived there 23 years on average, and household heads had lived there 38 years on average. Length of residence ranged from less than a year to 79 years for the population as a whole. Nearly all (96%) household heads were born in Alaska, and length of residency in Emmonak for household heads ranged from 2 to 79 years (Table 3-3).

22. Central Yup'ik for beluga skin with fat attached; the English word "muktuk" comes from the Inupiaq cognate of this Yup'ik word (Jacobson 1984:226).

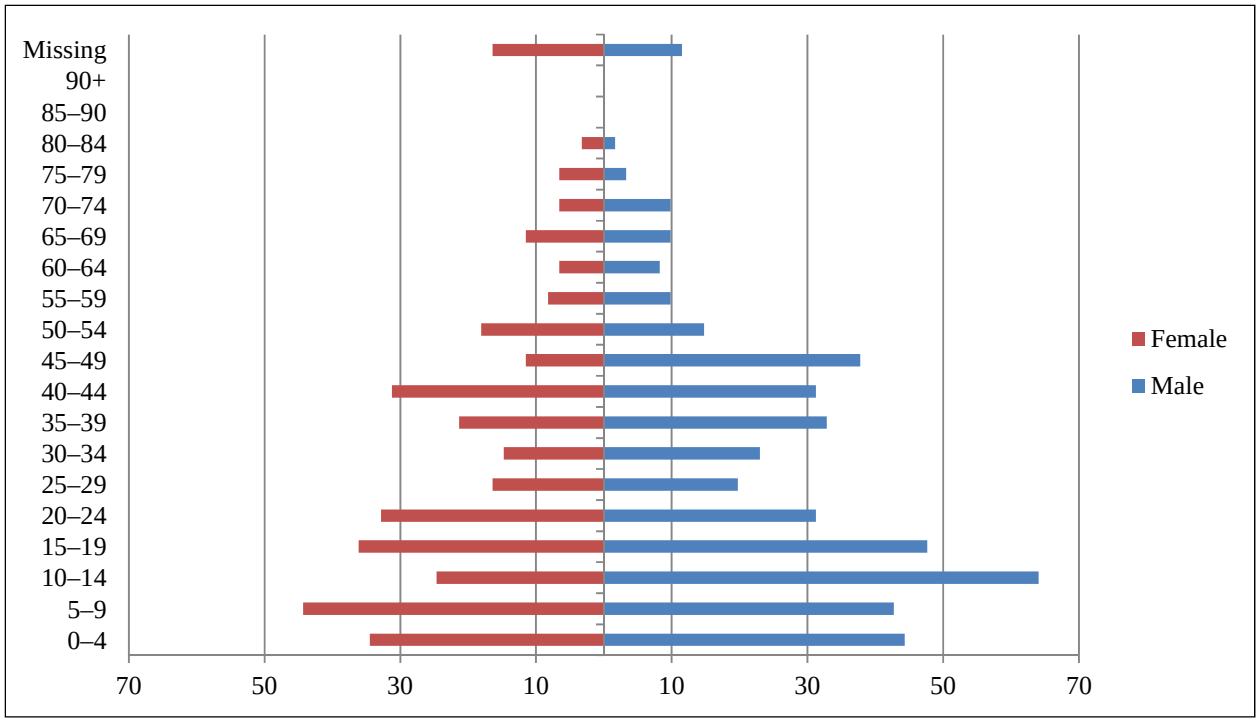

Figure 3-3.–Population profile for Emmonak, 2008.

Table 3-3.–Demographic characteristics of Emmonak, 2008.

Sampled households	109
Number of households in the community	179
Percentage of households sampled	60.9%
Estimated population	788.3
Household size	
Mean	4.4
Minimum	1
Maximum	10
Age	
Mean	27.8
Minimum	0.0
Maximum	84.0
Median	23.0
Length of residency–population	
Mean	22.9
Minimum	0.0
Maximum	79.0
Length of residency–household heads	
Mean	38.1
Minimum	2.0
Maximum	79.0
Sex	
Males	
Number	443.4
Percentage	56.3%
Females	
Number	344.9
Percentage	43.8%
Alaska Native	
Households (either head)	
Number	172.4
Percentage	96.3%
Estimated population	
Number	771.8
Percentage	97.9%

Source ADF&G Division of Subsistence household surveys, 2009.

Jobs and Income

Respondents were asked about both earned income (jobs held and wages earned by all household members 16 years old and older) and unearned income from sources such as the Alaska Permanent Fund Dividend, social security, and public assistance.

For 2008, Emmonak households earned or received an estimated $7.7 million, of which $3.74 million (49%) was from wage employment and $3.94 million (51%) was from other sources. Per capita income in 2008 was an estimated $9,749, and average household income was $42,935 (Table 3-5). An estimated 271 of 470 adults (58%) held at least one job in 2008 (Table 3-5). Out of all persons aged 16 and older, employment averaged only 10.8 weeks per year. On average, those with jobs worked during

approximately 7 months of the year, and 36% of employed adults worked year-round. The number of jobs held ranged from 1 to 5. On average, employed adults held 1.4 jobs.

Table 3-4.–Comparison of selected study findings for Emmonak, 2008.

Demography	
Population	788.3
Percent Alaska Native	97.9%
Percent of household head born in Alaska	95.8%
Average length of residency, household heads (years)	38.1
Cash economy	
Percent of jobs located in community	88.5%
Average number of months employed	7.1
Percent of employed adults working year-round	35.8%
Average household income	$42,934.52
Per capita income	$9,749.18
Total household income–all sources	$7,685,280
Percent of household income from employment	48.7%
Percent of household income from other sources[a]	51.3%
Resource harvest and use	
Per capita harvest, pounds usable weight	481.8
Average household harvest, pounds usable weight	2,121.8
Number of resources used by 50 percent or more of households	21
Average number of resources used per household	21.5
Average number of resources attempted to harvest per household	17.2
Average number of resources harvested per household	15.4
Average number of resources received per household	11.2
Average number of resources given away per household	9.0
Percent of total harvest taken by top 25 percent	57.6%
Percent of households taking 70 percent of harvest	33.9%
Per capita harvest of lowest 50 percent of households, pounds per person	69.1
Average number of resources used by lowest 50 percent of households	16.9
Average number of resources used by top 25 percent of households	30.6

Source ADF&G Division of Subsistence household surveys, 2009.

a. Includes record Alaska Permanent Fund Dividend and Energy Rebate of $3,267 per person.

Table 3-5.–Employment characteristics, Emmonak, 2008.

Characteristics	Emmonak
Adults	
Number	469.6
Mean weeks employed	10.8
Employed adults	
Number	271.0
Percentage	57.7%
Jobs	
Number	385.9
Mean	1.4
Minimum	1
Maximum	5
Months employed	
Mean	7.1
Minimum	0
Maximum	12
Percent employed year-round	35.8%
Mean weeks employed	30.8
Households	
Number	179
Employed	
Number	149.4
Percentage	83.5%
Jobs per employed household	
Mean	2.6
Minimum	1
Maximum	8
Employed adults	
Minimum	1
Maximum	6
Mean	
Employed households	1.8
Total households	1.5
Mean person weeks of employment	18.8

Source ADF&G Division of Subsistence household surveys, 2009.

Figure 3-4 shows the percentage of community income by source, whether earned or unearned income. Looking at income from jobs alone (earned income only), employment in local government represented 22% of all jobs, and 28% of job-related income. Income from agriculture, forestry, and fishing represented 44% of all jobs and 37% of job-related income. Services jobs provided 9% of jobs and 11% of job-related income to the community. Table 3-6 provides additional information on less frequent employment in Emmonak in 2008.

The main contributor to non-employment sources of income was the Alaska Permanent Fund Dividend (31% of total community income), which paid individuals an unusually high $3,269 in 2008 due to a $1,200 increment from the Alaska Resource Rebate. Social Security contributed approximately 7%, food

stamps 5%, and pension/retirement 3%. Income from Native corporation dividends, totaling $31,645, provided less than 1% of non-employment sources of income.

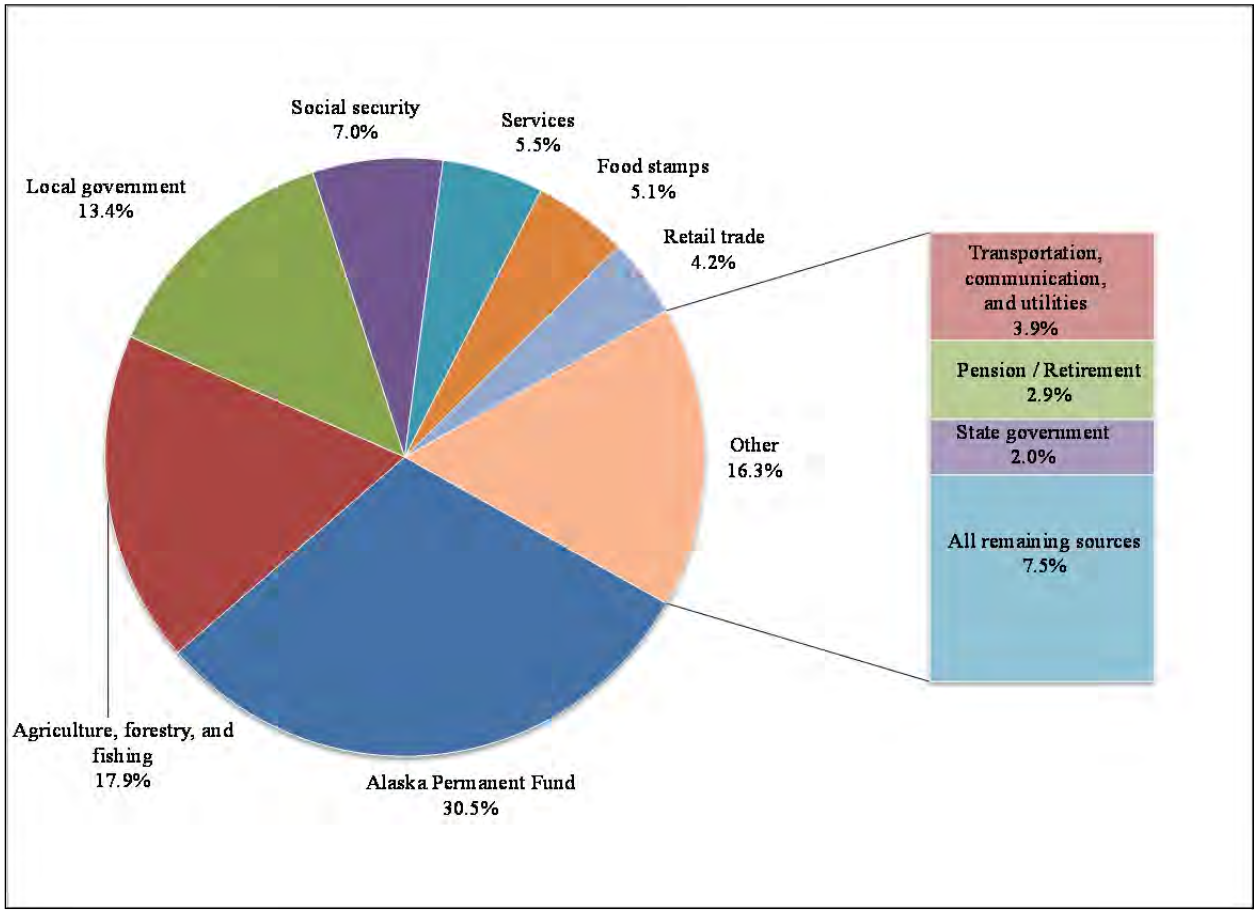

Figure 3-4.–Top 10 income sources ranked by estimated amount, Emmonak, 2008.

Table 3-6.–Employment by industry, Emmonak, 2008.

Industry	Jobs	Households	Employed individuals	Percentage of income from jobs
Estimated total number	**385.9**	**179**	**270**	**100.0%**
Federal government	**1.3%**	**2.8%**	**1.8%**	**0.6%**
Executive, administrative, and managerial occupations	0.4%	0.9%	0.6%	0.0%
Natural scientists and mathematicians	0.4%	0.9%	0.6%	0.1%
Administrative support occupations, including clerical	0.4%	0.9%	0.6%	0.5%
State government	**3.8%**	**8.3%**	**5.5%**	**4.1%**
Executive, administrative, and managerial occupations	0.4%	0.9%	0.6%	1.1%
Technologists and technicians, except health	0.9%	1.8%	1.2%	1.2%
Administrative support occupations, including clerical	0.4%	0.9%	0.6%	0.5%
Service occupations	1.3%	2.8%	1.8%	0.9%
Mechanics and repairers	0.9%	1.8%	1.2%	0.5%
Local government	**21.7%**	**39.4%**	**30.4%**	**27.6%**
Executive, administrative, and managerial occupations	2.1%	4.6%	3.0%	5.0%
Engineers, surveyors and architects	0.9%	1.8%	1.2%	1.9%
Social scientists, social workers, religious workers and lawyers	0.9%	1.8%	1.2%	0.9%
Teachers, librarians, and counselors	3.4%	7.3%	4.9%	4.3%
Technologists and technicians, except health	0.9%	1.8%	1.2%	0.2%
Marketing and sales occupations	0.4%	0.9%	0.6%	0.5%
Administrative support occupations, including clerical	4.3%	9.2%	6.1%	6.3%
Service occupations	2.6%	5.5%	3.6%	2.1%
Agricultural, forestry and fishing occupations	0.4%	0.9%	0.6%	0.5%
Mechanics and repairers	0.9%	1.8%	1.2%	1.0%
Construction and extractive occupations	2.1%	3.7%	3.0%	1.9%
Precision production occupations	1.7%	3.7%	2.4%	2.1%
Handlers, equipment cleaners, helpers, and laborers	1.3%	2.8%	1.8%	0.9%
Agriculture, forestry and fishing	**43.8%**	**65.1%**	**58.4%**	**36.8%**
Administrative support occupations, including clerical	0.9%	1.8%	1.2%	0.6%
Service occupations	0.9%	1.8%	1.2%	0.6%
Agricultural, forestry and fishing occupations	28.9%	53.2%	40.8%	21.7%
Construction and extractive occupations	1.3%	2.8%	1.8%	2.6%
Precision production occupations	8.9%	12.8%	12.8%	8.0%
Production working occupations	0.4%	0.9%	0.6%	0.5%
Transportation and material moving occupations	1.3%	2.8%	1.8%	1.8%
Handlers, equipment cleaners, helpers, and laborers	1.3%	2.8%	1.8%	1.0%
Construction	**2.1%**	**4.6%**	**3.0%**	**2.9%**
Engineers, surveyors and architects	0.4%	0.9%	0.6%	1.2%
Construction and extractive occupations	0.9%	1.8%	1.2%	0.4%
Production working occupations	0.4%	0.9%	0.6%	0.9%
Handlers, equipment cleaners, helpers, and laborers	0.4%	0.9%	0.6%	0.5%
Transportation, communication and utilities	**4.7%**	**10.1%**	**6.7%**	**8.0%**
Executive, administrative, and managerial occupations	0.4%	0.9%	0.6%	2.3%
Administrative support occupations, including clerical	1.7%	3.7%	2.4%	2.4%
Service occupations	0.4%	0.9%	0.6%	0.5%
Mechanics and repairers	0.4%	0.9%	0.6%	0.0%
Transportation and material moving occupations	1.3%	2.8%	1.8%	2.4%
Handlers, equipment cleaners, helpers, and laborers	0.4%	0.9%	0.6%	0.5%

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Table 3-6.–Page 2 of 2.

Industry	Jobs	Households	Individuals	Percentage of income from jobs
Retail trade	**7.7%**	**15.6%**	**10.9%**	**8.7%**
Marketing and sales occupations	4.7%	10.1%	6.7%	4.8%
Administrative support occupations, including clerical	1.3%	2.8%	1.8%	1.6%
Mechanics and repairers	0.4%	0.9%	0.6%	1.6%
Precision production occupations	0.4%	0.9%	0.6%	0.4%
Production working occupations	0.4%	0.9%	0.6%	0.2%
Handlers, equipment cleaners, helpers, and laborers	0.4%	0.9%	0.6%	0.0%
Services	**8.9%**	**16.5%**	**12.2%**	**11.2%**
Executive, administrative, and managerial occupations	0.4%	0.9%	0.6%	0.5%
Social scientists, social workers, religious workers and lawyers	0.9%	1.8%	1.2%	2.4%
Teachers, librarians, and counselors	0.4%	0.9%	0.6%	0.9%
Registered nurses, pharmacists, dietitians, therapists, and physician's assistants	1.7%	3.7%	2.4%	3.5%
Writers, artists, entertainers, and athletes	1.7%	1.8%	1.8%	0.3%
Health technologists and technicians	0.4%	0.9%	0.6%	0.5%
Administrative support occupations, including clerical	1.7%	3.7%	2.4%	1.5%
Service occupations	1.3%	2.8%	1.8%	1.7%
Handlers, equipment cleaners, helpers, and laborers	0.4%	0.9%	0.6%	0.1%

Source ADF&G Division of Subsistence household surveys, 2009.

WILD FOOD HARVESTS

Households in Emmonak harvested an estimated 379,803 edible pounds of wild fish, game, and plants for subsistence during 2008, providing 482 lb by edible weight per person (Table 3-7)**.** All households reported using at least one type of wild resource in 2008, and 94% of households reported harvesting wild resource. The 10 most widely used subsistence resources in 2008 were moose (95% of households), chum salmon (91%), Chinook salmon (89%), cloudberries (82%), wood (73%), sheefish (70%), Canada geese (cacklers) (69%), blueberries (65%), bearded seal (64%), and ptarmigan (64%).

Table 3-7.–Estimated harvests and uses of wild resources in Emmonak, 2008.

	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95%
Resource names(s)	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	confidence limit
All resources	**100.0%**	**94.5%**	**93.6%**	**96.3%**	**84.4%**	**379,803.0**	**2121.8**	**481.8**				**6.8%**
Fish	**98.2%**	**83.5%**	**82.6%**	**89.0%**	**63.3%**	**216,531.9**	**1209.7**	**274.7**				**8.7%**
Salmon	96.3%	73.4%	70.6%	74.3%	47.7%	150,966.6	843.4	191.5	27,152.7	151.7	ind	9.9%
Chum salmon	90.8%	69.7%	67.0%	57.8%	41.3%	98,529.4	550.4	125.0	19,131.9	106.9	ind	10.2%
Coho salmon	55.0%	39.4%	37.6%	32.1%	20.2%	16,718.3	93.4	21.2	3,265.3	18.2	ind	28.9%
Chinook salmon	89.0%	55.0%	52.3%	65.1%	34.9%	30,944.2	172.9	39.3	3,042.7	17.0	ind	12.0%
Pink salmon	22.0%	20.2%	19.3%	8.3%	9.2%	3,531.4	19.7	4.5	1,471.4	8.2	ind	29.8%
Sockeye salmon	11.0%	10.1%	10.1%	2.8%	2.8%	1,243.2	6.9	1.6	241.4	1.3	ind	33.2%
Nonsalmon fish	89.0%	69.7%	69.7%	72.5%	49.5%	65,565.3	366.3	83.2	39,244.8	219.2		10.4%
Herring	16.5%	3.7%	3.7%	12.8%	4.6%	4,831.0	27.0	6.1	805.2	4.5	gal	42.6%
Herring roe	11.9%	3.7%	3.7%	8.3%	1.8%	1,798.3	10.0	2.3	257.1	1.4		60.7%
Herring sac roe	1.8%	0.9%	0.9%	0.9%	0.0%	9.9	0.1	0.0	1.6	0.0	gal	0.0%
Herring spawn on kelp	11.9%	3.7%	3.7%	8.3%	1.8%	1,788.5	10.0	2.3	255.5	1.4	gal	61.1%
Smelt	12.8%	11.0%	7.3%	6.4%	4.6%	384.0	2.1	0.5	64.0	0.4	gal	39.0%
Capelin (grunion)	0.0%	0.9%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Cod	27.5%	12.8%	11.0%	20.2%	2.8%	420.8	2.4	0.5	1,285.8	7.2		30.1%
Pacific cod (gray)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Pacific tomcod	5.5%	2.8%	2.8%	3.7%	0.9%	209.4	1.2	0.3	279.2	1.6	ind	51.5%
Saffron cod	22.0%	10.1%	8.3%	16.5%	1.8%	211.4	1.2	0.3	1,006.7	5.6	ind	33.1%
Flounder	0.9%	0.9%	0.9%	0.9%	0.0%	59.1	0.3	0.1	19.7	0.1		77.5%
Starry flounder	0.9%	0.9%	0.9%	0.9%	0.0%	59.1	0.3	0.1	19.7	0.1	ind	77.5%
Pacific halibut	4.6%	0.9%	0.9%	3.7%	0.9%	3.3	0.0	0.0	3.3	0.0	lb	77.5%
Lamprey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Sculpin	0.9%	0.9%	0.0%	0.9%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Blackfish	45.0%	20.2%	19.3%	32.1%	12.8%	4,435.2	24.8	5.6	17,740.8	99.1	ind	25.8%
Burbot	53.2%	33.9%	32.1%	26.6%	24.8%	6,412.9	35.8	8.1	1,425.1	8.0	ind	20.4%
Char	2.8%	1.8%	1.8%	0.9%	0.9%	1,243.1	6.9	1.6	828.7	4.6		76.8%

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Table 3-7.–Page 2 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Dolly Varden	2.8%	1.8%	1.8%	0.9%	0.9%	1,243.1	6.9	1.6	828.7	4.6	ind	76.8%
Arctic grayling	2.8%	2.8%	2.8%	0.0%	1.8%	101.0	0.6	0.1	67.3	0.4	ind	75.6%
Northern pike	58.7%	48.6%	47.7%	21.1%	29.4%	7,038.7	39.3	8.9	3,128.3	17.5	ind	13.8%
Sheefish	69.7%	51.4%	49.5%	40.4%	27.5%	22,097.5	123.4	28.0	2,762.2	15.4	ind	12.0%
Trout	2.8%	0.9%	0.9%	1.8%	0.9%	2.3	0.0	0.0	1.6	0.0	ind	77.5%
Fish, continued												
Rainbow trout	2.8%	0.9%	0.9%	1.8%	0.9%	2.3	0.0	0.0	1.6	0.0	ind	77.5%
Whitefish	73.4%	56.0%	55.0%	41.3%	36.7%	16,738.1	93.5	21.2	10,855.6	60.6		10.4%
Broad whitefish	50.5%	39.4%	38.5%	23.9%	24.8%	4,860.9	27.2	6.2	2,430.5	13.6	ind	13.1%
Cisco	60.6%	47.7%	45.0%	29.4%	28.4%	7,440.8	41.6	9.4	6,106.4	34.1		12.2%
Bering cisco	52.3%	42.2%	37.6%	25.7%	24.8%	4,670.6	26.1	5.9	3,336.1	18.6	ind	13.9%
Least cisco	29.4%	24.8%	22.9%	14.7%	16.5%	2,770.2	15.5	3.5	2,770.2	15.5	ind	23.0%
Humpback whitefish	33.0%	29.4%	28.4%	11.0%	16.5%	3,816.5	21.3	4.8	1,908.2	10.7	ind	16.5%
Round whitefish	7.3%	7.3%	6.4%	3.7%	2.8%	591.2	3.3	0.8	394.1	2.2	ind	38.1%
Unknown whitefish	0.9%	0.9%	0.9%	0.0%	0.0%	28.7	0.2	0.0	16.4	0.1	ind	77.5%
Land mammals	**97.2%**	**78.9%**	**67.9%**	**76.1%**	**57.8%**	**99,292.2**	**554.7**	**126.0**	**700.4**	**3.9**		**7.8%**
Large land mammals	95.4%	75.2%	60.6%	74.3%	52.3%	96,869.4	541.2	122.9	135.5	0.8		8.0%
Black bear	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Brown bear	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Caribou	7.3%	0.9%	0.0%	7.3%	0.9%	0.0	0.0	0.0	0.0	0.0		
Caribou, bull	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Caribou, cow	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Caribou, unknown sex	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Moose	95.4%	75.2%	60.6%	73.4%	52.3%	96,869.4	541.2	122.9	135.5	0.8		8.0%
Moose, bull	–	–	–	–	–	94,521.0	528.1	119.9	132.2	0.7	ind	8.1%
Moose, cow	–	–	–	–	–	1,174.2	6.6	1.5	1.6	0.0	ind	77.5%
Moose, unknown sex	–	–	–	–	–	1,174.2	6.6	1.5	1.6	0.0	ind	77.5%
Small land mammals	38.5%	40.4%	33.0%	11.9%	21.1%	2,422.8	13.5	3.1	565.0	3.2		30.2%

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Table 3-7.–Page 3 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Land mammals, continued												
Beaver	6.4%	6.4%	6.4%	1.8%	1.8%	1,305.6	7.3	1.7	87.0	0.5	ind	50.0%
Coyote	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Fox	3.7%	5.5%	3.7%	0.0%	1.8%	0.0	0.0	0.0	21.3	0.1		
Arctic fox	0.9%	1.8%	0.9%	0.0%	0.9%	0.0	0.0	0.0	3.3	0.0	ind	
Red fox	2.8%	3.7%	2.8%	0.0%	0.9%	0.0	0.0	0.0	18.1	0.1	ind	
Red fox– cross phase	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Hare[b]	31.2%	33.9%	25.7%	10.1%	18.3%	998.6	5.6	1.3	399.1	2.2		20.0%
Arctic hare	1.8%	0.9%	0.9%	0.9%	0.0%	123.2	0.7	0.2	24.6	0.1	ind	77.5%
Snowshoe hare	25.7%	26.6%	21.1%	9.2%	13.8%	632.4	3.5	0.8	252.9	1.4	ind	19.4%
Jackrabbit	6.4%	9.2%	6.4%	0.9%	5.5%	243.0	1.4	0.3	121.5	0.7	ind	53.6%
Unknown hare	0.0%	0.9%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Land otter	5.5%	6.4%	5.5%	0.0%	1.8%	78.8	0.4	0.1	26.3	0.1	ind	37.0%
Lynx	1.8%	2.8%	1.8%	0.9%	0.9%	19.7	0.1	0.0	4.9	0.0	ind	57.6%
Marten	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Mink	2.8%	2.8%	2.8%	0.0%	0.9%	0.0	0.0	0.0	4.9	0.0	ind	
Muskrat	1.8%	1.8%	1.8%	0.9%	0.9%	13.5	0.1	0.0	18.1	0.1	ind	70.8%
Porcupine	0.9%	0.9%	0.9%	0.0%	0.9%	6.6	0.0	0.0	1.6	0.0	ind	77.5%
Weasel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Wolf	0.0%	0.9%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Wolverine	0.9%	1.8%	0.9%	0.0%	0.0%	0.0	0.0	0.0	1.6	0.0	ind	
Marine mammals	**81.7%**	**56.0%**	**45.0%**	**64.2%**	**47.7%**	**43,309.5**	**242.0**	**54.9**	**246.3**	**1.4**		**13.1%**
Porpoise	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Harbor porpoise	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Seal	79.8%	54.1%	42.2%	55.0%	42.2%	23,767.3	132.8	30.2	218.4	1.2		12.2%
Bearded seal	64.2%	47.7%	34.9%	40.4%	37.6%	19,082.4	106.6	24.2	136.3	0.8	ind	13.8%
Ribbon seal	1.8%	2.8%	0.9%	1.8%	0.9%	367.9	2.1	0.5	6.6	0.0	ind	77.5%
Ringed seal	16.5%	16.5%	10.1%	9.2%	7.3%	1,563.4	8.7	2.0	27.9	0.2	ind	25.2%

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Table 3-7.–Page 4 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Marine mammals, continued												
Spotted seal	20.2%	22.0%	13.8%	11.0%	11.0%	2,575.0	14.4	3.3	46.0	0.3		23.1%
Spotted seal, male	–	–	–	–	–	1,655.3	9.2	2.1	29.6	0.2	ind	31.5%
Spotted seal, female	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Spotted seal, unknown sex	–	–	–	–	–	919.6	5.1	1.2	16.4	0.1	ind	34.0%
Unknown seal	27.5%	2.8%	0.9%	26.6%	3.7%	178.7	1.0	0.2	1.6	0.0	ind	77.5%
Steller sea lion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Steller sea lion, male	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Steller sea lion, female	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Steller sea lion, unknown sex	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	ind	
Walrus	0.0%	0.9%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Whale	45.9%	29.4%	12.8%	37.6%	18.3%	19,542.2	109.2	24.8	27.9	0.2		20.7%
Beluga	45.9%	29.4%	12.8%	37.6%	18.3%	19,542.2	109.2	24.8	27.9	0.2	ind	20.7%
Bowhead	0.9%	0.0%	0.0%	0.9%	0.9%	0.0	0.0	0.0	0.0	0.0	ind	
Birds and eggs	**87.2%**	**75.2%**	**73.4%**	**54.1%**	**51.4%**	**11,728.0**	**65.5**	**14.9**	**8,897.8**	**49.7**		**8.9%**
Migratory birds	87.2%	73.4%	72.5%	44.0%	44.0%	8,529.5	47.7	10.8	4,266.7	23.8		9.8%
Ducks	62.4%	54.1%	54.1%	17.4%	24.8%	1,359.9	7.6	1.7	1,751.6	9.8		12.4%
Bufflehead	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Canvasback	1.8%	1.8%	1.8%	0.9%	1.8%	36.1	0.2	0.0	32.8	0.2	ind	61.1%
Eider	0.9%	0.9%	0.9%	0.0%	0.0%	8.8	0.0	0.0	3.3	0.0		77.5%
Common eider	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
King eider	0.9%	0.9%	0.9%	0.0%	0.0%	8.8	0.0	0.0	3.3	0.0	ind	77.5%
Gadwall	2.8%	2.8%	2.8%	0.9%	0.9%	17.1	0.1	0.0	21.3	0.1	ind	60.9%
Goldeneye	0.9%	0.9%	0.9%	0.0%	0.9%	2.6	0.0	0.0	3.3	0.0	ind	77.5%
Harlequin	0.9%	0.9%	0.9%	0.0%	0.9%	4.9	0.0	0.0	9.9	0.1	ind	77.5%
Mallard	43.1%	37.6%	37.6%	11.9%	10.1%	517.3	2.9	0.7	517.3	2.9	ind	14.4%

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Table 3-7.–Page 5 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Merganser	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Common merganser	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Red-breasted merganser	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Long-tailed duck (oldsquaw)	1.8%	1.8%	1.8%	0.0%	0.9%	10.5	0.1	0.0	13.1	0.1	ind	61.1%
Northern pintail	37.6%	34.9%	34.9%	10.1%	13.8%	413.5	2.3	0.5	516.9	2.9	ind	18.1%
Scaup	0.9%	0.9%	0.9%	0.0%	0.9%	8.9	0.0	0.0	9.9	0.1	ind	77.5%
Scoter	3.7%	4.6%	3.7%	0.0%	0.9%	10.3	0.1	0.0	11.5	0.1		47.9%
Black scoter	3.7%	4.6%	3.7%	0.0%	0.9%	10.3	0.1	0.0	11.5	0.1	ind	47.9%
Northern shoveler	20.2%	18.3%	18.3%	5.5%	9.2%	157.6	0.9	0.2	262.6	1.5	ind	20.5%
Teal	11.9%	11.0%	11.0%	2.8%	7.3%	59.1	0.3	0.1	197.1	1.1		26.9%
Green-winged teal	11.9%	11.0%	11.0%	2.8%	7.3%	59.1	0.3	0.1	197.1	1.1	ind	26.9%
Wigeon	8.3%	6.4%	6.4%	2.8%	3.7%	48.6	0.3	0.1	69.4	0.4	ind	37.5%
Unknown ducks	10.1%	9.2%	7.3%	3.7%	3.7%	64.6	0.4	0.1	83.3	0.5	ind	48.9%
Geese	83.5%	71.6%	70.6%	37.6%	38.5%	3,860.3	21.6	4.9	2,163.8	12.1		9.9%
Brant	11.9%	11.0%	10.1%	4.6%	2.8%	96.6	0.5	0.1	80.5	0.4	ind	27.3%
Canada geese	77.1%	66.1%	65.1%	27.5%	34.9%	1,777.8	9.9	2.3	1,243.6	6.9		10.4%
Cacklers	68.8%	59.6%	58.7%	24.8%	31.2%	1,098.5	6.1	1.4	915.4	5.1	ind	10.6%
Lesser Canada geese (taverner/parvipes)	20.2%	19.3%	17.4%	8.3%	11.0%	630.0	3.5	0.8	300.0	1.7	ind	19.3%
Unknown Canada geese	4.6%	4.6%	3.7%	1.8%	1.8%	49.3	0.3	0.1	28.2	0.2	ind	51.0%
Emperor geese	1.8%	1.8%	1.8%	0.0%	0.9%	12.3	0.1	0.0	4.9	0.0	ind	57.6%
Snow geese	38.5%	33.0%	30.3%	15.6%	11.0%	688.8	3.8	0.9	299.5	1.7	ind	19.6%
White-fronted geese	46.8%	41.3%	39.4%	13.8%	22.9%	1,284.8	7.2	1.6	535.3	3.0	ind	13.4%
Unknown geese	0.9%	0.0%	0.0%	0.9%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 3-7.–Page 6 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Swan	60.6%	48.6%	47.7%	22.9%	17.4%	2,233.3	12.5	2.8	223.2	1.2		14.3%
Trumpeter swan	1.8%	0.9%	0.9%	1.8%	0.9%	99.5	0.6	0.1	9.9	0.1	ind	77.5%
Tundra swan (whistling)	57.8%	46.8%	45.9%	20.2%	15.6%	2,068.1	11.6	2.6	206.8	1.2	ind	15.1%
Unknown swan	0.9%	0.9%	0.9%	0.9%	0.9%	65.7	0.4	0.1	6.6	0.0	ind	77.5%
Crane	32.1%	27.5%	27.5%	11.0%	11.9%	1,076.0	6.0	1.4	128.1	0.7		16.8%
Sandhill crane	32.1%	27.5%	27.5%	11.0%	11.9%	1,076.0	6.0	1.4	128.1	0.7	ind	16.8%
Shorebirds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Common snipe	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Other birds	64.2%	58.7%	55.0%	23.9%	30.3%	2,915.0	16.3	3.7	2,915.0	16.3		11.7%
Upland game birds	64.2%	58.7%	55.0%	23.9%	30.3%	2,915.0	16.3	3.7	2,915.0	16.3		11.7%
Grouse	1.8%	1.8%	1.8%	0.9%	0.9%	36.1	0.2	0.0	36.1	0.2		70.8%
Spruce grouse	1.8%	1.8%	1.8%	0.9%	0.9%	36.1	0.2	0.0	36.1	0.2	ind	70.8%
Ptarmigan	64.2%	58.7%	55.0%	23.9%	30.3%	2,878.9	16.1	3.7	2,878.9	16.1	ind	11.8%
Owl	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Snowy owl	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown other birds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Bird eggs	31.2%	25.7%	22.9%	14.7%	10.1%	283.4	1.6	0.4	1,716.1	9.6		18.3%
Duck eggs	15.6%	11.9%	11.0%	6.4%	2.8%	46.6	0.3	0.1	310.4	1.7	ind	25.0%
Geese eggs	24.8%	22.0%	19.3%	9.2%	5.5%	102.0	0.6	0.1	679.9	3.8	ind	21.5%
Swan eggs	18.3%	14.7%	12.8%	9.2%	4.6%	46.3	0.3	0.1	154.4	0.9	ind	23.4%
Crane eggs	12.8%	11.0%	10.1%	5.5%	2.8%	29.8	0.2	0.0	90.3	0.5	ind	24.7%
Shorebird eggs	1.8%	1.8%	1.8%	0.0%	0.0%	1.1	0.0	0.0	23.0	0.1		67.3%
Common snipe eggs	1.8%	1.8%	1.8%	0.0%	0.0%	1.1	0.0	0.0	23.0	0.1	ind	67.3%
Seabird and loon eggs	13.8%	13.8%	11.9%	3.7%	4.6%	52.7	0.3	0.1	425.3	2.4		26.2%
Cormorant eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gull eggs	13.8%	13.8%	11.9%	3.7%	4.6%	45.7	0.3	0.1	285.7	1.6	ind	24.3%

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Table 3-7.–Page 7 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Loon eggs	0.9%	0.0%	0.0%	0.9%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Tern eggs	3.7%	3.7%	2.8%	0.9%	0.9%	7.0	0.0	0.0	139.6	0.8	ind	57.6%
Unknown eggs	1.8%	0.9%	0.9%	0.9%	0.0%	4.9	0.0	0.0	32.8	0.2	ind	77.5%
Marine invertebrates	**4.6%**	**2.8%**	**2.8%**	**1.8%**	**0.9%**	**116.6**	**0.7**	**0.1**	**93.6**	**0.5**		**53.9%**
Clams	2.8%	0.9%	0.9%	1.8%	0.0%	9.9	0.1	0.0	3.3	0.0	gal	77.5%
Cockles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Crabs	1.8%	1.8%	1.8%	0.0%	0.9%	57.5	0.3	0.1	57.5	0.3		55.1%
Dungeness crab	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
King crab	1.8%	1.8%	1.8%	0.0%	0.9%	57.5	0.3	0.1	57.5	0.3		55.1%
Red king crab	1.8%	1.8%	1.8%	0.0%	0.9%	57.5	0.3	0.1	57.5	0.3	ind	55.1%
Tanner crab	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Unknown crab	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Mussels	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Blue mussels	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Shrimp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Snails	0.9%	0.9%	0.9%	0.0%	0.0%	49.3	0.3	0.1	32.8	0.2	gal	75.8%
Vegetation	**94.5%**	**88.1%**	**89.0%**	**58.7%**	**50.5%**	**8,824.9**	**49.3**	**11.2**	**3,386.4**	**18.9**		**8.5%**
Berries	83.5%	72.5%	73.4%	45.0%	30.3%	7,418.4	41.4	9.4	1,854.6	10.4	gal	8.5%
Blueberry	65.1%	55.0%	55.0%	23.9%	16.5%	1,453.7	8.1	1.8	363.4	2.0	gal	10.5%
Low bush cranberry	13.8%	11.0%	11.0%	3.7%	2.8%	216.8	1.2	0.3	54.2	0.3	gal	30.1%
High bush cranberry	0.9%	0.9%	0.9%	0.9%	0.9%	26.3	0.1	0.0	6.6	0.0	gal	77.5%
Crowberry	56.9%	45.0%	45.9%	25.7%	14.7%	1,397.2	7.8	1.8	349.3	2.0	gal	12.5%
Gooseberry	0.9%	0.9%	0.9%	0.0%	0.0%	13.1	0.1	0.0	3.3	0.0	gal	77.5%
Huckleberry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Cloudberry	81.7%	67.9%	68.8%	29.4%	23.9%	4,125.4	23.0	5.2	1,031.3	5.8	gal	8.2%
Raspberry	22.0%	21.1%	21.1%	3.7%	5.5%	172.4	1.0	0.2	43.1	0.2	gal	19.0%
Strawberry	1.8%	1.8%	1.8%	0.9%	0.9%	13.5	0.1	0.0	3.4	0.0	gal	75.2%

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Table 3-7.–Page 8 of 8.

Resource names(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Vegetation, continued												
Plants/greens/mushrooms	64.2%	60.6%	59.6%	20.2%	22.9%	1,406.5	7.9	1.8	634.2	3.5		20.3%
Wild rhubarb	8.3%	6.4%	5.5%	3.7%	4.6%	101.8	0.6	0.1	25.5	0.1	gal	34.8%
Fiddlehead ferns	0.9%	0.9%	0.9%	0.0%	0.9%	24.6	0.1	0.0	24.6	0.1	gal	77.5%
Hudson bay tea	57.8%	56.0%	55.0%	16.5%	19.3%	282.8	1.6	0.4	282.8	1.6	gal	19.7%
Sourdock	1.8%	1.8%	1.8%	0.0%	0.0%	4.1	0.0	0.0	4.1	0.0	gal	63.8%
Willow leaves	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Cow parsnip (wild celery)	1.8%	1.8%	1.8%	0.0%	0.0%	4.9	0.0	0.0	4.9	0.0	gal	57.6%
Other wild greens	16.5%	16.5%	16.5%	1.8%	2.8%	927.8	5.2	1.2	232.0	1.3	gal	29.2%
Stinkweed	11.0%	11.0%	11.0%	1.8%	2.8%	53.8	0.3	0.1	53.8	0.3	gal	30.1%
Mousefoods[c]	2.8%	1.8%	1.8%	1.8%	0.9%	6.6	0.0	0.0	6.6	0.0	gal	47.0%
Sea chickweed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Seaweed/kelp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Wood	73.4%	68.8%	67.9%	21.1%	32.1%	0.0	0.0	0.0	897.6	5.0	cord	

Source ADF&G Division of Subsistence household surveys, 2009.

a. Summary rows that include incompatible units of measure have been left blank.

b. Harvest information was collected for Arctic hare, snowshoe hare, and jackrabbit. There is a scientific and local distinction between the snowshoe hare, *Lepus americanus*, and other hares (Murray and Smith 2008a). However, there is some confusion surrounding other hare species in Alaska; current taxonomy suggests that the one hare species other than snowshoe hare in Western Alaska is *Lepus othus* (Murray and Smith 2008c), which has been referred to locally as Alaskan hare, jackrabbit, tundra hare, and Arctic hare. The species more commonly referred to in the literature as Arctic hare, *Lepus arcticus*, is distributed throughout northern Canada and parts of Greenland, and is not believed to occur in Alaska (Murray and Smith 2008b). This variability in terminology led to a situation in which harvest data for 3 hare species were collected in an area where only 2 species are generally thought to be present. Hence, it may prove useful to consolidate the harvest results for jackrabbit and Arctic hare into one category, although it should also be noted that there may be a local taxonomic distinction between these 2 names.

c. "Mousefoods" = various plant roots obtained from mouse caches.

– = data not collected.

Fish of all species formed the majority of Emmonak's subsistence harvest in 2008, and constituted an estimated 57% of all wild foods harvested by edible weight. Nearly all households (98%) reported using, and most (83%) reported harvesting fish species during 2008. Land and marine mammals contributed an estimated 26% and 11612%, respectively, to the total subsistence harvest by weight and most households (97% for land mammals, 82% for marine mammals) used them. Birds and bird eggs were a relatively minor portion of Emmonak's subsistence harvest in 2008 by edible weight (3%), yet an estimated 73% of Emmonak households harvested and 87% used them. Similarly, although wild plants made up only 2% of the total wild food harvest by edible weight, 89% of Emmonak households harvested and 95% used them. Nearly 5% of Emmonak households used and 3% harvested marine invertebrate species for subsistence.

The number of species harvested by Emmonak households ranged from zero to 43. Although the mean number of species harvested by household was 15, the average household used 22 different species for subsistence. This difference is indicative of the high levels of interhousehold sharing of harvested resources within Emmonak; the majority of households during the study year gave away (84%) and received (96%) a variety of subsistence resources. Fish, for example, were given away by 63% and received by 89% of households, and similar rates of sharing occurred with other resources.

Salmon comprised 70% of the fish harvest and represented a large portion of the wild food harvested in Emmonak in 2008 with 150,967 total edible pounds. Residents of Emmonak harvested all 5 species of Pacific salmon present in Alaska waters, although chum salmon (18,788 individual salmon, 65% of total salmon harvest by edible weight), Chinook salmon (3,018 individuals, 20% of salmon by edible weight), and coho salmon (3,237 individuals, 11% of salmon by edible weight) dominated the harvest. Salmon are also notable in being the only wild food (with the exception of small numbers of whitefish in an experimental fishery) harvested commercially in Emmonak, although the salmon retained from the commercial catch for subsistence represented only 6% by edible weight of the total salmon harvest documented in this survey.

Residents of Emmonak used a variety of nonsalmon fish species as well during the study year, with (ranked in descending order by contribution to total edible weight) 2,762 sheefish, 10,855 other whitefish, 3,125 northern pike, 1,382 burbot, and 17,732 Alaska blackfish harvested. Smelt, tomcod, flounder, Dolly Varden, and Arctic grayling were also harvested in smaller quantities. Combined, the nonsalmon fish harvest contributed 30% of the total fish harvest by edible weight.

Households in Emmonak were asked what gear type they used to harvest subsistence fish in 2008. In answer to the question, *How many did your household catch with gill net or seine?*, households reported that the majority of subsistence harvested fish (89%, 193,644 lb) were taken with gillnets or seines (Table 3-8). Rod and reel gear accounted for less than 1% (1,425 lb) of the total fish harvest. Fish retained for subsistence use by commercial fishing permit holders accounted for 4% (9,403 lb), and subsistence fish taken with other gear or methods such as traps or jigging accounted for 6% (12,060 lb) of the total subsistence fish harvest.

Table 3-8.–Estimated harvest, in pounds of salmon and other fish in Emmonak by gear type, 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest
Resource name(s)	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Fish	**9,403.1**	**4.3%**	**193,643.9**	**89.4%**	**1,425.0**	**0.7%**	**12,059.8**	**5.6%**	**216,531.9**
Salmon	**8,757.7**	**5.8%**	**141,917.3**	**94.0%**	**141.9**	**0.1%**	**149.8**	**0.1%**	**150,966.6**
Chum salmon	3,423.8	3.5%	95,105.6	96.5%	0.0	0.0%	0.0	0.0%	98,529.4
Coho salmon	681.1	4.1%	15,911.1	95.2%	126.1	0.8%	0.0	0.0%	16,718.3
Chinook salmon	3,974.9	12.8%	26,969.3	87.2%	0.0	0.0%	0.0	0.0%	30,944.2
Pink salmon	677.9	19.2%	2,688.0	76.1%	15.8	0.4%	149.8	4.2%	3,531.4
Sockeye salmon	0.0	0.0%	1,243.2	100.0%	0.0	0.0%	0.0	0.0%	1,243.2
Nonsalmon fish	**644.8**	**1.0%**	**51,724.4**	**78.9%**	**1,283.4**	**2.0%**	**11,912.7**	**18.2%**	**65,565.3**
Herring	0.0	0.0%	4,831.0	100.0%	0.0	0.0%	0.0	0.0%	4,831.0
Herring roe	0.0	0.0%	1,387.0	77.1%	0.0	0.0%	411.3	22.9%	1,798.3
Herring sac roe	0.0	0.0%	0.0	0.0%	0.0	0.0%	9.9	100.0%	9.9
Herring spawn on kelp	0.0	0.0%	1,379.4	77.1%	0.0	0.0%	409.0	22.9%	1,788.5
Smelt	0.0	0.0%	76.4	19.9%	0.0	0.0%	307.7	80.1%	384.0
Capelin (grunion)	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Cod	0.0	0.0%	265.9	63.2%	0.0	0.0%	154.8	36.8%	420.8
Pacific cod (gray)	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Pacific tomcod	0.0	0.0%	123.2	58.8%	0.0	0.0%	86.2	41.2%	209.4
Saffron cod	0.0	0.0%	142.8	67.5%	0.0	0.0%	68.6	32.5%	211.4
Flounder	0.0	0.0%	59.1	100.0%	0.0	0.0%	0.0	0.0%	59.1
Starry flounder	0.0	0.0%	59.1	100.0%	0.0	0.0%	0.0	0.0%	59.1
Pacific halibut	0.0	0.0%	0.0	0.0%	3.3	100.0%	0.0	0.0%	3.3
Arctic lamprey	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Sculpin	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Alaska blackfish	0.0	0.0%	225.8	5.1%	0.0	0.0%	4,209.4	94.9%	4,435.2
Burbot	0.0	0.0%	5,357.7	83.5%	421.2	6.6%	634.0	9.9%	6,412.9
Char	0.0	0.0%	1,243.1	100.0%	0.0	0.0%	0.0	0.0%	1,243.1
Dolly Varden	0.0	0.0%	1,243.1	100.0%	0.0	0.0%	0.0	0.0%	1,243.1
Arctic grayling	0.0	0.0%	0.0	0.0%	2.5	2.5%	98.5	97.5%	101.0
Northern pike	0.0	0.0%	786.9	11.2%	343.6	4.9%	5,908.2	83.9%	7,038.7
Sheefish	118.2	0.5%	21,427.4	97.0%	512.4	2.3%	39.4	0.2%	22,097.5

-continued-

Table 3-8.–Page 2 of 2.

	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest
Resource name(s)	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Nonsalmon fish, continued									
Trout	0.0	0.0%	2.3	100.0%	0.0	0.0%	0.0	0.0%	2.3
Rainbow trout	0.0	0.0%	2.3	100.0%	0.0	0.0%	0.0	0.0%	2.3
Whitefishes	526.3	3.1%	16,064.0	96.0%	0.0	0.0%	147.8	0.9%	16,738.1
Broad whitefish	0.0	0.0%	4,788.7	98.5%	0.0	0.0%	72.3	1.5%	4,860.9
Cisco	497.6	6.7%	6,943.2	93.3%	0.0	0.0%	0.0	0.0%	7,440.8
Bering cisco	160.9	3.4%	4,509.7	96.6%	0.0	0.0%	0.0	0.0%	4,670.6
Least cisco	336.7	12.2%	2,433.6	87.8%	0.0	0.0%	0.0	0.0%	2,770.2
Humpback whitefish	0.0	0.0%	3,740.9	98.0%	0.0	0.0%	75.5	2.0%	3,816.5
Round whitefish	0.0	0.0%	591.2	100.0%	0.0	0.0%	0.0	0.0%	591.2
Unknown whitefish	28.7	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	28.7

Source ADF&G Division of Subsistence household surveys, 2009.

Of all salmon harvested for subsistence, 94% (141,917 lb) were harvested using subsistence nets, less than 1% (142 lb) using rod and reel, less than 1% (150 lb) using other gear, and 6% (8,758 lb) retained from commercial harvests. Of the individual salmon species, 97% (95,106 lb) of chum salmon were harvested using subsistence nets and 4% (3,424 lb) retained from commercial harvests. No chum salmon were harvested with rod and reel, or by any other gear or method. Eighty-seven percent (26,969 lb) of Chinook salmon were taken with subsistence nets while 13% (3,975 lb) were retained from commercial harvests. As with chum salmon, no Chinook salmon were taken with rod and reel or by any other gear or method. Sockeye salmon were harvested only by subsistence nets (100%, 1,243 lb).[23] Of the coho salmon, 95% (15,911 lb) were harvested using subsistence nets, less than 1% (126 lb) with rod and reel, and 4% (681 lb) retained from commercial harvests. No coho salmon were taken with any other gear or method. Finally, the majority of pink salmon, 76% (2,688 lb), were also harvested with subsistence nets; less than 1% (16 lb) was harvested with rod and reel, 19% (678 lb) retained from commercial catches, and 4% (150 lb) with other gear or methods. Pink salmon is the only salmon species that was taken by other gear or methods, such as dip nets.

Of all nonsalmon fish species, 79% (51,724 lb) were taken with subsistence nets, 2% (1,283 lb) with rod and reel, 18% (11,913 lb) with other gear and methods, and 1% (645 lb) retained from commercial catches.

The category of "other gear and methods" for Emmonak consisted mainly of traditional jigging methods and the use of dipnets and fish traps. Northern pike, whitefish, and saffron cod are sometimes harvested by "jigging" for them through holes cut in the ice. Jigging gear consists of a baited hook or unbaited lure and line, and a stick or small rod without a reel. Saffron cod, along with smelt and herring are sometimes harvested by dip net. As mentioned above, a small amount of pink salmon was harvested by dip net in 2008. Fish traps are used primarily for Alaska blackfish. These basket-type traps are placed beneath the ice of lakes and small tundra creeks just before freeze up and fishing occurs throughout winter until just before breakup (Wolfe 1981).

Historically, harvest methods and gear for fishing on the lower Yukon River included setnets and dip nets made of willow roots and animal sinew, and "jigging" sticks with hooks made of various materials. Large wooden basket traps and weirs were used for larger fish, and smaller traps made with thin wood strips were used for blackfish (Wolfe 1981). By the 1950s, commercially made nylon nets and motorized boats were being used. With the advent of motorized boats, "drifting" became a common fishing method (Wolfe 1982, Wolfe 1984). Alaska blackfish traps are now generally made of small wire mesh stretched around wooden or plastic hoop frames with a wire mesh funnel in one end (Wolfe 1981).

Land mammal harvests made up 26% of Emmonak households' subsistence harvest by edible weight in 2008. Moose was the only large land mammal harvested in Emmonak in 2008, although 7% of households received and used caribou. The estimated 136 individual moose harvested in 2008 represented 98% of Emmonak residents' harvest of all land mammals by edible weight. Although 61% of households harvested moose in 2008, 95% of households used moose; this indicates high levels of distribution throughout the community for this resource. Moose hunting corresponded with ADF&G general hunting regulations, which allowed one antlered moose per person in August through September, or one antlerless moose or calf (either sex) in late December and early January. Emmonak hunters took very few cow moose (≤2 in 2008, and harvested 80% of all moose in September (Table 3-9). The remainder of the land mammal harvest consisted of small mammals including 87 beavers, 253 snowshoe hares, and 122 "jackrabbits," (see Table 3-1) as well as smaller harvests of Arctic hares, river otters, red foxes, arctic

23. While individual sockeye salmon are periodically harvested in the Yukon River, in general, the Yukon River does not support an annual migration of sockeye salmon. However, ADF&G does not collect harvest location data with salmon harvest information, so it is unknown whether these sockeye salmon were harvested in the Yukon River or elsewhere.

foxes, lynx, muskrats, and porcupines. Residents of Emmonak harvested beavers primarily in late spring (April through June), with a few beavers also harvested in August and September. Muskrats were harvested almost entirely in October. Trapping for other furbearers took place throughout the winter months, although there was a decrease in harvests in January and February. Residents of Emmonak harvested hares and jackrabbits in all months other than June through September, with the highest harvests (70% of total) in March and April (Table3-10).

Table 3-9.–Estimated harvest of large land mammals by month and sex in Emmonak, 2008.

		Month of harvests[a]													
Resource name	Sex	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Unknown	Total
Black bear	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown bear	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caribou	Bull	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moose	Bull	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	107.6	0.0	0.0	9.9	0.0	132.2
	Cow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.6
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	1.6
Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**14.8**	**109.2**	**0.0**	**0.0**	**11.5**	**0.0**	**135.5**

Source ADF&G Division of Subsistence household surveys, 2009.

a. Amount of resource harvested is individual units, unless otherwise specified.

Table 3-10.–Estimated harvest of small land mammals by month and sex in Emmonak, 2008.

	Month of harvests[a]													
Resource name(s)	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Unknown	Total
Beaver	0.0	0.0	0.0	9.9	27.9	36.1	0.0	4.9	8.2	0.0	0.0	0.0	0.0	87.0
Coyote	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arctic fox	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3
Red fox	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	3.3	3.3	3.3	6.6	0.0	18.1
Red fox–cross phase	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arctic hare	0.0	0.0	24.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.6
Snowshoe hare	29.6	21.3	72.3	75.5	21.3	0.0	0.0	0.0	0.0	0.0	4.9	23.0	5.0	252.9
Jackrabbit[b]	0.0	16.4	8.2	95.2	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	121.5
Unknown hare	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
River (land) otter	1.6	1.6	3.3	6.6	0.0	0.0	0.0	3.3	0.0	0.0	4.9	4.9	0.0	26.3
Lynx	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.6	4.9
Marten	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mink	0.0	0.0	0.0	1.6	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	4.9
Muskrat	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	16.4	0.0	0.0	0.0	18.1
Porcupine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	1.6
Weasel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wolf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wolverine	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
Total	**31.2**	**39.4**	**115.0**	**190.5**	**50.9**	**37.8**	**0.0**	**8.2**	**14.8**	**23.0**	**13.1**	**34.5**	**6.6**	**565.0**

Source ADF&G Division of Subsistence household surveys, 2009.

a. Amount of resource harvested is individual units, unless otherwise specified.

b. See Table 3-1.

Marine mammals, which contributed 11% to Emmonak's total wild food harvest in 2008 by edible weight, are an important subsistence resource in this coastal community. Emmonak hunters harvested 136 bearded seals in 2008, and this was the most widely used marine mammal species in Emmonak during the study year. Thirty-five percent of households harvested and 64% of households used bearded seal. Residents of Emmonak harvested relatively few of the smaller spotted seals (46), ringed seals (28), and ribbon seals (7) compared to bearded seals. Spring hunting for seals, which generally takes place in leads off of pack ice, occurred only in April and accounted for around 8% of the total seal harvest with an estimated 20 seals taken. Seal hunting resumed in June and continued through October, with the highest harvests occurring in August and September (Table 3-11).

Beluga whale was the second most widely used marine mammal species, and the estimated 28 beluga whales harvested in 2008 provided a substantial 19,542 edible pounds. Residents of Emmonak harvested between 3 and 10 beluga whales each month from June through October during 2008, with the highest harvest (10 whales) occurring in September. Although only 13% of households harvested beluga whales in 2008, the 46% of Emmonak households that used beluga whales indicate relatively high levels of distribution throughout the community. Emmonak has also been described as a major source of marine mammal resources for upriver communities with less access to the Bering Sea (Wolfe 1981). Such distribution of marine resources throughout Emmonak as well as other communities may be reflected in the 48% of households that gave away marine mammals in 2008.

Table 3-11.–Estimated harvest of marine mammals by month and sex in Emmonak, 2008.

		Month of harvests[a]													
Resource name	Sex	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Unknown	Total
Harbor porpoise	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bearded seal	Any	0.0	0.0	0.0	8.2	0.0	3.3	9.9	49.3	41.1	24.6	0.0	0.0	0.0	136.3
Ribbon seal	Any	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	6.6
Ringed seal	Any	0.0	0.0	0.0	4.9	0.0	0.0	3.3	0.0	9.9	9.9	0.0	0.0	0.0	27.9
Spotted seal	Male	0.0	0.0	0.0	4.9	0.0	0.0	0.0	8.2	9.9	1.6	0.0	0.0	0.0	24.6
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	1.6	6.6	1.6	6.6	0.0	0.0	0.0	16.4
Unknown seal	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	1.6
Steller sea lion	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	4.9
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walrus	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beluga	Any	0.0	0.0	0.0	0.0	0.0	4.9	3.3	4.9	9.9	3.3	0.0	0.0	0.0	26.3
Bowhead	Any	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total		**0.0**	**0.0**	**0.0**	**19.7**	**0.0**	**8.2**	**18.1**	**69.0**	**73.9**	**50.9**	**0.0**	**0.0**	**6.6**	**246.3**

Source ADF&G Division of Subsistence household surveys, 2009.

a. Amount of resource harvested is individual units, unless otherwise specified.

Although wild birds and eggs contributed only 3% (11,728 lb) to the 2008 wild food harvest in Emmonak by edible weight, their widespread harvest (74% of households) and use (87% of households) suggests a value disproportionate to their contribution to the total food harvest. Migratory birds, including waterfowl and cranes, formed the majority of harvested birds. Canada geese, primarily "cacklers," was the most harvested migratory bird species (1,777 individual geese), followed by white-fronted geese (1,285), mallards (517), and northern pintails (514). Although the harvest of tundra (whistling) swans (205) and sandhill cranes (128) involved fewer individual birds relative to geese and ducks, these species provided a relatively large portion of the total edible weight from migratory birds due to their large size. Residents of

Emmonak harvested an estimated 2,853 ptarmigan in 2008, making this the most harvested nonfish species by number of individuals in the study year. An estimated 31% of households used eggs, primarily from ducks, geese, swans, cranes, and gulls, during the study year, although eggs made up less than 1% of total harvest by edible pounds.

Nearly all (95%) residents of Emmonak used wild plants during the study year. Berries were the most used and harvested wild plant resources; the average household gathered about 10 gallons of berries (84% of the total plant harvest by edible weight). The most harvested and used berries included cloudberries (salmonberries), blueberries, and crowberries (blackberries), in addition to smaller numbers of cranberries, raspberries, and strawberries. Emmonak residents harvested an estimated 1,407 usable lb of other plants for food and medicinal uses, including Hudson's Bay tea (Labrador tea), wild rhubarb, stinkweed, fiddlehead ferns, wild celery, and "mousefoods" (various edible roots removed from rodent caches). Additional plant species harvested in 2008, totaling an estimated 928 lb, were described in the survey as "other wild greens" due to difficulties in identification and inconsistent terminology among the surveyors and within the community. Emmonak residents harvested an estimated 865 cords of firewood in 2008, and 73% of households reported using firewood for heating. During fieldwork in 2009, comments received from several residents indicated that continuing high prices for stove oil led to an increasing number of households gathering driftwood for use as an additional heat source for their homes. However, most homes do not rely solely on wood for heat.

Approximately 5% of Emmonak households used and 3% harvested a total of 117 lb of marine invertebrate species, consisting of 58 red king crabs, 33 gallons of snails, and 3 gallons of clams. One respondent indicated that his harvest of king crabs, although taken for subsistence, also served to help him locate harvest areas for potential future harvest in the Norton Sound king crab commercial fishery. Identification to species level was not possible for snails and clams, which were each harvested by less than 1% of households, although snails were described as "sea snails."

Household Level Harvests and Patterns

As in other rural Alaska communities (Wolfe 1987, Wolfe et al. 2010), including Akutan and Togiak, a relatively small percentage of Emmonak's households accounted for most of the subsistence harvest in 2008: 34% of the households took 70% of the harvest (Figure 3-5). As in Togiak, involvement in commercial fishing was associated with high levels of subsistence harvest in Emmonak (Table 3-12, Figure 3-6). Commercial fishing households (53% of all households) averaged subsistence harvests of 2,676 lb and accounted for 67% of the community total, compared to 1,492 lb and 33% for other households. This difference was statistically significant.

A notable difference between the results of household surveys conducted in Emmonak in 1980 and 2008 involved major changes in the economic role of commercial fishing. Commercial fishing in 1980 for communities in the lower Yukon including Emmonak "represented the largest and most consistent source of money…and comprised 45.8 percent of their annual monetary income, or $8,026 per household" (Wolfe 1981:92). Adjusted for inflation and for the consumer price index in Anchorage, this would be equivalent to about $18,908 in 2011 (ADLWD 2012b). By contrast, average income earned by an individual engaged in commercial salmon fishing in the Lower Yukon in 2008 totaled only $1,479 (Volk et al. 2009); no directed commercial fishing for Chinook salmon took place in 2008 due to conservative management actions on the Yukon River.

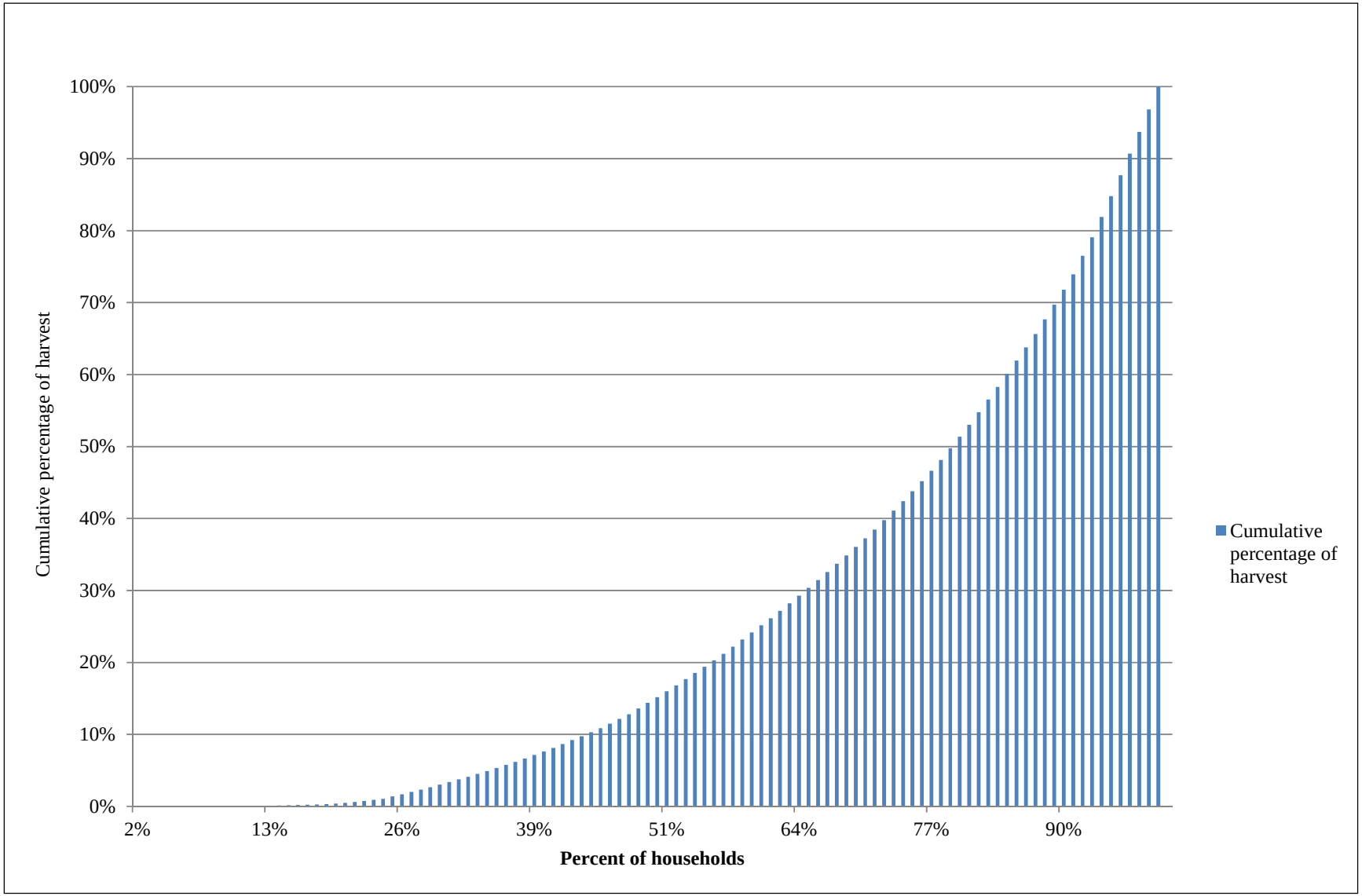


Figure 3-5.–Cumulative percentage of harvest, Emmonak, 2008.

Table 3-12.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Emmonak, 2008.

	Pounds harvested per household						
	Households not commercial fishing (n=46)		Households commercial fishing (n=63)				
Resource category	Mean	Percentage of total reported pounds	Mean	Percentage of total reported pounds	t	Significance	
Salmon	470.7	26.1%	1,171.1	73.9%	-3.41	0.001	Yes
Other fish	334.3	42.7%	394.4	57.3%	-0.609	0.544	No
Large game	392.5	33.9%	671.9	66.1%	-2.559	0.012	Yes
Furbearers	18.3	63.2%	9.4	36.8%	0.845	0.4	No
Marine mammals	191.5	37.0%	286.3	63.0%	-1.162	0.248	No
Birds and eggs	53.5	38.2%	76.1	61.8%	-1.5	0.137	No
Marine invertebrates	0.4	28.2%	0.9	71.8%	-0.535	0.594	No
Plants	30.6	29.0%	65.7	71.0%	-3.507	0.001	Yes
All resources	**1,491.9**	**32.9%**	**2,675.7**	**67.1%**	**-3.301**	**0.001**	**Yes**

Source ADF&G Division of Subsistence household surveys, 2009.

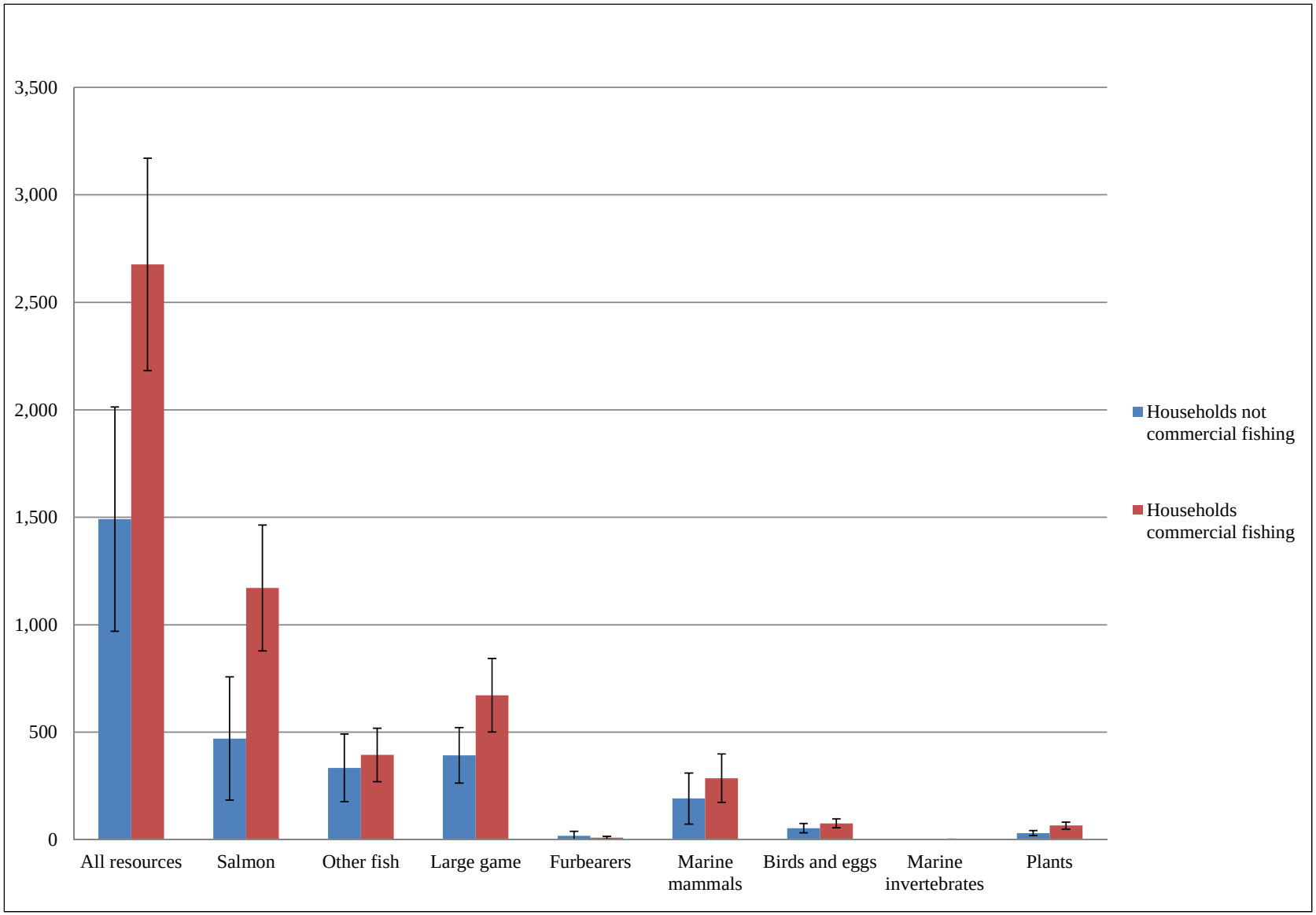


Figure 3-6.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Emmonak, 2008.

Harvest Areas

For 2008, residents of Emmonak reported using a total of 6,111 square miles for subsistence (Figure 3-7). This area included most waters and land in the Yukon Delta downstream from Mountain Village, near shore waters and ice in the Bering Sea, and outlying sites extending to the Kusilvak Mountains in the south and the Andreafsky River in the east. Coastal waters of Norton Sound and the numerous channels and tributaries of the Yukon River formed the backbone of subsistence harvest areas for Emmonak residents in 2008, being used as both an extensive transportation network and a harvest location for the fish, marine mammals, and waterfowl that formed the bulk of Emmonak's subsistence harvest. Residents of Emmonak also used lands within or bordering these waters as harvest locations for land mammals, upland game birds, and vegetation.

Search and harvest areas for chum salmon, Chinook salmon, and coho salmon were similar (Figure 3-8). Residents of Emmonak fished for salmon in most of the main passes of the Yukon Delta (Kwiguk, Kwikluak, and Kwikpak passes) upstream to Head of Passes, and in nearshore waters at the mouths of these passes. Additional salmon harvest areas included Nanvaranak Slough, the mouth of Elongozhik Slough, Emmonak Slough, Bugomowik Pass, and the waters of Kwimeluk Pass near Nunam Iqua. Harvest areas for less frequently harvested sockeye salmon and pink salmon were limited to Kwiguk Pass and the mainstem of the Yukon River.

Residents of Emmonak harvested at least 16 nonsalmon fish species in 2008, and the range of harvest locations for these fishes reflects this diversity (figures 3-9 and 3-10). Harvest areas for sheefish and whitefishes showed significant overlap, and included Kwikpak Pass from near Emmonak upstream to its head at the mainstem of the Yukon River, Emmonak, Mahtkwingak and Bugomowik sloughs and coastal marine waters near their mouths, and the waters of and between Akularak Pass and Kwimlithla Slough.

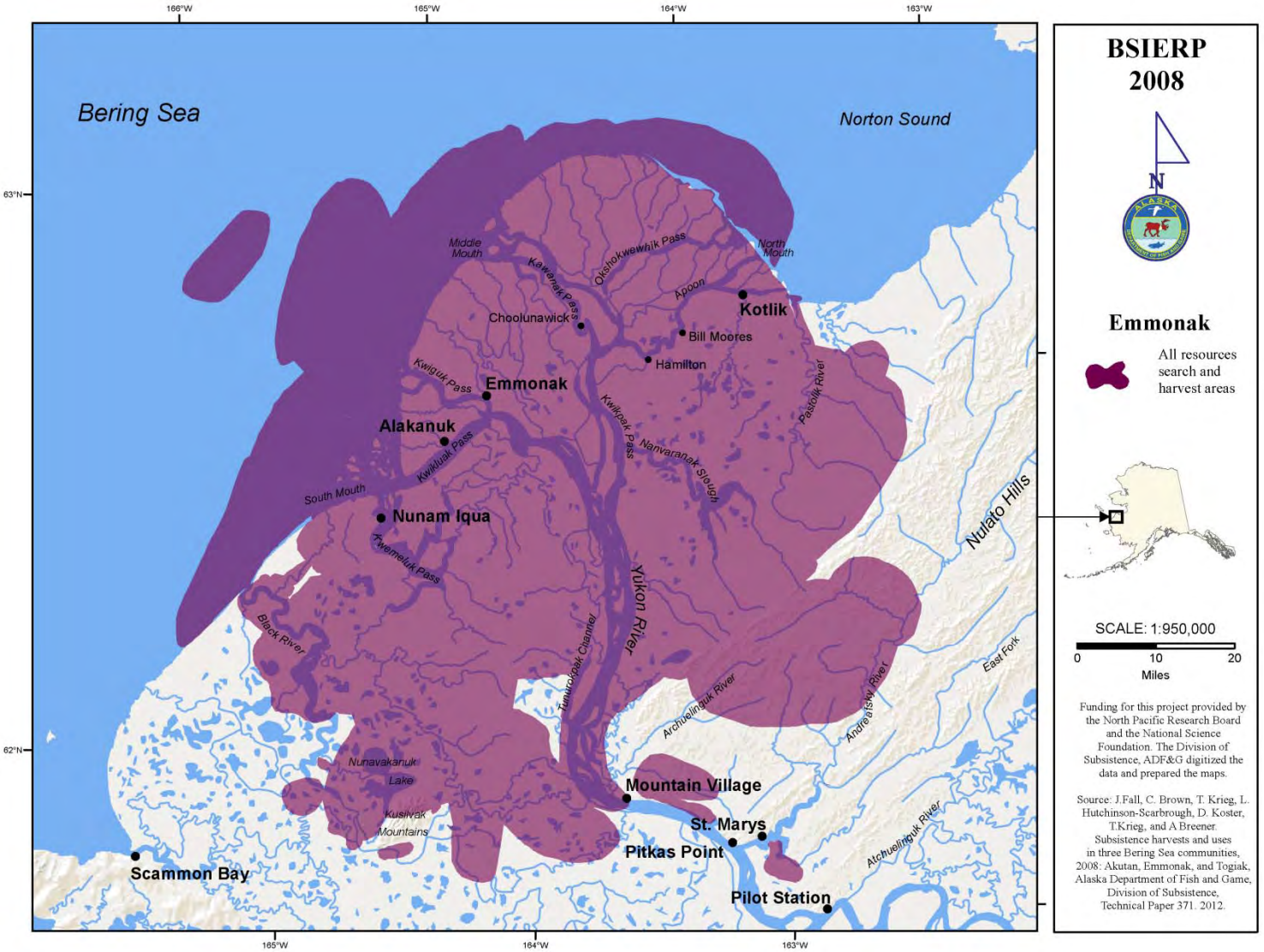


Figure 3-7.–All resources search and harvest areas, Emmonak, 2008.

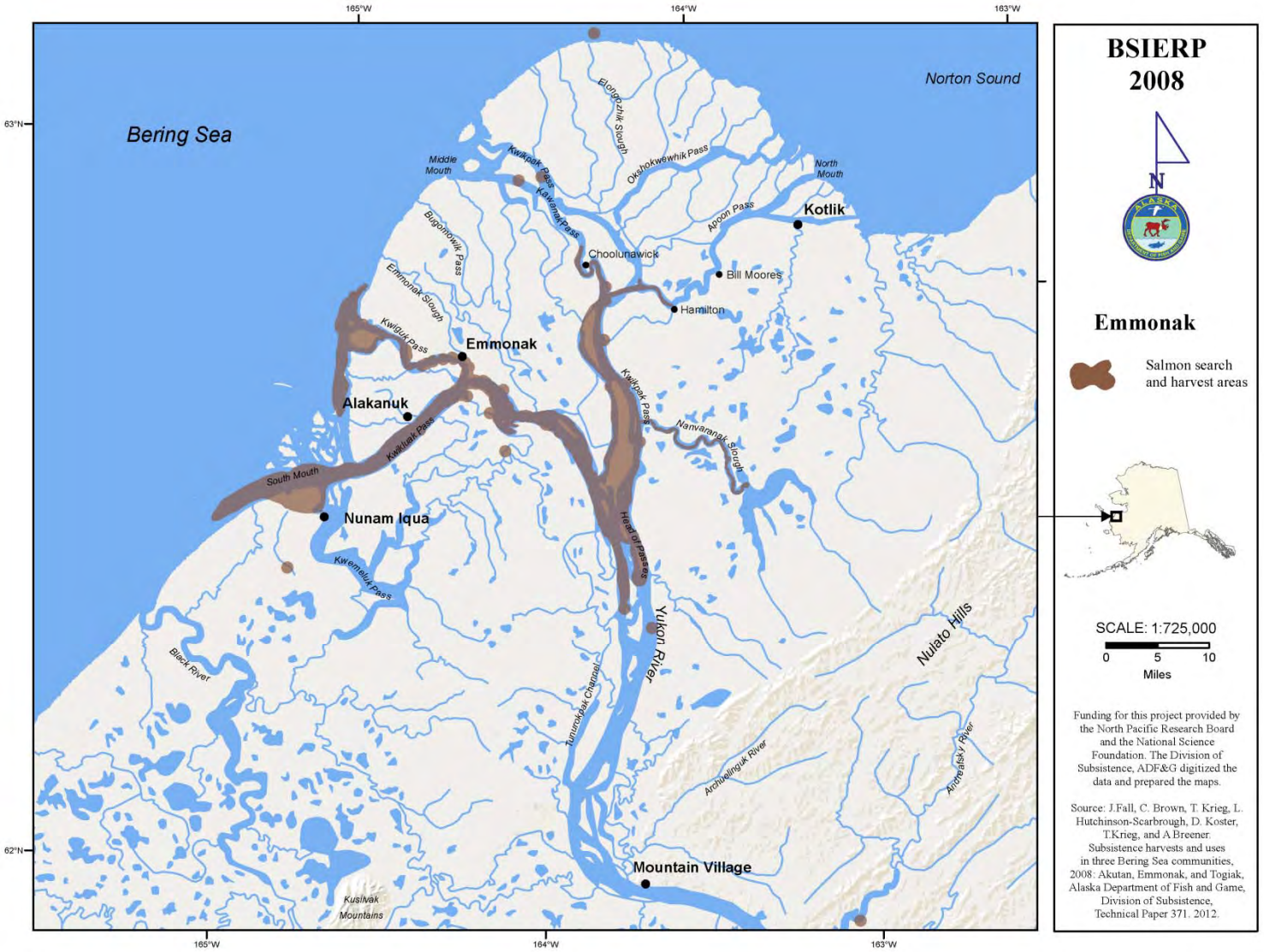


Figure 3-8.–Salmon search and harvest areas, Emmonak, 2008.

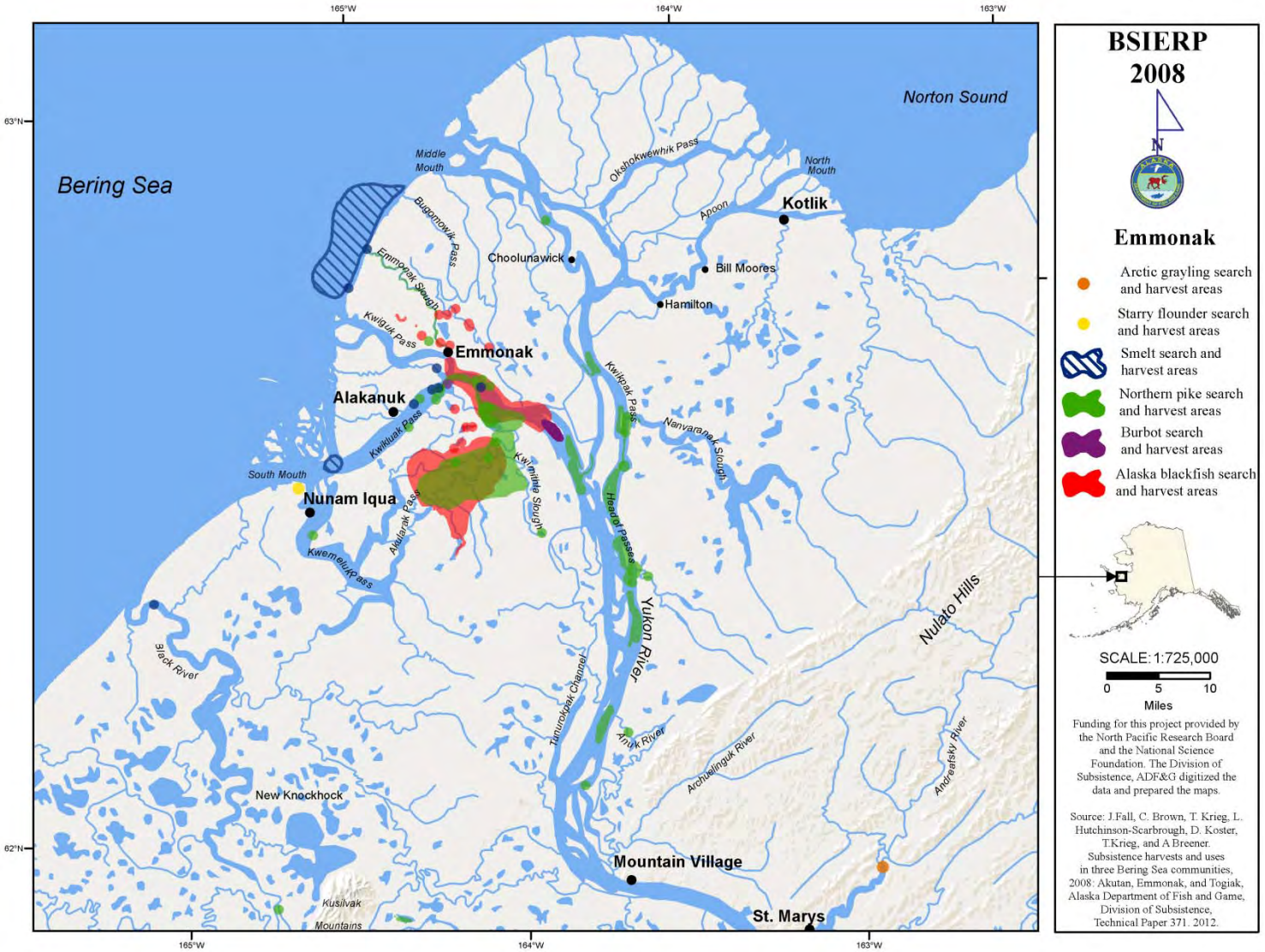


Figure 3-9.–Nonsalmon (excluding whitefish) search and harvest areas, Emmonak, 2008.

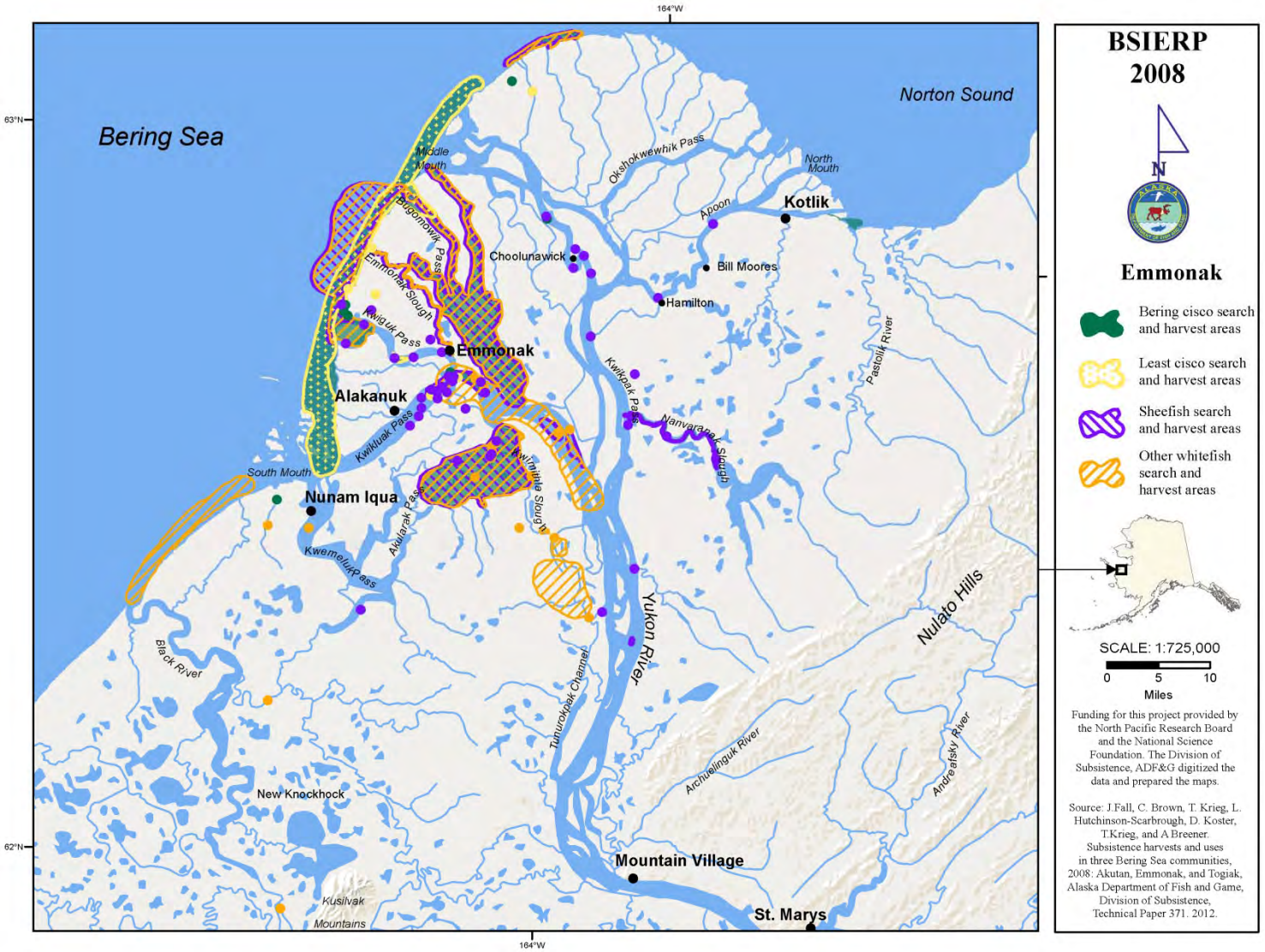


Figure 3-10.–Whitefish search and harvest areas, Emmonak, 2008.

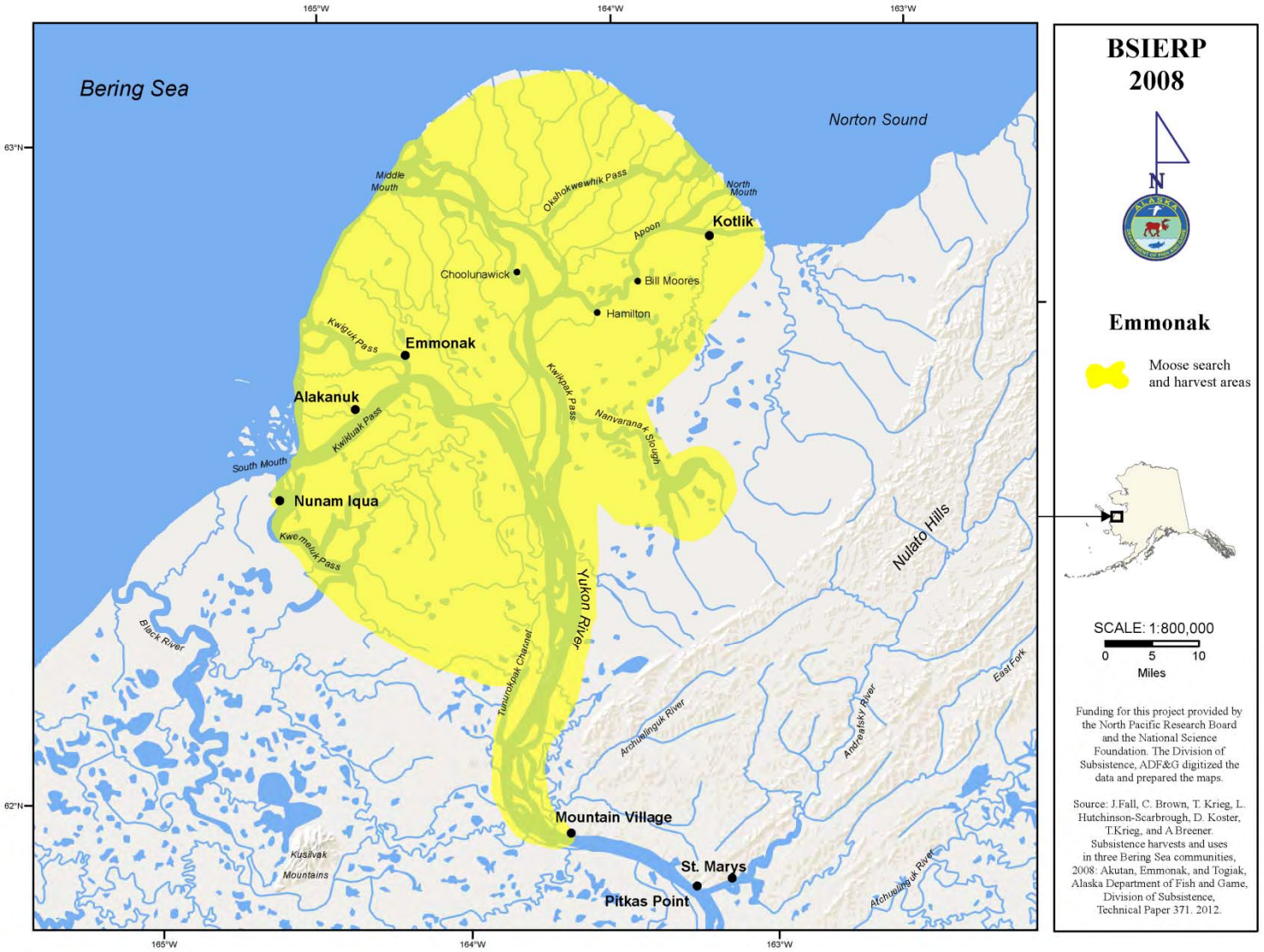


Figure 3-11.–Moose search and harvest areas, Emmonak, 2008.

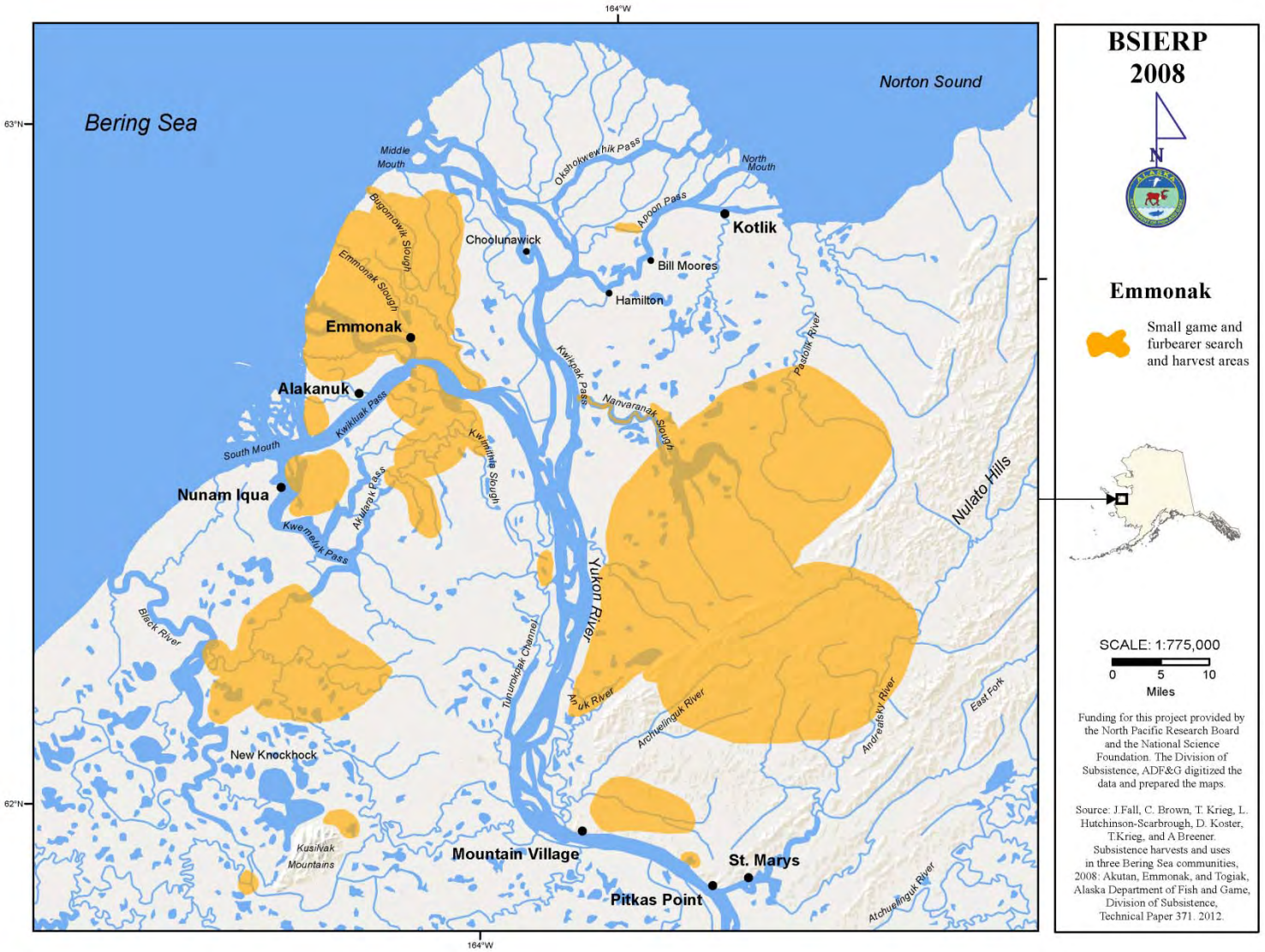


Figure 3-12.–Small game and furbearer search and harvest areas, Emmonak, 2008.

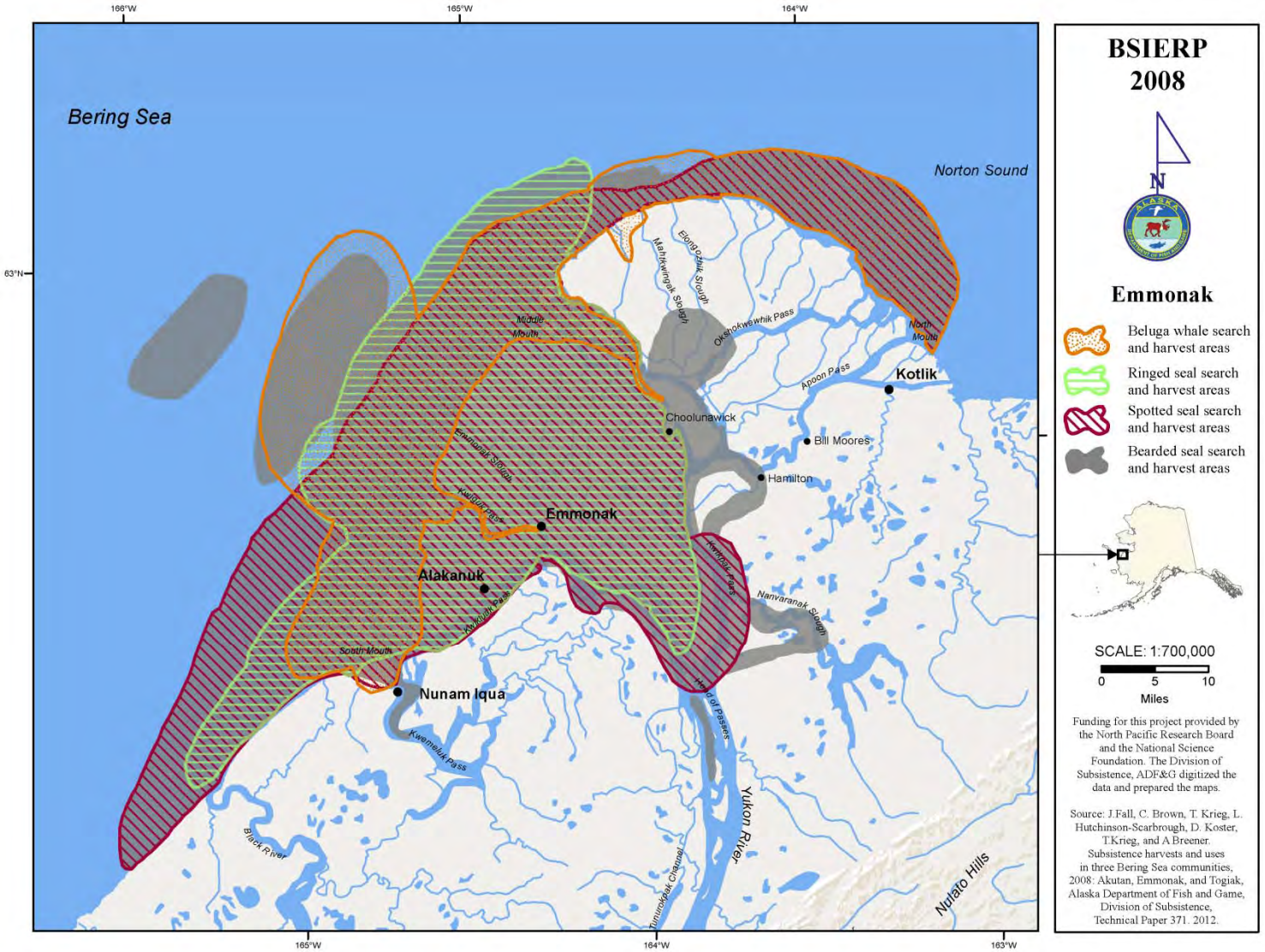


Figure 3-13.–Marine mammals search and harvest areas, Emmonak, 2008.

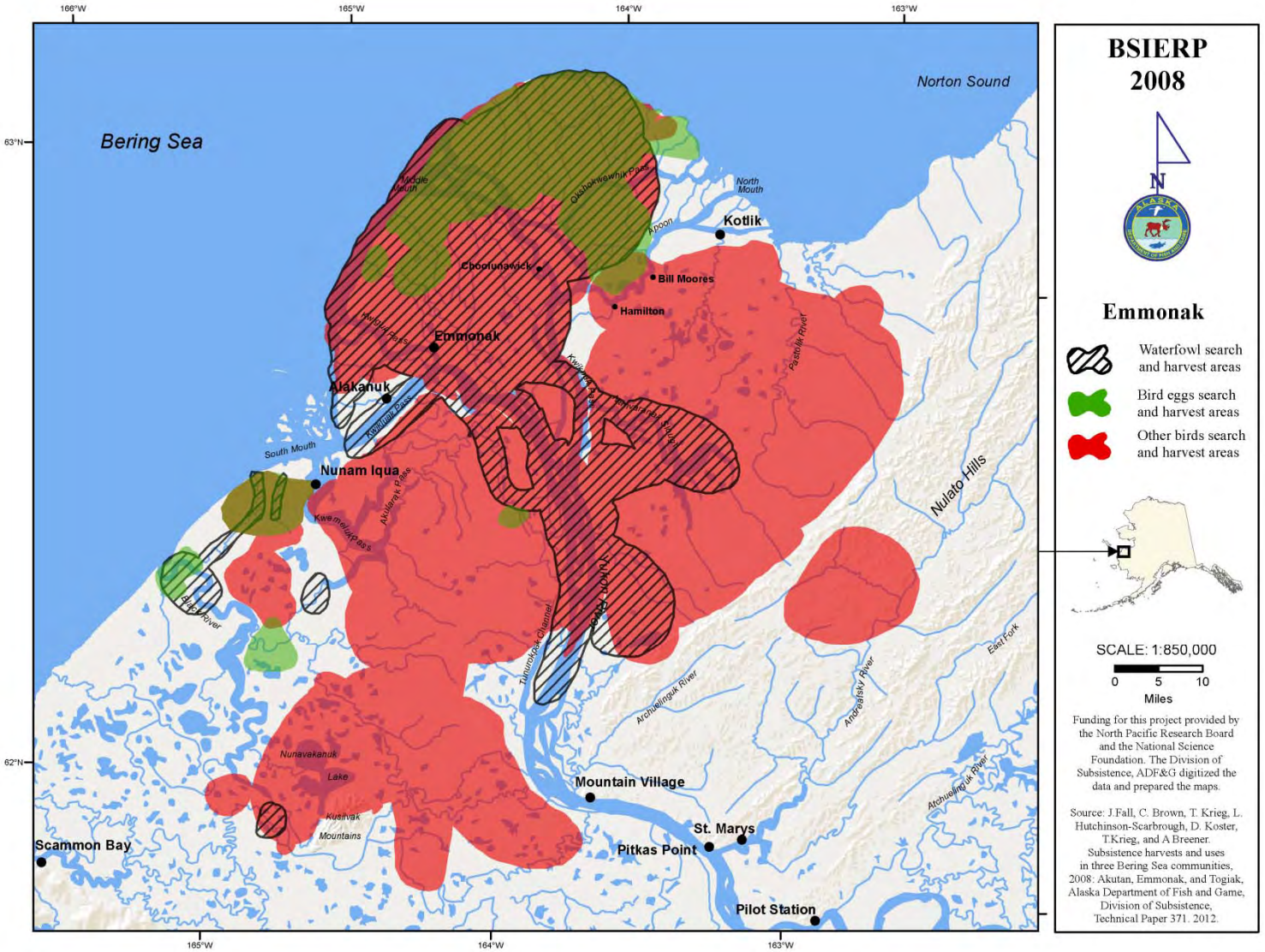


Figure 3-14.–Birds and eggs search and harvest areas, Emmonak, 2008.

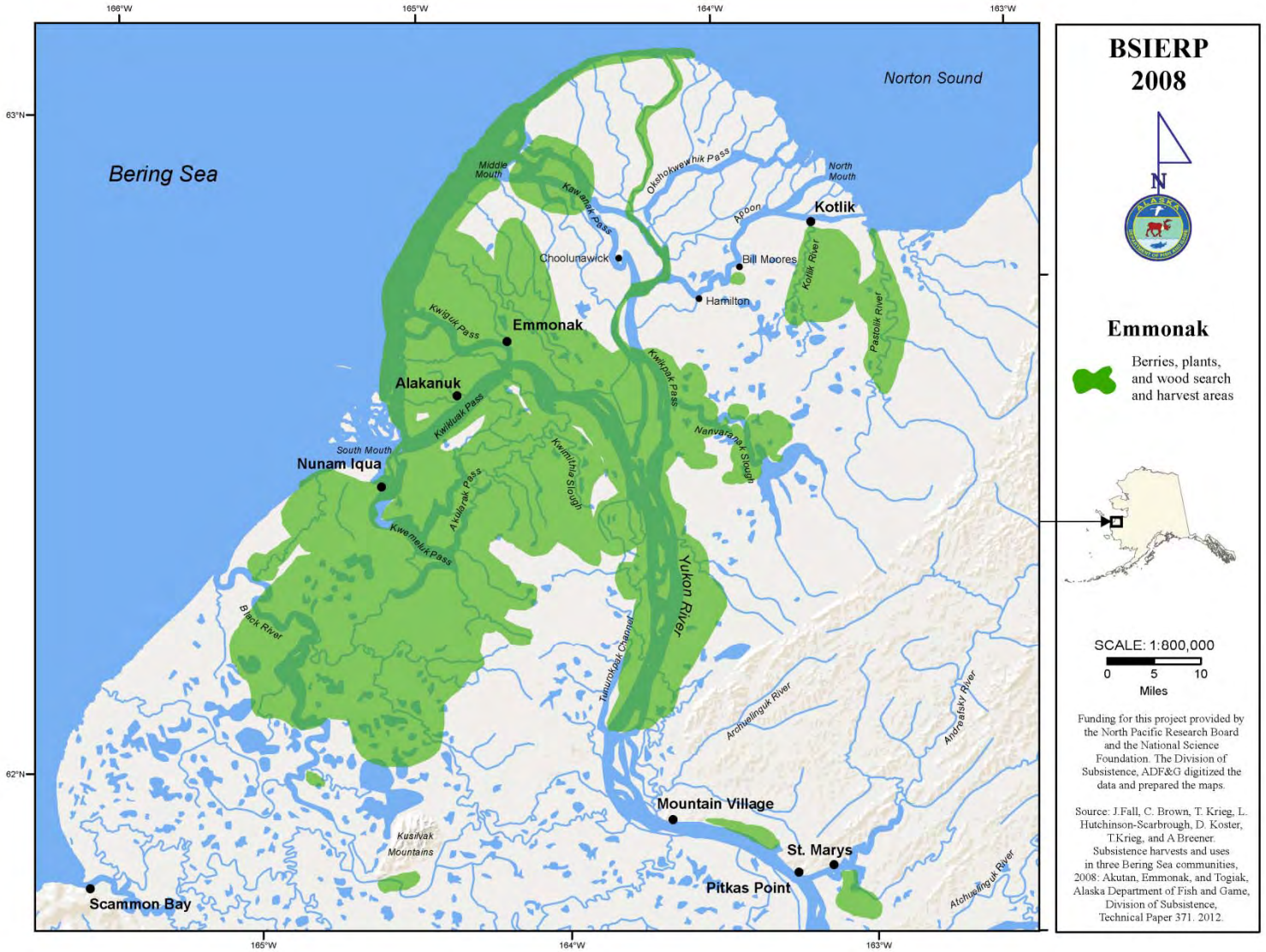


Figure 3-15.–Vegetation search harvest areas, Emmonak, 2008.

Emmonak residents also harvested sheefish in Nanvaranak Slough, and whitefishes in the Black River and coastal waters near its mouth. Northern pike fishing occurred throughout the area surrounding Akularak Pass, along Emmonak Slough, from the large passes of the Yukon River near Emmonak upstream to the entrance of Tunurokpak Channel, and in a small outlying site directly to the east of the Kusilvak Mountains. Residents of Emmonak caught burbot in many of the sloughs and channels near Emmonak, and also in the waters of and around Akularak Pass, Nanvaranak Slough, Pektotolik Slough, and the Anuk River. Alaska blackfish harvesting occurred near Emmonak and also in the numerous small lakes south of Emmonak surrounding Akularak Pass. Harvest areas for other nonsalmon fishes show a good deal of overlap with the previously mentioned species. One exception is Arctic grayling that were caught in the Andreafsky River near Saint Mary's in 2008.

Residents of Emmonak hunted moose throughout much of the Yukon Delta downstream from Mountain Village in 2008 (Figure 3-11). Since there were both fall and winter moose seasons in 2008, the search and harvest areas reflect the use of both boats and snowmachines for transportation, and display the large hunting areas that can be covered by water and over land, particularly in winter. Emmonak hunters generally hunted moose within a large (2,451 square miles) polygon bounded by Nunam Iqua to the southwest, Mountain Village to the southeast, Kotlik to the northeast, and the Bering Sea to the northwest. Although this represents a large area, moose hunting occurred almost entirely within the Lower Yukon region, contrasting with the historical pattern of relatively long distance travel upriver for moose hunting (see comparison section below).

Search and harvest areas for small land mammals included most of the sloughs, ponds, and land within approximately 10 miles of Emmonak and neighboring villages; more distant sloughs and channels of the Yukon River frequently accessed for travel and other subsistence activities; and several relatively remote areas with particular importance for furbearer harvests (Figure 3-12). Fox harvests, for example, took place within a few miles immediately south of Emmonak, near the mouths of the frequently traveled Emmonak Slough and Kwiguk Pass, and also in the Black River area near New Knockhock. Relatively distant areas used for harvesting furbearers in 2008 include the area east of the Black River near New Knockhock (foxes, otters, hares), the area surrounding the Kusilvak Mountains (mink, hare), the hills west of the Andreafsky River (lynx, hares), land between the upper Pastolik River south to the Anuk River and including Nanvaranak Lake and Slough (otters, hares), and the area in between and surrounding Akularak Pass and Kwemlithla Slough (beavers, muskrats, hares).

Emmonak hunters harvested marine mammals from sea ice, in nearshore waters of the Bering Sea, and in branches of the Yukon River in 2008 (Figure 3-13). Beluga whale hunting occurred in the Bering Sea from waters near Nunam Iqua in the south and along the coast to near Kotlik, and also in Kwiguk Pass upstream to Emmonak and Kawanak Pass upstream to Choolunawick. Seal hunting for all species largely overlapped beluga whale harvest areas, but extended further south along the coast to beyond the Black River, and occurred in more river channels and further upstream in the Yukon River to Head of Passes. Emmonak hunters also harvested seals in open water leads from shore-fast ice in spring.

Residents of Emmonak hunted wild birds and eggs over an extensive area during 2008 (Figure 3-14). Hunters traveled over a greater area in search of ptarmigan than they did for almost any other resource, although hunting also took place close to Emmonak. Search and harvest areas for ptarmigan extended beyond the Kusilvak Mountains to the south and farther east than Saint Mary's in a portion of the hills west of the Andreafsky River. Hunting for waterfowl and egg gathering occurred primarily in and beside the main passes of the Yukon River downstream from Head of Passes, and also in wetlands near the Black River, south of Nunam Iqua, west of the Kusilvak Mountains, and near Nanvaranak Lake. The search area for spruce grouse was primarily located around Akularaq Pass south of Emmonak.

Harvest areas for berries and other plant species largely overlapped each other during 2008 (Figure 3-15). Residents of Emmonak gathered berries and other wild plants in the immediate vicinity of Emmonak and nearby channels and sloughs, south of Emmonak in a discontinuous area reaching to the Kusilvak

Mountains, and near the neighboring communities of Kotlik, Mountain Village, and Saint Mary's. Wood harvests took place mostly on the Bering Sea coast and in the areas around river channels and sloughs near Emmonak, reflecting the major utilization of driftwood in this treeless region and the use of river channels for its transportation. Wood was also gathered south of Emmonak in the Black River region, possibly reflecting *in situ* use of wood at seasonal camps in the area.

HARVEST ASSESSMENTS

In order to track changes in patterns of use and availability of resources, the survey asked respondents to assess their own harvest and uses by reporting whether they used more, less, or about the same amount of 10 resource categories in 2008 as in past years. This section discusses responses to this question. Percentages do not include households that did not respond to the question or reported that they never harvested the resource. Subsistence harvests can also be assessed by comparing current harvest estimates with past harvest estimates. This will be discussed in a later section.

In most categories, Emmonak households reported using the same or a lesser amount of resources in 2008 than they had in past years. Of the 109 surveyed households that reported using or attempting to harvest subsistence resources, 40% said they used the same amount of wild resources overall, 34% used less, 24% used more; and 2% of households did not respond or did not know how to describe the change (Table 3-13). The individual categories experiencing the most pronounced use decreases in 2008 were furbearers and marine mammals. Out of the 47 households using or attempting to harvest furbearers, 25 (53%) indicated a change in their use patterns, and most said they used less. Of the 92 households using or attempting to harvest marine mammals, 45 (49%) indicated a change in their use patterns; 39 of these 45 households (87%) used less. This general pattern (i.e., out of the subset of households that indicated a change in use, the majority used less than in recent years) held to a lesser degree for all salmon and nonsalmon fish species, birds, and plants. For these resources, between 35% and 54% of households using or attempting to harvest the resource indicated a change in use, and the majority of these households (67%–84%) used less (Figure 3-16). Marine invertebrates and large game were exceptions to this pattern, with the majority of households that indicated change saying they used more. Of households that used or attempted to harvest large game, 44% indicated a change in their use patterns, with 61% saying they used more in 2008 than in recent years. The one household that reported a change in use of marine invertebrates indicated increased use, although only 4 households used or attempted to harvest marine invertebrates in 2008.

Table 3-13.–Changes in patterns of use and resource condition, Emmonak, 2008.

	Using or attempting	Compared to recent years, the household's use of resource was ...							
		Less		Same		More		No response/unknown	
Resource category	Number	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
All resources	**109**	**37**	**33.9%**	**44**	**40.4%**	**26**	**23.9%**	**2**	**1.8%**
Salmon	101	36	35.6%	46	45.5%	18	17.8%	1	1.0%
Nonsalmon	95	30	31.6%	52	54.7%	11	11.6%	2	2.1%
Large game	104	18	17.3%	56	53.8%	28	26.9%	2	1.9%
Furbearers	47	23	48.9%	18	38.3%	2	4.3%	4	8.5%%
Marine mammals	92	39	42.4%	42	45.7%	6	6.5%	5	5.4%
Migratory birds	90	31	34.4%	45	50.0%	8	8.9%	6	6.7%
Other birds	71	22	31.0%	40	56.3%	4	5.6%	5	7.0%
Bird eggs	34	10	29.4%	21	61.8%	2	5.9%	1	2.9%
Marine invertebrates	4	0	0.0%	2	50.0%	1	25.0%	1	25.0%
Plants and berries	102	29	28.4%	49	48.0%	21	20.6%	3	2.9%

Source ADF&G Division of Subsistence household surveys, 2009.

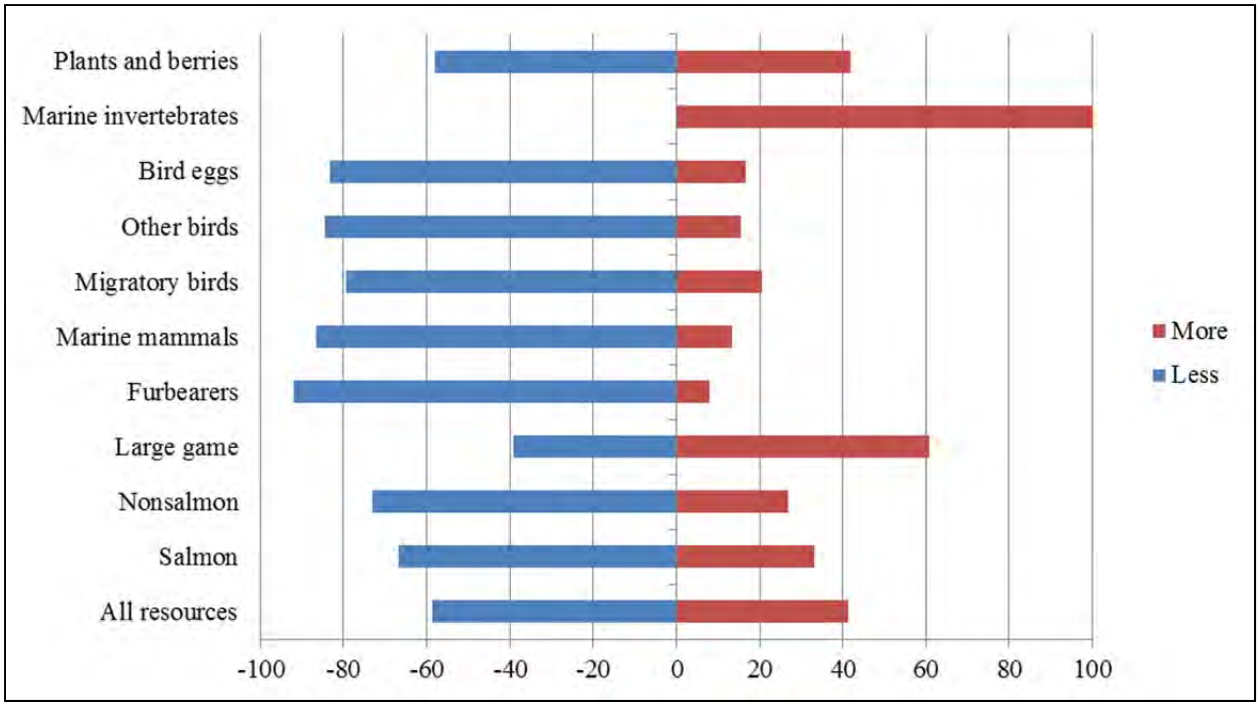


Figure 3-16.–Comparison of percentage of households indicating a change in use pattern, Emmonak, 2008.

In addition to the "less, same, more" question, households were asked why their uses of certain resource categories had changed. Several factors could account for changes in harvest use patterns for individual households in Emmonak including the fluctuation of subsistence resource populations; lack of cash or gear to pursue certain subsistence activities; the timing of available subsistence resources; conflicts between pursuing cash employment versus pursuing subsistence activities; and fluctuation in the amount of sharing. The majority of reasons given for using less of a resource centered on lack of cash to purchase necessary equipment (e.g., nets, motors, boats and all-terrain vehicles) for pursuing subsistence activities, and the high costs of gas, heating oil, and household goods for everyday living (Table 3-14). One survey respondent put it very simply, "No transportation, no outboard, no snowmachine." Another frequent response given as to why respondents used less was that some resources were perceived to be declining in the area around Emmonak, especially salmon species, particular bird species, and berries. Some view changing environmental conditions such as warmer weather, late or early freeze-ups, and unfavorable wind conditions as a factor in why they are seeing less of some resources.

Table 3-14.–Reasons for using/harvesting less resources in 2008 than in other recent years, Emmonak.

Reason	Total (all) resources[a]	Any resource category[b]
Climate/weather	0.0%	4.6%
Resource condition	0.0%	0.0%
Habitat changes	0.0%	0.0%
Population factors	28.6%	21.4%
Animal behavior	2.9%	3.1%
Economic factors	28.6%	16.3%
Personal factors	51.4%	57.1%
Given less	2.9%	6.6%
Contamination	0.0%	1.0%
Management	0.0%	1.5%
Competition	0.0%	2.6%
Other	0.0%	0.5%

Source ADF&G Division of Subsistence household surveys, 2009.

Note Respondents could provide more than one reason for the change.

a. N = 35 households that reported using/harvesting less resources and who provided reasons for the change.

b. N = 202 cases in which households reported using/harvesting less of a resource category and who provided reasons for the change.

If a household reported that they used more of a particular subsistence resource in 2008, the reason they most often gave was that they engaged in more subsistence activities and invested more effort in harvesting to compensate for a poor general economy and rising prices (Table 3-15). Several households reported an increase in wood harvesting due to the high cost of home heating fuel. Others cited an increase in consumption of subsistence foods due to the high cost of grocery store foods. Many stated that moose were increasing in population around Emmonak, making it easier to acquire more meat to put away for winter. This is reflected in the increased use of large land mammals in 2008. Moose (136 individuals) were the only large mammals harvested in Emmonak in 2008. Some respondents stated that they increased their fishing effort in order to fill their freezers as well. One survey respondent stated,

> It was cheaper to harvest. We caught more fish because we knew we weren't going to make money on king salmon [commercial fishing]; we weren't going to be able to buy other foods. It could still cost us $200 to go gather eggs. It may cost $800 to go get a moose [due to cost of gas].

Table 3-15.–Reasons for using/harvesting more resources in 2008 than in other recent years, Emmonak.

Reason	Total (all) resources[a]	Any resource category[b]
Climate/weather	4.2%	4.3%
Population factors	12.5%	20.4%
Animal behavior	0.0%	2.2%
Economic factors	70.8%	35.5%
Personal factors	41.7%	32.3%
Given more	8.3%	14.0%
Change in area	0.0%	2.2%
Management	0.0%	1.1%
Other	0.0%	0.0%

Source ADF&G Division of Subsistence household surveys, 2009.

Note Respondents could provide more than one reason for the change.

a. N = 24 households that reported using/harvesting more resources and who provided reasons for the change.

b. N = 93 cases in which households reported using/harvesting more of a resource category and who provided reasons for the change.

In general, when Emmonak residents could not get the subsistence resource that they needed, they either focused on an alternate resource, relied on store food, or family and friends shared subsistence foods with them.

COMPARISONS WITH PRIOR RESULTS

This baseline survey was the second comprehensive subsistence harvest study conducted in the community of Emmonak; Wolfe (1981) conducted a baseline analysis of the economy and culture of the people of 6 Yukon River delta communities, including Emmonak, over a 12-week period during the summer of 1981. The final report includes documentation of settlement patterns, subsistence and commercial harvests, the organization of salmon fishing, sharing and exchange of food resources, and cultural concepts of resource utilization as experienced in Emmonak in 1980–1981. Wolfe's baseline analysis serves as a point of comparison for the current ADF&G comprehensive survey, although Wolfe's one-year sample of 18% of households, which was biased toward active harvesting households, should not be directly compared to the 2008 data without some caution. In addition to Wolfe (1981), ADF&G Division of Commercial Fisheries has conducted salmon harvest surveys annually in Emmonak from the mid 1970s through the present time. Coffing et al. (1998; 1999) described harvests of ice seals in the communities of Emmonak, Hooper Bay, and Quinhagak for the years 1997 and 1998; these data are also used for comparison between Wolfe's 1980 and the 2008 data.

The comparison of these previous 3 data sets with the 2008 data indicates more than simply shifting harvest levels; it suggests that Emmonak residents experience and respond to change in myriad ways. Further, through examples discussed below regarding seal hunting and salmon fishing, this comparison tracks the various influences and pressures that inform Emmonak residents' adaptations.

Demographic and Economic Comparisons

Emmonak's population has shown considerable growth since Wolfe's study in 1980; an estimated 788 individuals lived in Emmonak in 2008, compared to 567 in 1980 (Wolfe 1981). This growth potentially affects subsistence in that there may be more pressure on resources harvested near Emmonak, and in that, for resources harvested at similar rates as in 1980, there may be significantly less of the resource available per capita (see below). The most significant economic differences between the 1980 and 2008 studies involve radical changes in the economic role of commercial fishing in Emmonak and changes to cost of living including large increases in fuel prices. Commercial fishing in 1980 for communities in the lower

Yukon including Emmonak "represented the largest and most consistent source of money…and comprised 45.8% of their annual monetary income, or $8,026 per household" (Wolfe 1981:92) . Adjusted for inflation and for the consumer price index in Anchorage, this would be equivalent to around $18,908 in 2011.[24] By contrast, average income earned by an individual engaged in commercial salmon fishing in the Lower Yukon in 2008 totaled only $1,479 (Volk et al. 2009); no directed commercial fishing for Chinook salmon took place in 2008 due to conservative management actions on the Yukon River.

Despite these changes, commercial salmon remained important to Emmonak's local economy in 2008. According to household survey results, in 2008, 29% of all jobs held by Emmonak residents involved commercial fishing (Table 3-6). About 42% of employed adults in Emmonak held commercial fishing jobs, and these jobs produced about 22% of earned income and 10% of all income for the community in 2008. The number of Emmonak residents holding limited entry permits for commercial gillnet fishing for salmon in the Lower Yukon River has been relatively steady since 1980, with annual averages of 102 permit holders in the 1980s, 98 permit holders in the 1990s, and 97 permit holders from 2000 through 2010. However, Emmonak residents' annual gross earnings in this fishery dropped from $895,828 in the 1980s to $735,565 in the 1990s and $289,143 in the 2000s.[25]

The diminished role of commercial salmon in Emmonak's cash economy since the 1980 data was collected, discussed in more detail below, strongly affected subsistence in 2008. The integration of the subsistence and commercial components of Emmonak's economy was first described by Wolfe (Wolfe 1984) in the early 1980s. Much of the income from commercial sales of salmon is reinvested into the subsistence component to buy such things as boats, gas, nets, and guns used for subsistence activities like seal and whale hunting, moose hunting, and berry picking. With a decline in commercial input, many respondents noted that they lacked the cash to go out for subsistence purposes. Respondents described attempting to harvest more subsistence resources due to the difficulty in purchasing store bought foods. However, many respondents also described difficulty in harvesting subsistence resources because of gas prices that approached $8.00 a gallon during the study year (State of Alaska 2009). The 2008 survey asked respondents "In 2008, did fuel costs affect your household's subsistence hunting and fishing?" Out of 102 households, 91 (89%) indicated that fuel costs affected their subsistence hunting and fishing, 8 (8%) households were not affected, and 3 (3%) were unsure. Of those affected, nearly all indicated that high fuel costs limited their subsistence activities, and many commented on both the necessity of subsistence resources and the difficulty in traveling to harvest them in 2008: "We're in a disaster situation because of gas prices and fuel costs. Without subsistence we wouldn't make it." A general description of economic changes in relation to subsistence between 1980 and 2008 is that in 2008, residents of Emmonak had to balance the financial costs and benefits of subsistence harvest activities to a greater extent than in 1980.

Harvest Changes

Survey results indicate that Emmonak hunters and fishers harvested more subsistence resources in 2008 (379,803 lb) than in 1980 (275,490 lb). A likely explanation for this difference is Emmonak's population growth since 1980 (see "Demography" above). Controlling for population change, however, the edible weight of subsistence harvested resources per capita (pounds per person) for all resources was lower in 2008 (482 lb) than in 1980 (612 lb) (Figure 3-17). A variety of factors may have influenced this decrease in per capita harvest over the approximately 3 decades since Wolfe's 1981 work. The factors include increased availability (and decreased cost) of store bought foods; changing food preferences; spiking

24. State of Alaska, Department of Labor, Consumer Price Index Inflation and Deflation Calculators, http://labor.alaska.gov/research/cpi/inflationcalc.htm. (Accessed February 2012).

25. State of Alaska, Commercial Fisheries Entry Commission. Fishery statitics—participation and earnings. www.cfec.state.ak.us. (Accessed September 2012).

energy costs concurrent with decreased cash income from commercial fishing; and other social, environmental, cultural and economic changes that have occurred since 1980. In addition to this general decrease in per capita harvest, there were several more specific differences in subsistence harvests, in terms of the quantities of particular species harvested (figures 3-18 and 3-19), harvest areas, and seasonality of harvests, discussed in more detail below.

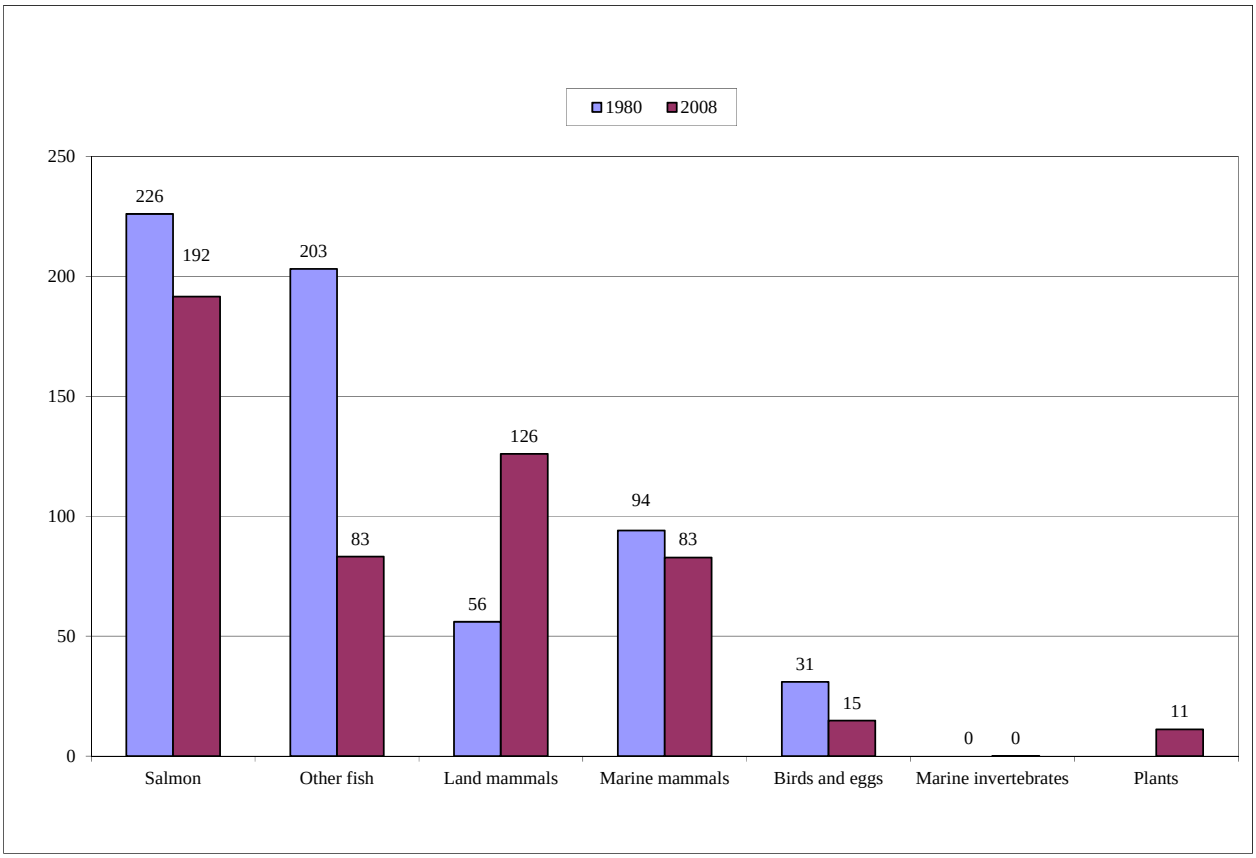


Figure 3-17.–Estimated harvests by resource category, pounds per person, 1980 and 2008, Emmonak.

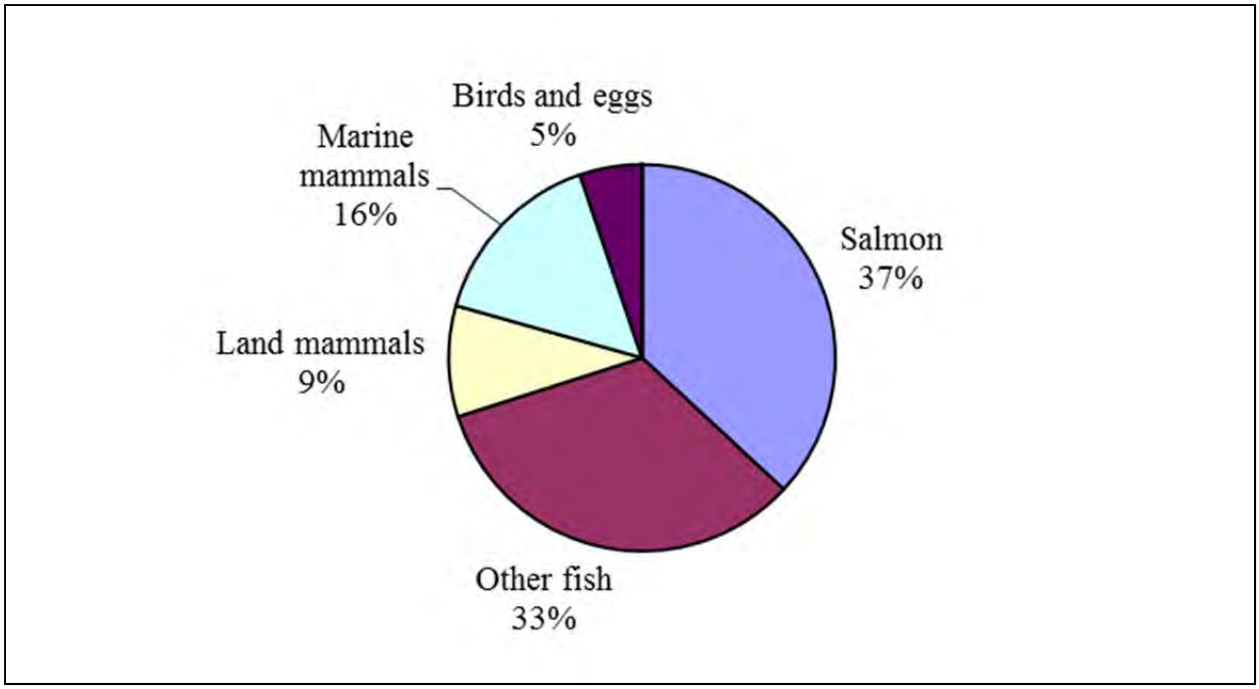


Figure 3-18.–Estimated per capita harvest by resource category, 1980, Emmonak.

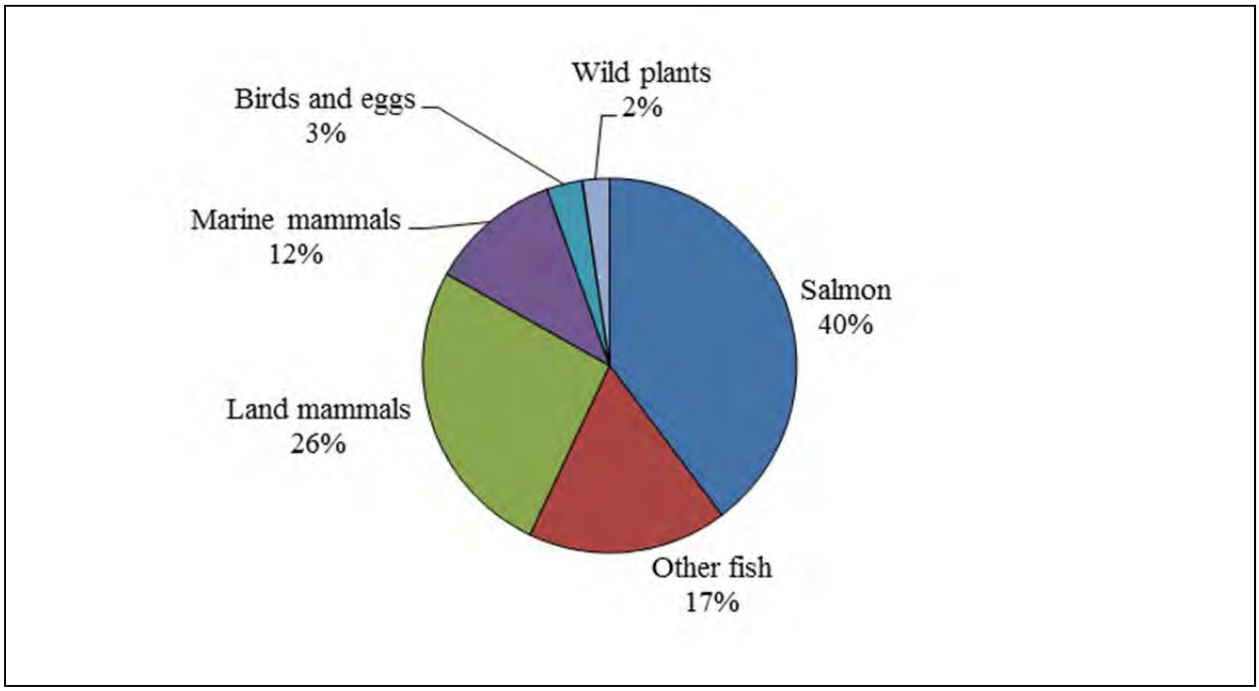


Figure 3-19.–Estimated per capita harvest by resource category, 2008, Emmonak.

Salmon

Comparison of the 2008 estimated subsistence salmon harvest to previous harvest estimates allows greater understanding of the composition and magnitude of such harvests over time, and also illustrates potential changes to salmon harvest patterns through time. As stated earlier, salmon, especially Chinook salmon, are harvested for both subsistence use and for commercial sale. Emmonak subsistence salmon

harvest information for the year 1980 is available from Wolfe (1981), and annual subsistence salmon harvests for Emmonak have been documented from the 1970s through 2008 by ADF&G's postseason subsistence salmon harvest surveys. For the purposes of this comparison, only the years from 1988, when the survey instrument was redesigned, are used.

Wolfe (1981) surveyed 18 households in Emmonak from June 1980 to May 1981 and reported harvest estimates of subsistence salmon species in edible lb, noting that Emmonak had poor harvests of salmon in 1980. In 1980, residents of Emmonak harvested an estimated 2,256 Chinook salmon, 12,144 chum, and 1,350 coho salmon. For the years 1988–2008, the average annual subsistence salmon harvest estimates by species for Emmonak from ADF&G's postseason surveys (Figure 3-20) are relatively stable, with 2,281 Chinook (with a range from 702 in 1996 to 4,372 in 1993), 11,086 summer chum (with a range from 6,097 in 1996 to 22,985 in 1989), 1,606 fall chum (range of 785 in 2004 to 3,441 in 1994) and 651 coho salmon (range of 191 in both 2000 and 2005 to 1,578 in 1988) (Holder and Hamner 1998, Borba and Hamner 1998, Busher et al. 2009). The first annual subsistence harvest estimate for pink salmon is for the year 1997, and harvest estimates for pink salmon between the years 1997 and 2008 ranged from a high of 641 in 2008 to a low of 0 in the year 2000 (Borba and Hamner 1998, Busher et al. 2009).

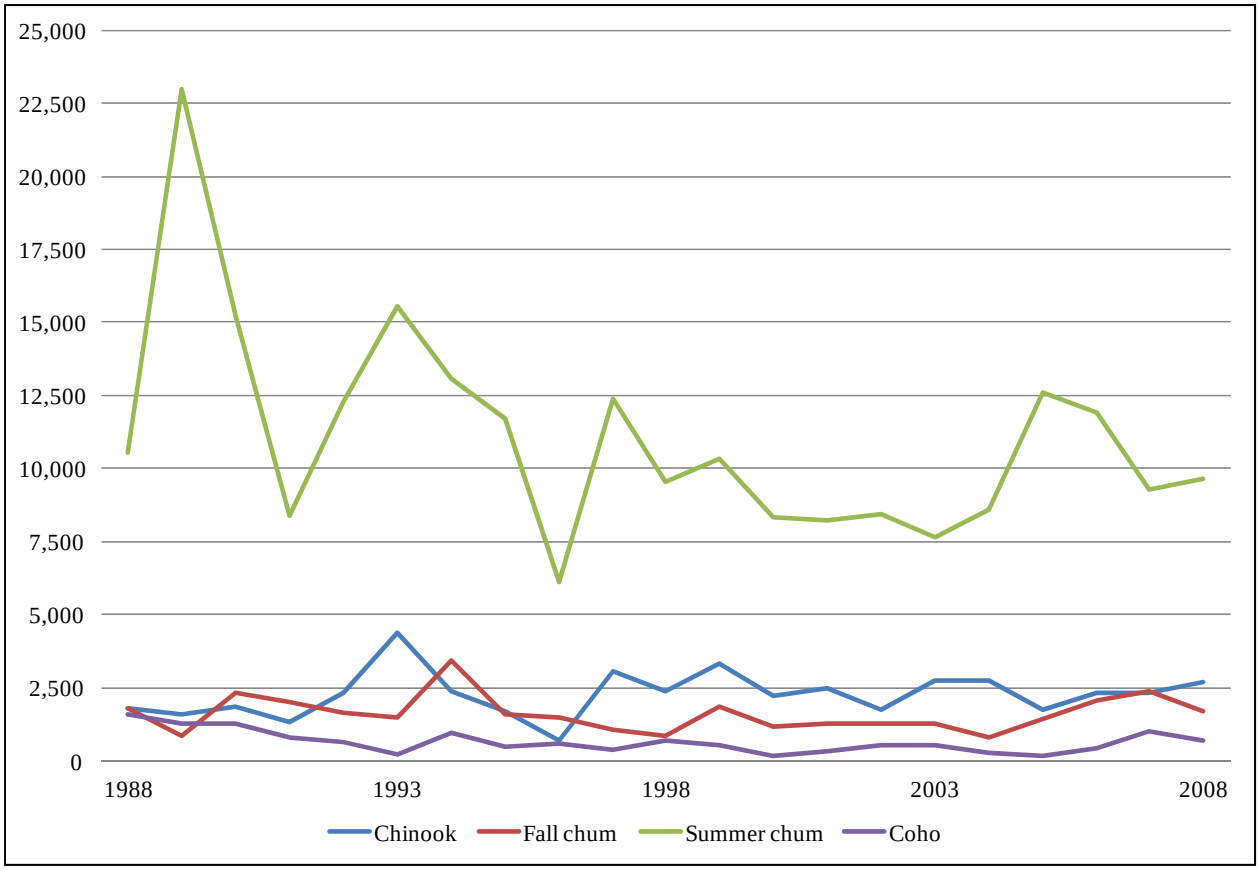


Figure 3-20.–Subsistence salmon harvests, 1988–2008, Emmonak.

Subsistence salmon harvest estimates of 3,018 Chinook and 18,788 chum salmon from the 2008 comprehensive survey show a harvest that was higher than average, especially for chum salmon, but within the range of the past 20 years, and are also higher but relatively similar to estimates from the comprehensive subsistence survey in 1980 (Wolfe 1981). The subsistence harvest estimate from the 2008 comprehensive survey for coho salmon, at 3,237 fish, was much higher than the 20 year average, and outside of the range of previous estimated harvests. Higher than average values for chum and coho salmon may potentially reflect postseason subsistence harvest surveys taking place in early September

before coho and fall chum salmon fishing have definitively ended, whereas the 2008 comprehensive survey was conducted in early 2009. Pink salmon in 2008 also had a much higher harvest estimate than previous years, at 1,471 fish.

The annual subsistence salmon postseason surveys and 2008 comprehensive subsistence harvest estimates give a general picture of harvest numbers of individual salmon species for Emmonak over 20 years leading up to 2008. Several general statements can be made using this data. Chinook salmon subsistence harvests have remained relatively stable through the years with the exception of slightly lower harvest years in 1995, 2002, and 2005, and a much lower harvest in 1996. In spite of this stability in community level Chinook salmon harvests, Emmonak's population growth (see "Demography" above) suggests a reduction over time in per capita harvests. For example, the per capita harvest of Chinook salmon in 1980, described by Wolfe (1981:125) as a "poor year" for salmon in Emmonak, was 80 lb per person. In 2008, it was 39 lb per person. So, while the community harvest levels are stable, per capita comparisons reveal that Chinook salmon harvests are not keeping up with population growth and thus Emmonak residents are ultimately using less Chinook salmon. This reduction is likely due to a number of factors, but most certainly includes declining Chinook salmon returns over the last decade (JTC 2012:58). This harvest pattern does not hold true for the other salmon species that have not experienced the same level of decline as Chinook salmon. Summer chum salmon per capita harvests were also higher in 1980, though the difference between 1980 and 2008 is not as dramatic as the Chinook salmon example. Per capita harvests of coho salmon in 2008 were actually higher than in 1980.

Beyond just the harvest averages over time, however, salmon harvests in Emmonak tell another important story. Many lower Yukon River residents, including those in Emmonak, have been experiencing dual pressures on their traditional salmon harvesting practices. The first involves local observations about changes in the natural environment, including weather. Emmonak residents observed that their summers are increasingly rainy, which interferes with optimal drying times, a main form of preserving salmon for winter storage. As discussed earlier, Emmonak residents used natural indicators to predict salmon run timing and abundance (Moncrieff et al. 2009). Wind direction, for example, determined which mouth of the river salmon enter. Other indicators, like snow load, the arrival of geese or presences of black flies and mosquitoes all helped fishers to understand the run. However, residents now observe that winters are warmer, there are more storms than in the past, and these storms generally come from the south. Northern and western winds bring abundant levels of salmon into the south mouth, closest to Emmonak fishers. With southern winds, according to local knowledge, salmon will enter the north mouth of the Yukon River, entering the river by Kotlik and bypassing Emmonak fishers. The changes have decreased the reliability and predictive capacity of natural indicators, thus affecting local residents' ability to the indicators productively (Moncrieff et al. 2009).

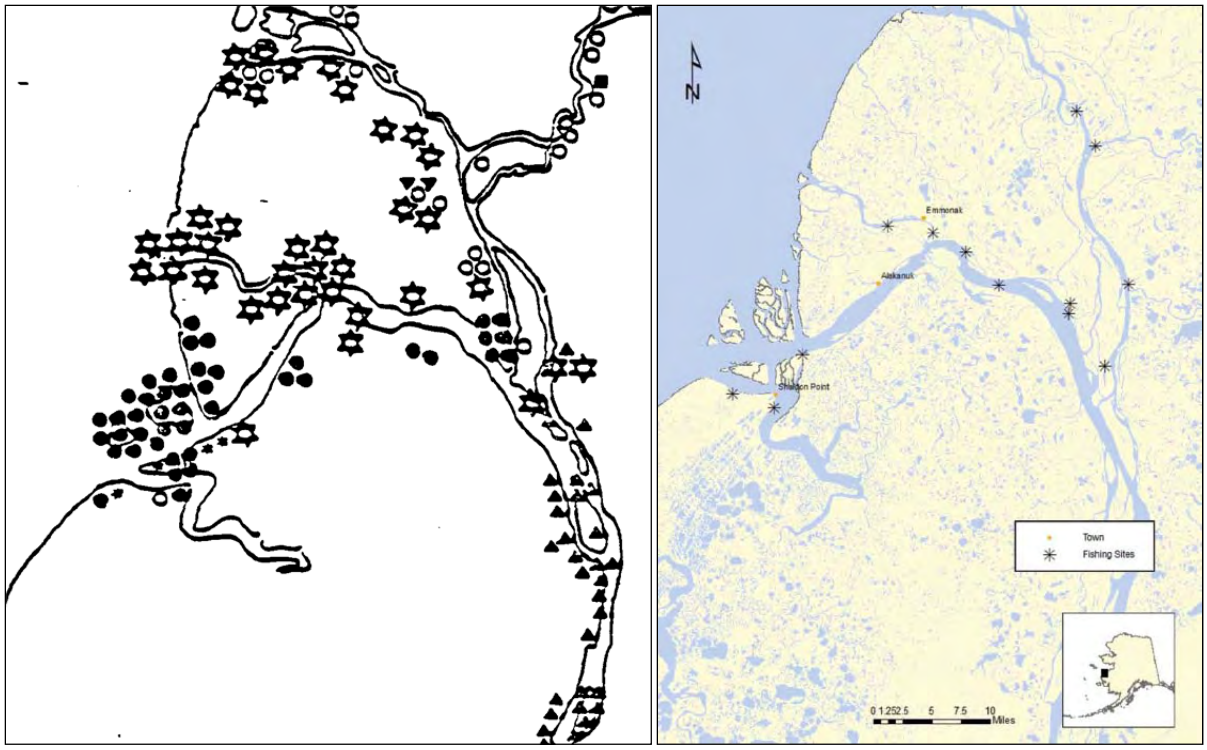
The second pressure experienced by Emmonak residents involves salmon, specifically Chinook salmon, abundance. Both subsistence and commercial salmon fishing on the Yukon River in 2008 were complicated by a poor run of approximately 151,000 Chinook salmon for the entire Yukon River, 36% below the 2002–2007 average, which itself was lower than previous averages (JTC 2009). As noted earlier, Chinook salmon runs have been declining over the last several years, though the reasons for this are not fully understood. Fishers, managers, and scientists have suggested various causes, from changing environmental conditions in the Bering Sea to overfishing incidental harvest through the pollock fishery to regulations. Harvests of over 100,000 fish were common in the 1980s and early 1990s. In the 1980s, for example, commercial salmon harvests provided the largest and most consistent source of cash income in the lower river. In 1980, the commercial harvest of Chinook salmon was 143,853 fish valued at $3,367,599 or an average of about $5,000 per permit holder with additional wages for processing those salmon (Wolfe 1984). Between 1994 and 1998, the average commercial harvest was 91,263 fish. By 1999, the commercial harvest was 62,294 fish. Due to concerns about meeting escapement and border crossing goals according to the Yukon River Salmon Agreement and the Pacific Salmon Treaty, no commercial opportunities for Chinook salmon have been provided for the last several years. Commercial

fishing income has come largely from harvests of summer chum salmon, a much less economically valued fish.

Increasingly complex regulations to protect the runs have also put additional pressure on subsistence harvesting, with subsistence openings not always occurring during optimal processing times. In 2008, mesh size restrictions and reduced harvest times were imposed on the subsistence summer salmon fishery for only the second time in history. The commercial fishery for the more abundant run of summer chum salmon was delayed due to concerns about incidental take of Chinook salmon, which potentially reduced the commercial harvest of chum salmon by over 150,000 fish (JTC 2009).

On the cusp of a disappearing commercial Chinook salmon fishery and increasing restrictions on the subsistence fishery, it is unclear how Emmonak residents will adapt over time. However some short-term adaptive shifts can be seen. Residents have to make strategic choices about how to balance a shifting set of resources that includes other available wild foods as well as cash (see Wheeler 1997). The relatively high harvests of subsistence chum, coho, and pink salmon in 2008 may reflect some households' choice to harvest more fish due to concerns about costs of groceries in a year when less money was earned from commercial fishing. Fishers also compensate for commercial losses by harvesting other species for commercial sale including summer chum salmon, Arctic lamprey, and Bering cisco. The nascent fisheries on the latter 2 species remain small, however, because fish population dynamics data are too limited to allow high levels of exploitation.

Longer-term adaptations have been slowly occurring since the 1980s, namely changes to fish camp residence patterns (Figure 3-21). The structure of commercial and subsistence openings as short bursts of activity have discouraged seasonal residence at fish camp over time. Increasing regulation and restrictions, along with economic factors such as increasing gas prices and employment opportunities, have further discouraged longer-term stays at fish camp. For many, commercial fishing income funds fish camp and other seasonal camps; without this input, summer fish camp becomes less of a possibility for many families. Declining camp residence has implications for the generational transmission of knowledge and time spent out on the land necessary for successful subsistence activities. Regulations, though important for conservation and allocative purposes, can also constrain fishers' ability to accommodate short-term weather events or longer-term climactic shifts.



Locations of summer fish camps. Stars denote Emmonak camps. *Source* Wolfe 1981.

Locations of summer fish camps, 2007. *Source* Moncrieff et al. 2009.

Figure 3-21.–Fish camp locations, Emmonak, 1980 and 2007.

In sum, the declining salmon runs require the community to respond to more than just a decrease in an important food resource. Because salmon are the basis for an integrated subsistence and commercial economy, the effects of a declining salmon run cascade throughout the rest of Emmonak's subsistence activities, both in terms of harvesting and distribution of food and resources.

Fish Other than Salmon

Emmonak fishers harvested fewer nonsalmon fish in 2008 than in 1980; an estimated 91,400 lb of nonsalmon fish were harvested in 1980 compared to 64,565 lb in 2008. All species showed a reduced harvest by edible weight per capita (Figure 3-22). Residents of Emmonak harvested an estimated 4,017 sheefish in 1980, while the 2008 harvest was 2,762 fish; a similar pattern can be seen for broad whitefish (3,278 in 1980; 2,431 in 2008), Bering and least cisco combined (19,694 in 1980; 6,106 in 2008), saffron cod (4,794 in 1980; 1,007 in 2008)[26], northern pike (3,656 harvested in 1980; 3,125 in 2008), and blackfish (28,606 fish in 1980; 17,732 in 2008). The number of burbot harvested increased in 2008 (1,382 fish) relative to 1980 (1,033 fish), but lb per capita actually decreased. Nonsalmon fish overall in 2008 contributed 16% to the total subsistence harvest by edible weight, less than half of the proportion seen in 1980 (33%). Although the 2008 data cannot be viewed as proof of a longer-term decline in nonsalmon fish harvests, such a decline could potentially be related to reduced need for nonsalmon fish due to fewer dog teams, reductions in associated subsistence activities such as trapping, reduced ability to access harvest locations due to economic or environmental concerns, or potentially a decline in certain

26. The number of saffron cod harvested in 2008 may be higher than the data indicate because of misidentification issues associated with Pacific tomcod and saffron cod. It is likely that the 279 Pacific tomcod reported harvested were in fact saffron cod, known locally as "tomcod." However, even in combining Pacific tomcod and saffron cod harvest estimates, the decrease in harvest is still clear.

nonsalmon fish populations. Changes in harvest may also be related to changes in food preference. In the case of Alaska blackfish, pounds per harvest declined from 48 lb per person in 1980 to 6 lb in 2008. Several respondents in 2008 referred to Alaska blackfish as "elders' food"—food eaten primarily by elders now, suggesting that younger people do not share their elders' taste for Alaska blackfish. Reasons given in 2008 for catching fewer nonsalmon fish than usual included reduced fish populations, high gas prices that restricted travel to harvest locations, and environmental conditions such as a late freeze-up. Wolfe (1981) mapped locations of important nonsalmon fish harvest locations for Emmonak and surrounding communities, and in 2008 nearly all of these harvest locations were still being used (see "Harvest Areas" above).

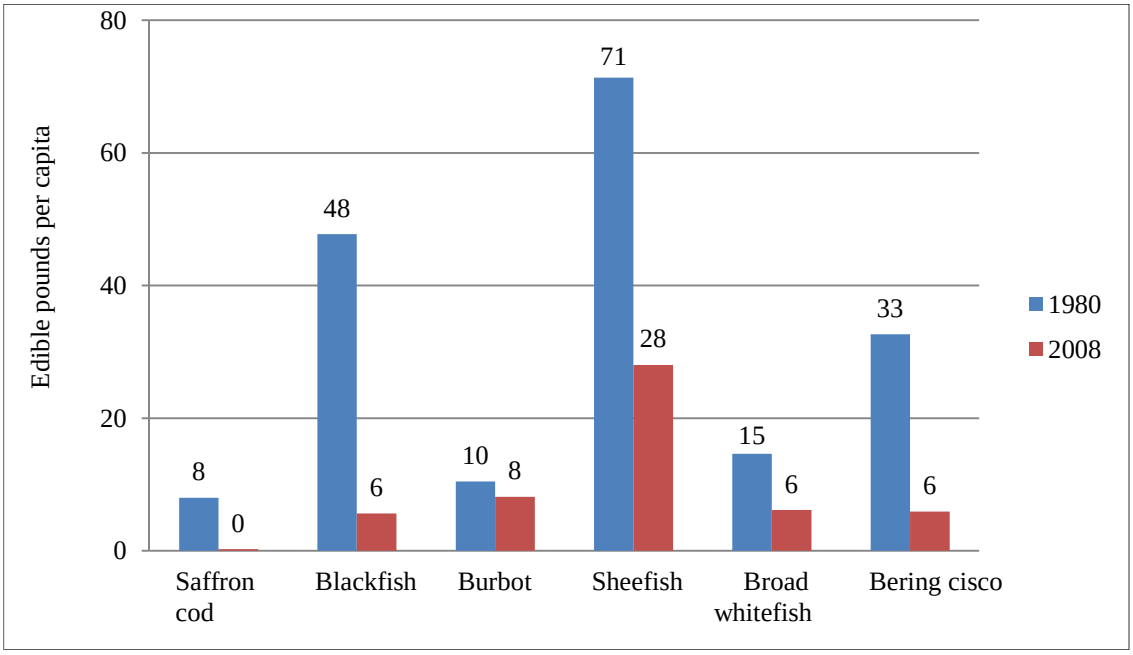


Figure 3-22.–Nonsalmon fish harvests, pounds per capita, 1980 and 2008, Emmonak.

Land Mammal Changes

Differences in land mammal harvests between 1980 and 2008 can be characterized by reductions in small land mammal hunting and trapping, and a large increase in moose harvests. With the exception of beavers (39 harvested 1980, 87 in 2008) and river (land) otters (11 in 1980, 26 in 2008), all small land mammals showed a reduced harvest in 2008, including foxes (239 in 1980, 21 in 2008), hares (1,267 in 1980, 399 in 2008), minks (189 in 1980, 5 in 2008), and muskrats (2,433 in 1980, 18 in 2008). Far less trapping for furbearers occurred in 2008 than in 1980, which key informants linked primarily to relatively low fur prices in 2008 for most species. "Nobody goes fur hunting no more. In them days there used to be lots of fur hunters… So there's no more hunting of the animals, there's hardly any hunting for money, the money's going down on the animals, but these days, there's still some pretty good money right now." Fur prices rose shortly after the 2008 study year and trapping is rebounding somewhat (DeMarban 2010).

Emmonak hunters harvested an estimated 136 moose in 2008, a large increase relative to the 25 harvested in 1980. Even with Emmonak's population growth since 1980, this increased harvest in 2008 provided over 3 times the edible weight per capita of moose that was harvested in 1980 (Figure 3-23). This change in harvest pattern is likely linked to recent growth in the moose population in the lower Yukon area. Very few moose in this area in the 1980s led to a 8-year moratorium on moose hunting between 1988 and 1995 (Weekley et al. 2011). In the decades preceding the moratorium, and during the 1980 study year, residents of Emmonak often left the lower Yukon region to hunt moose—"There wasn't any around here. We had to go upriver above Holy Cross,"—traveling long distances to reach moose in densities favorable to

hunting. A combination of the moratorium on hunting and a changing climate that produced high quality habitats of thick stands of alder and willow for moose browse around the delta led to an increase in the moose population from about 28 in 1992 to about 3,300 in 2008 (Perry 2010). Hence, residents of Emmonak in 2008 were able to harvest more moose nearby, without the added costs in time and fuel needed to hunt moose historically.

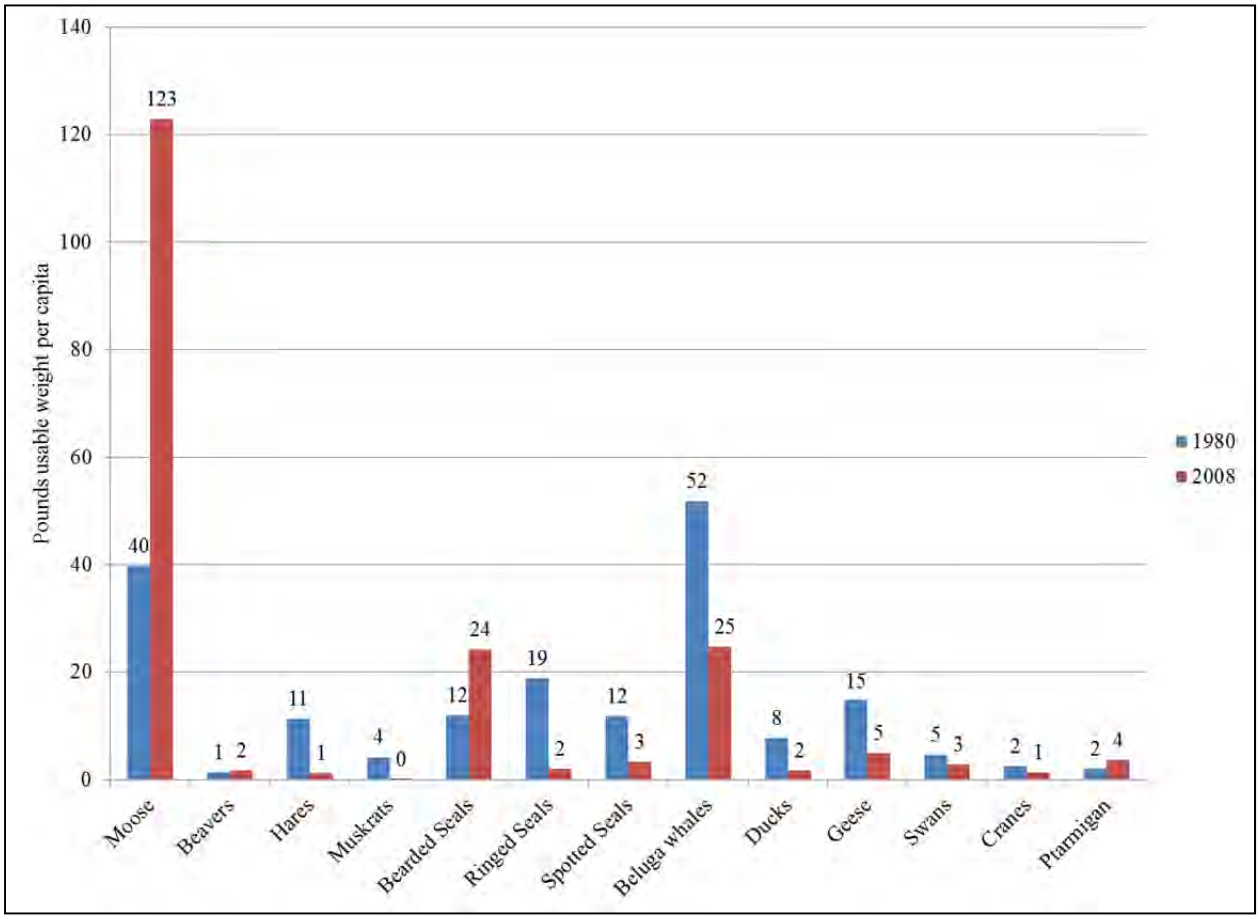


Figure 3-23.–Wildlife harvests, pounds per capita, 1980 and 2008, Emmonak.

Marine Mammals

Total marine mammal harvests declined between 1980 and 2008 from the perspective of pounds per capita, with 95 lb per person of marine mammals harvested in 1980 and 55 lb in 2008. As a percentage of Emmonak's total subsistence harvest by edible weight, marine mammal harvests were lower in 2008–they were 15% of total harvest in 1980 and 11% of total harvest in 2008. A comparison of results on a species level, however, suggests shifts in the patterns of the harvest and uses of beluga whales and seals. Specifically, marine mammal harvests in Emmonak show a strong shift in 2008 toward harvesting bearded seals in greater numbers and fewer ringed seals species relative to 1980, which will be explored in detail below (Figure 3-24). Additionally, estimated beluga whale harvests in 2008 (28 whales) were similar to that of 1980, when 33 were harvested. However, the lb per person harvest in 2008, 25 lb, is only half that of 1980 (52 lb per person).

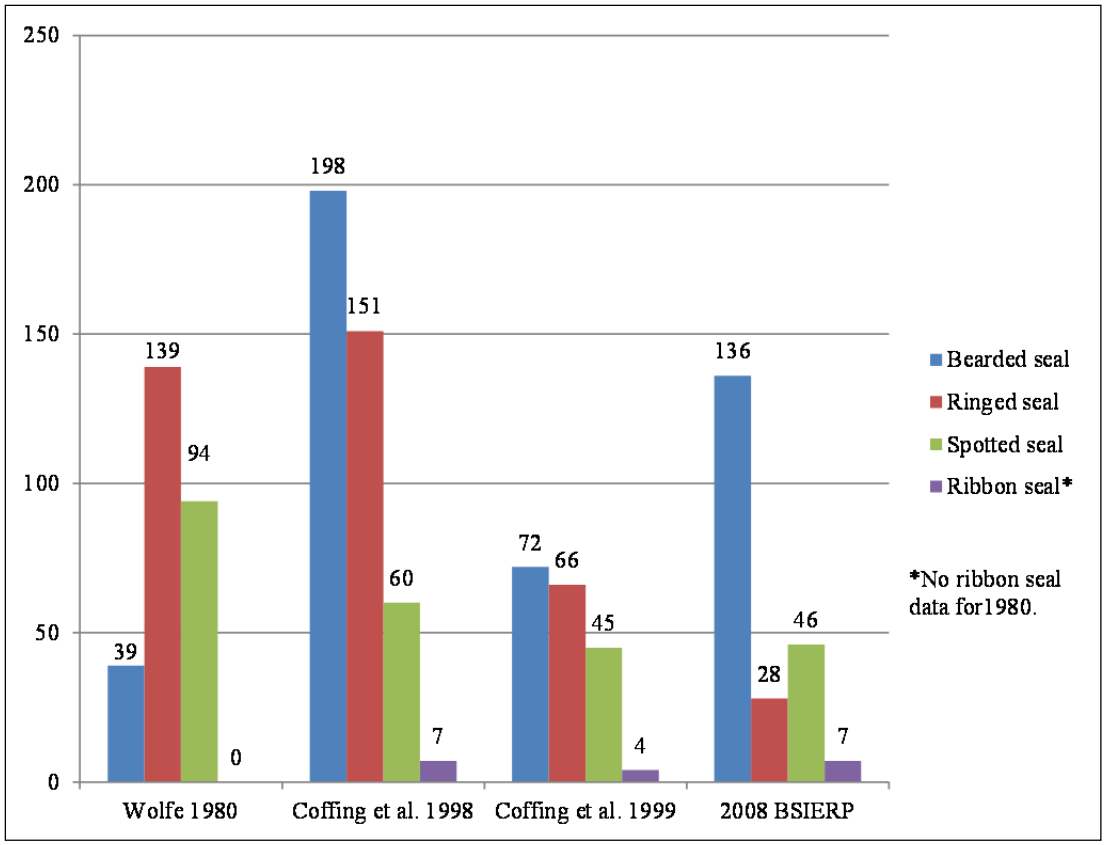


Figure 3-24.–Estimated ice seal harvests, 1980, 1998, 1999, and 2008, Emmonak.

During the 12 month period between June 1980 and May 1981, hunters in Emmonak harvested an estimated 139 ringed seals and 39 bearded seals. Ringed seals were the largest portion of the community's total seal harvest by edible weight. Households harvested an estimated 19 lb of ringed seal per person, compared to an estimated 12 lb of bearded seal and spotted seal respectively per person. Forty-four percent of households reported harvesting ringed seal, compared to 22% of households harvesting bearded seals. Wolfe (1981:154) wrote that it was considered an "average" year for seal harvests, though a poor year for salmon harvests.

The composition of the seal harvest was nearly opposite in 2008, with hunters taking an estimated 136 bearded seals and 28 ringed seals. Correspondingly, the lb per person harvest of bearded seal doubled (to 24 lb per person), while ringed seal harvest (2 lb per person) was just a fraction of the 1980 value. Spotted seal harvest in 2008 (3 lb per person) was just one-quarter of that in 1980 (12 lb per person). Ribbon seals have played a marginal role in Emmonak seal harvests over time. In 1980, none were harvested, and in the 3 subsequent data points (Coffing et al. 1998, 1999; this study), per capita harvest has remained less than 1 pound per person.

Timing of seal harvests also appears to have shifted between 1980 and 2008. In the 1980–1981 harvest year, Emmonak hunters occasionally harvested spotted and adolescent bearded seals in the summer near the Yukon River mouth or in the river itself. Although the community's focus was on salmon fishing, seals might be taken opportunistically by harpoon and gun, or when caught in a salmon net. Intensive sealing occurred from late August until October (prior to freeze-up) and again in the spring. In the fall, the primary species harvested were spotted seals, which sometimes migrated in large numbers near the coast, along with juvenile bearded seals. Spring seal hunting typically began in March and April, although it might begin as early as January and February, at the edge of the landfast ice where open water could be found. Ringed and bearded seals frequented lead areas through the late fall, winter and spring; however,

as Wolfe (1981) notes, severe weather and ice conditions often precluded hunting trips until late winter or spring. Typically, small parties of hunters would travel by snowmachine directly out from the village until they came upon lead areas. Hunting frequently occurred 20–30 miles from shore, and sometimes farther. According to one respondent,

> Timing of *qamigar*[27] is changing. When I was young, before snowmachines came around, my dad and his friends used to get up very early in the morning like 3–4 in the morning start preparing to get their dogs ready and their grubs ready because they have to go maybe 20–30 miles out to find the water. They have to go very, very early in the morning. Early in morning, that's when the seals are more active, you know, and you more chance of catching the seals early, early in the morning. In afternoon and evening they start getting more careful. So early in the morning is the best time….

In 2008, the majority (82%) of the seal harvests took place in the open water months of August through October. Nine percent of harvests took place in summer (June and July). Nine percent of harvests occurred in April and May, presumably at open leads—there were no reported harvest between November and February. While Wolfe did not break down harvest numbers by season, it seems likely that the greater harvest of ringed seals in 1980 were taken in the spring months, where very little spring hunting happened in 2008. (Changes in seal hunting by species will be discussed further below.)

Changes in the location of harvest between 1980 and 2008 may be related to the differences in seasonality of harvest and species harvested between 1980 and 2008. In 2008, the majority of harvest occurred in the fall in open water near the coast or in-river, primarily where one would find bearded seals. Ringed seals may be less abundant, or the dramatic decrease in their harvest may reflect the timing of when hunters are going for seals (in the fall open water rather than at the leads of shorefast ice in spring). Additionally, Wolfe (1981) reported that Emmonak hunters sometimes went out as far as 40 miles in the spring to get to open leads, while in 2008, hunters generally reported going out only 10 to 20 miles.

While marked differences exist between the 1980 and 2008 data on seal species harvested, harvest timing, and harvest location, it appears that some of those changes had already occurred by the late 1990s. Coffing et al. (1998, 1999) documented seal harvesting practices in Emmonak in 1997 and 1998; however they noted that the 1998 seal harvest was particularly poor and not representative of average harvests of the time. As a result, this discussion is limited to the 1997 data. A simple comparison of pound per capita harvests is not possible due to differences in research methodology. In this study (and Wolfe 1981) researchers did not distinguish between different sexes and ages of bearded seals. A conversion factor of 140 edible pounds per bearded seal was used. In Coffing et al. (1998 and 1999) researchers asked about the age and sex of animals harvested and used different conversion factors accordingly. Some comparisons between the data are possible, but better addressed by comparing per capita seal harvests (numbers of seals per person).

By 1997, Coffing et al. (1998) showed the increasing reliance upon bearded seals, with 198 taken, a per person harvest of 0.31 (compared to a 1980 per person harvest of 0.07. In 2008, that value was 0.17 per person. Spotted seal harvests, 0.09 per person, was less than in 1980 (when 0.17 spotted seals per person were harvested) and similar to that of 2008 (0.06 per person.) In terms of harvest timing, Coffing et al. (1998) observed that Emmonak hunters exhibited a pattern of highest harvest of seals during the month of September, similar to the 2008 patterns. Finally, Coffing et al. documented changes in harvest location:

> Hunters report that they often see young bearded seals near the mouth of freshwater tributaries and even miles inside of meandering sloughs during the fall month. Hunters do

27. Translated as "to go seal hunting with a small sled and kayak in the spring," (Jacobson 1984:310).

> not find spotted or ringed seal these [*sic*] inland waterways as frequently as bearded seals. (Coffing et al. 1999:10)

It remains unclear if this harvest shift occurred because of changes in ice formation, the cost of hunting, particularly gas and equipment costs, changing social patterns of knowledge transmission, or all of these. Many key respondents from this study commented on the dangers of hunting out on the ice. They also noted the technological changes which have allowed people to make day hunting trips rather than staying out at seal camp, an important setting where people build their knowledge of ice.

> Them days, when I was growing up, them, my folks used to hunt seals. They don't hunt them in the fall time, cause too far, too much ice. And they hunt what they have around that area. At winter time they go out, they look at the clouds, when open water, that's when they go out. Dog team. Take 'em all day to get down there and when they get down there they overnight, 2–3 nights on top of the ice. Now, let's go! Zip! Zip down, zip back. We got fast machines. Nobody overnights no more. Nowadays. Some of them even go in the afternoon down the coastline.

Hunting seals from ice, where more ringed and spotted seals could potentially be found, is also very dependent on weather and ice conditions (Coffing et al. 1999). One hunter commented on the pattern of declining spring seal hunting, suggesting that "one reason less spring seal hunting is partially attributed to younger hunters not knowing how to, and the ice as well may move, as opposed to previous generations…"

Birds and Eggs

Emmonak hunters harvested less birds by total edible weight in 2008 (11,728 lb) than in 1980 (14,358 lb), although for some species (tundra [whistling] swan, sandhill crane, and ptarmigan) more individual birds were harvested in 2008. Ducks and geese show the greatest change in harvest between the 2 study years; residents of Emmonak harvested an estimated 2,317 ducks of all species in 1980 and 1,746 in 2008, and harvested 1,339 geese in 1980 and 2,138 in 2008. Harvest data were not collected on individual duck or geese species in 1980, thus any change in species composition of duck and geese harvests cannot be assessed. Hunters in 2008 harvested more swans (206 in 1980, 222 in 2008) and cranes (106 in 1980, 128 in 2008) than in 1980, although pounds of swans and cranes per capita decreased because the increases in harvests were not large enough to compensate for the increase in human population over 3 decades (Figure 3-21). Hunters harvested more ptarmigan in 2008 (2,852 birds) than in 1980 (1,078), and this accounted for an increase in ptarmigan harvested per capita from 2.4 lb in 1980 to 3.7 lb in 2008. Quantitative data were not collected for eggs, marine invertebrates, or vegetation in 1980.

DISCUSSION AND CONCLUSIONS

Many researchers have commented on the fact that northern peoples have always lived with a high degree of variability in their physical, economic and political environments, and as a result, the capacity to change is an important part of their cultures (Berkes and Jolly 2001, Condon et al. 1995). Indeed, as earlier noted, many of the respondents emphasized that change itself is not remarkable, but rather is the only constant.

This understanding of change and the need for adaptation as a constant broadens the question of how individuals and communities deal with or adapt to change. Instead, researchers must strive to understand more holistically how different influences work together and how the effects of various influences filter through the entire system, affecting daily and longer-term decisions from spending money on gas to hunt seals on a particular day to altering residence patterns when families choose to catch and process fish from town instead of camp. To do this, these researchers drew on 2 different threads: Berkes and Jolly's (2001) distinction between coping mechanisms and adaptive strategies and Moerlein and Carothers's (2012) insights about what they term the "total environment of change."

According to Berkes and Jolly (2001), coping mechanisms are the immediate responses to situations that threaten livelihoods; they often take the form of emergency responses to unusual seasons or years. In contrast, adaptive strategies are the ways in which individuals and communities actually change their productive activities or modify local patterns to secure their livelihoods. The difference between the 2 can often be measured along a temporal scale; that is, coping strategies are usually short-term while adaptive strategies take longer periods of time to develop and take hold. However, the difference between coping mechanisms and adaptive strategies can also be measured on a spatial scale. Coping mechanisms tend to emerge at the level of the individual or household on a smaller spatial scale while adaptive strategies involve variables such as cultural values or patterns that are usually seen more on the community or regional level.

In both the salmon harvesting and sealing examples discussed above, Emmonak hunters and fishers experience the pressures of short-term decision-making and longer-term adaptations from a variety of influences. Changes in weather patterns (e.g., rainier summers, warmer winters) and the physical environment (e.g., changes in ice formation, changing river channels) affect the ways in which Emmonak residents interact with their landscape and its resources. However, linked economic, technological, and social changes also appear to play an important role in the evolving subsistence practices of local people. For example, Emmonak residents argue that the decline of a commercial fishery in the lower Yukon River, coupled with technological changes and the increasing costs of participating in subsistence activities are related to a decline in the levels of participation in subsistence activities, which in turn affects levels of and the passing on of hunting and fishing knowledge, as described earlier by one respondent.

As such, the reasons behind changes in subsistence practices in Emmonak exceed environmental or climactic causes; rather, environmental or weather related shifts are inextricably linked to other socioeconomic changes and adaptations that influence how Emmonak residents understand and live within their ecosystem. For example, rainier summers and declining salmon returns, along with increasing regulatory restrictions on subsistence fishing shorten the windows available for families to harvest what they need and contribute to changes in fish camp residence. The decline of salmon numbers, which may be related to conditions in the marine environment of the Bering Sea, reduce or eliminate commercial opportunities and as a result, the means by which most families supported other subsistence activities. Thus, it is difficult to evaluate climate related change in isolation from other kinds of changes equally experienced by Emmonak residents. Indeed, Emmonak residents themselves do not make these distinctions except to remind others that change is related to more than just the weather.

> …but now, now since we don't use dog teams any more, we switch to snowmachines and those travel 40–50 miles an hour and it doesn't take an hour or two to travel from our village to go down to the open water. A lot of times, these younger people miss out, they actually miss out on the seals when they are more active early, early in the morning…a lot has changed on our traditional way of hunting or gathering. Ice conditions have changed a lot...the ice out there in the Bering Sea is a lot thinner. You don't see no big thick ice. There used to be a bunch of big icebergs out there where they pile up and you don't see as much as before…it's not more dangerous. It's the way people, their attitude has changed. They're not as careful as before. Just like the change between the dog team and the snowmachine and everything else too. Our younger people don't know the weather. They can't tell how it is going to be if they look, they don't know how to tell the weather no more. A lot of times they get lost or get hurt. They're more prone to accidents and to get lost. Right now we depend on GPS [global positioning system]. That's good, that's a lot of change, on the other hand, those years before GPS came around, the people that go out hunting they have to know the weather.

Emmonak residents remind researchers to consider all changes, or what Moerlein and Carothers (2012) call the "total environment of change," in order to assess and understand their observations of climate

change and the implications of these changes for their subsistence practices. Understanding the total environment of change requires researchers to capture the various and often connected drivers of change—whether they be climate-related, social, political, or economic—and investigate how local residents experience these drivers in ways that shape their subsistence activities.

Further, understanding these connections, this total environment of change, must necessarily occur on the ground in localized places (Berkes and Jolly 2001). Because the subsistence harvesters of most northern communities understand and relate to their landscape through their subsistence activities, these relationships are always inflected through the details of the specific places where people hunt, fish, and gather. How the environment changes is usually first experienced on a small scale in highly localized places, when a particular slough dries enough to block a necessary access way or when the bank at a particular point along the river erodes and fills in an important setnet eddy. This research is consistent with those who discuss the importance of ethnography in research on subsistence and climate change, since many of the important lessons of these changes—how environmental and socioeconomic shifts work in concert to shape human–environment relationships—can only be understood in the places where subsistence hunters, fishers, and harvesters interact with their landscape.

CHAPTER 4: TOGIAK

In February 2009, researchers with the Division of Subsistence ADF&G, along with local research assistants, interviewed a randomly selected sample of 80 of 188 households (43%) in Togiak. Expanding for the unsurveyed households, the results show that residents of Togiak harvested an estimated 243,208 edible pounds of wild fish, land mammals, marine mammals, shellfish, birds and their eggs, and wild plants in 2008, which provided 303 edible pounds per person. This harvest was diverse, with salmon (Chinook, sockeye, coho), other fish (herring spawn on kelp, herring, and Dolly Varden), big game (moose and caribou), harbor/spotted seal, and berries all ranking in the top 10 resources, as estimated in usable pounds. In 2008, Togiak households on average used 27 kinds of wild resources. Table 4-1 lists the resources used for subsistence purposes in Togiak in 2008, along with their scientific and Central Yup'ik names.

As estimated in usable pounds, salmon made up the largest portion of Togiak's 2008 wild resource harvest at 35%. Other fish ranked second at 21%, followed by land mammals (17%), marine mammals (10%), wild plants (8%), birds and eggs (6%), and shellfish (3%).

This chapter summarizes the household survey findings for Togiak, including demographic characteristics, harvest estimates, employment, monetary income, and harvest areas. Harvest estimates are expanded from surveys to account for households that were not interviewed. Additional tables and maps appear in the appendices. Results from this survey are available online in the Division of Subsistence Community Subsistence Information System (CSIS).

ABOUT TOGIAK

Togiak is located on Togiak Bay, about 2 miles southwest of the mouth of the Togiak River, in the Bristol Bay region of southwest Alaska. Dillingham, Bristol Bay's regional center, is 67 miles to the east. Primary access is by air from Dillingham; the community is not on a road system. Togiak is incorporated as a second class city. The Togiak Traditional Council is the Alaska Native tribal governing body.

At the time of the earliest European exploration of the Bristol Bay area in the late 18th century, the present-day Togiak area was occupied by the *Tuyuryarmiut* (also known as the *Togiagamiut*), one of the 3 Central Yup'ik-speaking regional groups of southwest Alaska. The subsistence activities of the *Tuyuryarmiut* included hunting birds, small game, and marine mammals in spring; salmon fishing through the summer; hunting caribou; fishing for whitefish, Alaska blackfish, northern pike and other fish; and trapping beaver in fall; and hunting caribou, trapping furbearers, and fishing through the ice in the winter (VanStone 1984:224, 228–233; see also Wolfe et al. 1984).

The community of Togiak developed at its present location in about 1950 with the founding of a school, as well as the construction of a cannery on the east side of Togiak Bay. It attracted families from other Yup'ik settlements in the Togiak Bay area, such as Old Togiak, Osviak, and villages along the Togiak River, all of which are no longer occupied year-round. Togiak has also drawn population from Yup'ik communities of the Kuskokwim River area (Coiley-Kenner et al. 2003:11; Sepez et al. 2005:481–484; Wolfe et al. 1984).

Table 4-1.–Resources used for subsistence purposes in Togiak, 2008.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Fish			
Pacific salmon			
Chinook salmon	*Oncorhynchus tshawytscha*	*Taryaqvak*	King salmon
Sockeye salmon	*Oncorhynchus nerka*	*Sayak*	Red salmon, "spawnouts" in spawning phase
Coho salmon	*Oncorhynchus kisutch*	*Qakiiyaq*	Silver salmon
Chum salmon	*Oncorhynchus keta*	*Kangitneq*	Dog salmon
Pink salmon	*Oncorhynchus gorbuscha*	*Amaqaayak*	Humpies
Pacific halibut	*Hippoglossus stenolepis*	*Naternarpak*	
Pacific herring-all life stages	*Clupea pallasi*	*Iqalluarpak*	
Herring spawn on kelp		*Melucuaq*	
Herring sac roe		*Meluk*	
Smelts		*Iqalluaq*	
Capelin	*Mallotus vilosus*	*Cikaaq*	
Cods			
Pacific cod	*Gadus macrocephalus*	*Ceturrnaq*	Gray cod
Pacific tomcod	*Microgadus proximus*		
Sculpin (unknown)[b]	*Cottus* spp.	*Kayutak*	
Flounders/soles			
Starry flounder	*Platichthys stellatus*	*Naternaq*	
Trout			
Rainbow trout	*Oncorhynchus mykiss*	*Talaariq*	
Chars			
Dolly Varden–resident and anadromous	*Salvelinus malma*	*Yugyaq*	
		Angyuk	Sea run dollies
		Anerrluaq	Togiak trout
Lake trout	*Salvelinus namaycush*	*Cikignaq*	
Arctic grayling	*Thymallus arcticus*	*Nakrullugpak*	
Northern pike	*Esox lucius*	*Cuukvak*	
Whitefishes			
Round whitefish	*Prosopium cylindraceum*	*Cingikeggliq*	Candlefish
Humpback whitefish	*Coregonus pidschian*	*Uraruq*	
Least cisco	*Coregonus sardinella*	*Cavirutnnaq*	
Alaska blackfish	*Dallia pectoralis*	*Canqiiq*	
Marine invertebrates			
Crabs			
Dungeness crab	*Cancer magister*		
Red king crab	*Paralithodes camtschaticus*	*Pupsulegpak*	
Tanner crab	*Chionoecetes bairdi*	*Pupsulek*	
Clams			
Razor clams		*Aliruaq*	
Alaska razor clam	*Siliqua alta*		
Pacific razor clam	*Siliqua patula*		
Softshell clam	*Mya arenaria*		
Cockles (unknown)[b]		*Tavtaaq*	
Nuttall cockle	*Clinocardium nuttalli*		
Blue mussel	*Mytilus trossulus*	*Amyak*	
Land mammals			
Large land mammals			
Caribou	*Rangifer tarandus*	*Tuntuq*	

-continued-

Table 4-1.–Page 2 of 3.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Land mammals, continued			
Moose	*Alces alces*	*Tuntuvak*	
Brown bear	*Ursus arctos*	*Taqukaq*	
Small land mammals/furbearers			
Beaver	*Castor canadensis*	*Paluqtaq*	
Porcupine	*Erethizon dorsatum*	*Cukilek /Issaluq*	
Gray wolf	*Canis lupus*	*Kegluneq*	
Wolverine	*Gulo gulo*	*Terikaaniaq*	
River otter	*Lutra canadensis*	*Cuignilnguq*	Land otter
Muskrat	*Ondatra zibethicus*	*Kanaqlak*	
Weasel	*Mustela nivalis*	*Narullgiq*	
Lynx	*Lynx canadensis*	*Tertuli*	
Arctic ground squirrel	*Spermophilus parryii*	*Qanganaq*	Parka squirrel
Marten	*Martes* spp.	*Qavcicuar*	
Coyote	*Canis latrans*	*Kayu*	
Marine mammals			
Harbor seal/spotted seal	*Phoca vitulina, Phoca largha*	*Issuriq*	
Steller sea lion	*Eumetopias jubatus*	*Uginaq*	
Ringed seal	*Pusa hispida*	*Nayiq*	
Bearded seal	*Erignathus barbatus*	*Maklak*	
Walrus	*Odobenus rosmarus*	*Asveq*	
Harbor porpoise	*Phocoena phocoena*	*Mangayaaq*	
Birds			
Geese			
Canada geese	*Branta hutchinsii* spp.	*Lagiq*	Cacklers
Lesser Canada goose	*Branta canadensis*	*Lagirpak*	
White-fronted geese	*Anser* spp.	*Neqleq*	Specklebelly
Brant	*Branta bernicla*	*Neqlernaq*	Sea geese
Emperor goose	*Chen canagica*	*Nacaullek*	
Snow goose	*Chen caerulescens*	*Kanguq*	
Swans			
Tundra swan	*Cygnus columbianus*	*Qugyuk*	Whistling swan
Trumpeter swan	*Cygnus buccinator*	*Qugyuk*	
Sandhill crane	*Grus canadensis*	*Qucillgaq*	
Ducks			
Mallard	*Anas platyrhynchos*	*Uqulkatagpak*	
Northern pintail	*Anas acuta*	*Uqulkataq*	
Goldeneyes (unknown)[b]	*Bucephala* spp.	*Anarnissakaq*	
Northern shoveler	*Anas clypeata*	*Sugg'Erpak*	
Green-winged teal	*Anas crecca*	*Tengesqaaraq*	
Harlequin duck	*Histrionicus histrionicus*	*Cetusqaar*	
Scaup (unknown)[b]	*Aythya* spp.	*Kip'Alek*	
Wigeon (unknown)[b]	*Anas* spp.	*Qatkegaliq*	
Long-tailed duck	*Clangula hyemalis*	*Aarraangiiq*	Oldsquaw
Canvasback	*Aythya valisineria*		
Common merganser	*Mergus merganser*	*Payirpak*	
Red-breasted merganser	*Mergus serrator*	*Payiq*	
Black scoter	*Melanitta nigra*	*Kukumyar*	Black duck
Common eider	*Somateria mollissima*	*Metrag*	
King eider	*Somateria spectabilis*	*Qenallek*	

-continued-

Table 4-1.–Page 3 of 3.

Common English name	Scientific name	Central Yup'ik name[a]	Other names
Birds, continued			
Seabirds and loons			
Kittiwakes	*Rissa* spp.		
Upland game birds			
Ptarmigan	*Lagopus* spp.	*Qangqiiq*	
Spruce grouse	*Dendragapus canadensis*	*Egtuk*	
Eggs			
Gull eggs	*Larus* spp.	*Naru'Yaq*	
Murre eggs	*Uria* spp.	*Alpak*	
Geese eggs[b]		*Neqleq*	
Duck eggs[b]		*Yaqulek*	
Swan eggs[b]		*Qugyuk*	
Tern eggs[b]		*Tekiyaar*	
Common snipe eggs	*Gallinago gallinago*	*Kukukuaq*	
Cormorant eggs	*Phalacrocorax* spp.	*Uyalek*	
Unknown eggs[b]		*Kayanguq*	
Wild plants			
Berries			
Blueberry	*Vaccinium* sp.	*Suraq*	
Lowbush cranberry	*Vaccinium vitis idaea*	*Tumagliq*	
Highbush cranberry	*Viburnum edule*	*Kitngpak*	
Crowberry	*Empetrum nigrum L.*	*Tan'Gerpak*	Blackberry
Huckleberry	*Vaccinium parvifolium*	*Surav'Ak*	
Raspberry	*Rubus idaeus*		Red raspberry
Salmonberry	*Rubus spectabilis*	*Atsalugpiaq*	
Other plants			
Fiddlehead ferns	*Dryopteridaceae* spp.	*Ceturkaaq*	
Sourdock	*Rumex arcticus*	*Quagciq*	
Hudson's Bay tea	*Ledum palustre*	*Ayuk*	Labrador tea, muskeg tea
Stinkweed	*Artemisia Tilesii*	*Naunerrluk*	Wormwood, Alaska sage
Sea chickweed	*Honckenya peploides*	*It'Garralek*	Beach greens
Cow parsnip	*Heracleum lanatum*	*Tarnaq*	Wild celery
Firewood		*Eqiaq/ Murak*	

Source ADF&G Division of Subsistence household surveys, 2008.

a. Blank cell indicates that a specific Central Yup'ik name was not verified.

b. A specific species was not identified.

Presently, facilities in Togiak include the Togiak Sub-Regional Health Clinic, operated by the Bristol Bay Area Health Corporation. Most homes are connected to a piped water and sewer system as well as electricity supplied by a diesel generator. There is school for grades kindergarten through 12 with 229 students in 2011[28]. In the community are 2 stores, a gasoline station, and a fuel delivery service. An air taxi service operates between Togiak and Dillingham. There is also a public library and cultural center.

In 2010, Togiak Seafoods, a salmon processing facility, opened in Togiak, jointly owned by the Togiak Traditional Council (through funds provided by the Bristol Bay Economic Development Corporation) and Copper River Seafoods. The facility employed community residents. This facility was not yet operating when the Division's household survey was conducted. Another processor, Togiak Fisheries, owned by North Pacific Seafoods of Seattle, operated on the east side of Togiak Bay.

RESEARCH METHODS

The Togiak Traditional Council (TTC), and the TCC administrator and staff were involved in Regional Advisory Board (RAB) meetings to plan for the BSIERP. Ted Krieg with the Division of Subsistence worked closely with the TCC to review the research plan and prepare for the start of the household surveys in February 2009. On January 22, 2009, Krieg traveled to Togiak to meet with the TCC administrator and attend the Togiak ADF&G advisory committee meeting, where he presented the BSIERP project plans. Before baseline surveys began in February 2009, a community meeting took place to inform residents about the surveys and BSIERP.

Community advisory boards (CAB), made up of community members in each study community, were part of the BSIERP design. The CABs provided an avenue for the communities to have direct input into BSIERP. In Togiak, 6 CAB members were selected by the TTC. The initial meeting of the Togiak CAB took place on February 23, 2009 while the subsistence harvest surveys were being conducted. The CAB recommended that 5 resources be the core of the "local and traditional knowledge" (LTK) research for Togiak, which was to begin following the availability of the preliminary results of the household surveys. Those resources were bearded seals, walrus, herring, herring roe on kelp, and halibut. To some degree, the CAB believed that all of these resources were impacted and disturbed by human actions and behaviors. This direction helped prepare the interview protocol for the LTK key respondent interview portion of the project, which took place from February 1–12, 2010, about a year after the survey was administered.

From February 5–28, 2009, when the baseline comprehensive subsistence harvest surveys were being conducted, the Bering Sea Subsistence Network (BSSN) was also administering surveys about selected subsistence activities in Togiak. Based on earlier coordination through the RAB, the BSSN project was scheduled to be completed well in advance of the BSIERP surveys, but BSSN encountered unanticipated delays. The BSIERP survey timeline could not be delayed to avoid the overlap. Togiak residents received a monetary stipend for participating in the BSSN survey. Baseline subsistence surveys conducted by the Division of Subsistence are voluntary and do not include a stipend as an incentive. Research goals and questions for the 2 projects were quite different. However, despite efforts to inform community residents about the distinctiveness of the 2 projects, some residents, when asked to participate in the BSIERP survey, appeared to perceive no differences between the 2 surveys. In these cases, residents said that they felt that they were being asked to do the same survey twice and did not want to participate in 2 surveys back to back, especially if the second survey was not providing any payment. These factors likely resulted in a higher refusal rate for the BSIERP surveys than is usually encountered in Division of Subsistence projects.

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28. Alaska Community Database Community Information Summaries (CIS). State of Alaska, Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, Juneau. http://www.commerce.state.ak.us/dca/commdb/CF_CIS.htm. Hereinafter cited as ADCCED 2011. (Accessed October 3, 2011).

The project established a goal of 80 household surveys, approximately 40% of the initial estimate of 197 year-round households in Togiak. A random sample was drawn from household lists developed with the assistance of the TTC. The goal of 80 surveys was achieved, a sample of 42% of the adjusted estimate of 188 year round households (Table 4-2). As discussed above, the project encountered an unusually high refusal rate, 35% of the 123 contacted households. In the previous household survey conducted by the Division in Togiak in 2000, the refusal rate was 7% (7 of 107 contacted households) (Coiley-Kenner et al. 2003:7).

Table 4-2.–Sampling and participation, Togiak, 2008.

	Households
Initial estimated number of households	197
Interview goal	80
Households interviewed	80
Households failed to contact	10
Households declined to participate	43
Refusal rate[a]	35.0%
Moved/nonresident households[b]	9
Adjusted final estimated number of households	188
Percentage of households interviewed	42.6%
Percentage of interview goal achieved	100.0%

Source ADF&G Division of Subsistence household surveys, 2009.

a. Equal number of refusals/number of refusals + number of interviews.

b. Households that were not present during the study year or resident in the community for less than 3 months, + households that had moved from the community.

Following preliminary data analysis, a community review meeting took place the evening of February 10, 2010 to present the draft survey data and harvest area maps. Nick Bond, one of the BSIERP scientific researchers from NOAA, also attended the meeting. He gave a presentation on climate and sea ice changes and exchanged information with the attendees.

At a TTC meeting on February 12, 2010, Krieg presented the draft survey data and harvest area maps for council review. Some CAB members were also members of the TTC, thus the CAB was represented for the data review. The data were well received and generated some discussion. Most notably, TTC members expressed surprise that subsistence harvests for the study year (2008) for Togiak, as estimated in usable pounds per person, were less than for Emmonak and Akutan, the other 2 BSIERP study communities surveyed by the Division. One council member speculated that Togiak has more opportunity to earn cash income in comparison to the communities “up north,” and therefore is able to buy more food in stores. Although the perception among TCC members remained that Togiak used more subsistence foods than indicated by the survey results, they found this explanation of the difference between Togiak and the other study communities plausible.

LTK interviews took place in Togiak from February 1–12, 2010. In total, 11 key respondents were interviewed, in both English and Central Yup’ik. The interviews followed a protocol based on CAB direction to focus on 5 resources of particular interest: bearded seals, walrus, herring, herring spawn on kelp, and halibut. However, respondents covered a much wider range of topics that explored ecosystem changes in the Togiak area and other factors that affect local resources (such as commercial fisheries), as well as traditional Yup’ik natural resource management practices and traditional values. A separate

summary of the LTK interviews has been prepared (Krieg 2011), but selections from these interviews are included in this overview to provide context for the household survey findings.

DEMOGRAPHY

Table 4-3 and Figure 4-1 report population estimates for Togiak from 1960 through 2010. Based on federal census results, the community experienced steady growth from a population of 220 in 1960 to 809 in 2000, followed by a relatively stable population from 2000 to 2010. The federal census estimate was 817 for 2010 (U. S. Census Bureau 2011a). For 2008, this study estimated Togiak's population at 801 (Table 4-4). Of this, 94% (754 people) were of Alaska Native heritage. The 2010 federal census found that 94% of Togiak's population in 2010 was Alaska Native/American Indian (U. S. Census Bureau 2011a). According to findings of the U.S. Census Bureau's "American Community Survey," for the period 2005–2009, 69% of Togiak's population over the age of 5 spoke a language "other than English" at home, and 29% of this population spoke English "less than very well" (U.S. Census Bureau 2010) About 2% of those who did not use English at home used Spanish and the rest used an unspecified "other language" (ADLWD 2011). Central Yup'ik is most likely this "other language."

Table 4-3.–Historical population, Togiak, 1950–2010.

Year	U.S. Census (count)	Alaska Department of Labor (estimate)
1950	108	ND
1960	220	ND
1970	383	ND
1980	470	ND
1990	613	ND
1991	ND	610
1992	ND	641
1993	ND	670
1994	ND	657
1995	ND	703
1996	ND	736
1997	ND	760
1998	ND	799
1999	ND	841
2000	809	ND
2001	ND	784
2002	ND	804
2003	ND	815
2004	ND	797
2005	ND	774
2006	ND	775
2007	ND	774
2008	ND	788
2009	ND	808
2010	817	ND

Sources U.S. Census Bureau, 2011 and Alaska Department of Labor and Workforce Development, 2011.
ND = No data.

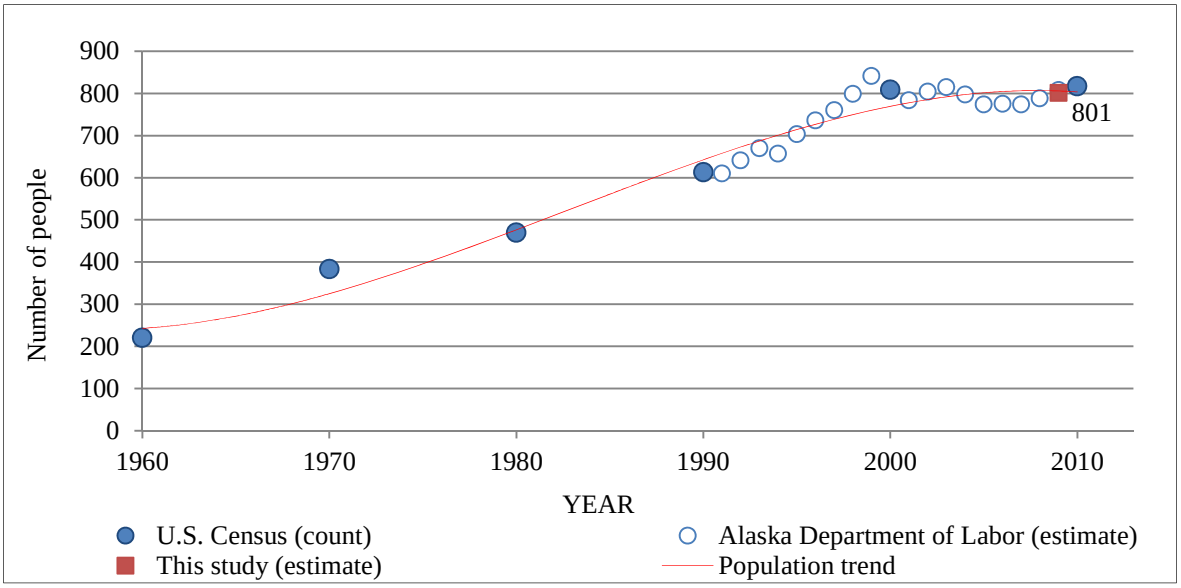

Figure 4-1.–Historical population, Togiak

Table 4-4.–Demographic characteristics of Togiak, 2008.

Sampled households	80
Number of households in the community	188
Percentage of households sampled	42.6%
Estimated population	801.4
Household size	
Mean	4.3
Minimum	1
Maximum	12
Age	
Mean	28.0
Minimum	0.0
Maximum	90.0
Median	22.0
Length of residency–population	
Mean	23.0
Minimum	0.0
Maximum	84.0
Length of residency–household heads	
Mean	37.2
Minimum	2.0
Maximum	79.0
Sex	
Males	
Number	173.0
Percentage	50.7%
Females	
Number	168.0
Percentage	49.3%
Alaska Native	
Households (either head)	
Number	178.6
Percentage	95.0%
Estimated population	
Number	754.4
Percentage	94.1%

Source ADF&G Division of Subsistence household surveys, 2009.

Figure 4-2 and Table 4-5 are population profiles for Togiak for 2008. Of the total population, 51% was male and 49% was female. The average age was 28 years, with 45% of the community age 19 years or less. Household heads, on average, had lived in Togiak for 37 years (Table 4-4). Of all household heads, 76% were born in Togiak, 8% were born in other Bristol Bay places, 11% in other Alaska communities. Only 4% of Togiak household heads were born outside of Alaska (Table 4-6).

Table 4-5.–Population profile, Togiak, 2008.

	Male			Female			Total		
Age	Number	Percentage	Cumulative percentage	Number	Percentage	Cumulative percentage	Number	Percentage	Cumulative percentage
0–4	61.1	15.0%	15.0%	54.1	13.7%	13.7%	115.2	14.4%	14.4%
5–9	30.6	7.5%	22.5%	42.3	10.7%	24.4%	72.9	9.1%	23.5%
10–14	54.1	13.3%	35.8%	40.0	10.1%	34.5%	94.0	11.7%	35.2%
15–19	28.2	6.9%	42.8%	47.0	11.9%	46.4%	75.2	9.4%	44.6%
20–24	42.3	10.4%	53.2%	23.5	6.0%	52.4%	65.8	8.2%	52.8%
25–29	30.6	7.5%	60.7%	23.5	6.0%	58.3%	54.1	6.7%	59.5%
30–34	21.2	5.2%	65.9%	28.2	7.1%	65.5%	49.4	6.2%	65.7%
35–39	7.1	1.7%	67.6%	11.8	3.0%	68.5%	18.8	2.3%	68.0%
40–44	21.2	5.2%	72.8%	25.9	6.5%	75.0%	47.0	5.9%	73.9%
45–49	30.6	7.5%	80.3%	9.4	2.4%	77.4%	40.0	5.0%	78.9%
50–54	25.9	6.4%	86.7%	21.2	5.4%	82.7%	47.0	5.9%	84.8%
55–59	18.8	4.6%	91.3%	28.2	7.1%	89.9%	47.0	5.9%	90.6%
60–64	9.4	2.3%	93.6%	7.1	1.8%	91.7%	16.5	2.1%	92.7%
65–69	2.4	0.6%	94.2%	11.8	3.0%	94.6%	14.1	1.8%	94.4%
70–74	9.4	2.3%	96.5%	4.7	1.2%	95.8%	14.1	1.8%	96.2%
75–79	7.1	1.7%	98.3%	2.4	0.6%	96.4%	9.4	1.2%	97.4%
80–84	2.4	0.6%	98.8%	9.4	2.4%	98.8%	11.8	1.5%	98.8%
85–90	0.0	0.0%	98.8%	2.4	0.6%	99.4%	2.4	0.3%	99.1%
90+	2.4	0.6%	99.4%	0.0	0.0%	99.4%	2.4	0.3%	99.4%
Missing	2.4	0.6%	100.0%	2.4	0.6%	100.0%	4.7	0.6%	100.0%
Total	**406.6**	**50.7%**		**394.8**	**49.3%**		**801.4**	**100.0%**	

Source ADF&G Division of Subsistence household surveys, 2009.

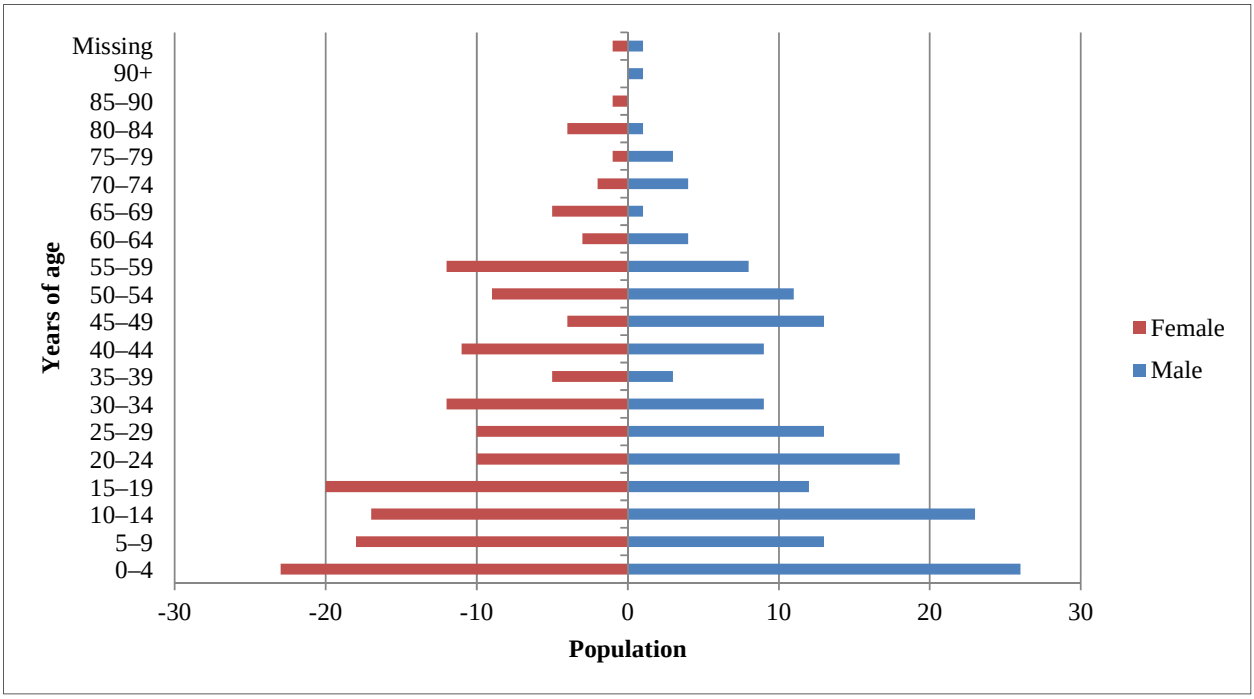

Figure 4-2.–Population profile for Togiak, 2008.

Table 4-6.–Place of birth of household heads, Togiak 2008.

Birthplace	Percentage of household heads
Togiak	75.5%
Aleknagik	0.6%
Angel Bay[a]	0.3%
Dillingham	0.3%
Igushik[a]	0.3%
Itsualnark[b]	0.3%
Manokotak	2.4%
Nunachuak[a]	0.3%
Nanvaurluq[a]	0.3%
Old Togiak[a]	0.3%
Osviak[a]	1.2%
Qissiang/Qissiangaq (Gechiak) [a]	1.2%
Twin Hills	0.3%
Subtotal, other Bristol Bay area	**7.7%**
Akiachak	0.3%
Anchorage	2.4%
Bethel	1.8%
Cuukvagtalek[b]	0.3%
Eek	0.3%
Emmonak	0.3%
Goodnews Bay	1.5%
Hooper Bay	0.3%
Kasigluk	0.9%
Kwethluk	0.3%
Nunapitchuk	0.3%
Platinum	1.2%
Quinhagak	0.6%
Tuluksak	0.3%
Yukon Flats area	0.3%
Subtotal, Other Alaska	**10.9%**
Other U.S.	4.4%
Missing	1.5%

Source ADF&G Division of Subsistence household surveys, 2009.

Note "Place of birth" means place of residence of the person's parents when the person was born.

a. Former villages and fish camps, with known or likely locations and spellings.

b. Former villages and fish camps, uncertain locations and spellings.

SEASONAL ROUND OF RESOURCE HARVESTS

Coiley-Kenner et al. (2003:31–35) provide a description of the seasonal round of subsistence activities by Togiak residents in the late 1990s and early 2000s, which was still followed in 2008 (see also Wolfe et al. 1984:326–333). The seasonal round begins with the break-up of sea ice in late March and early April, during which marine mammal hunting takes place, followed by harvests of herring, herring spawn on kelp, migratory birds and their eggs, clams, and wild plants in May and June. Salmon harvests begin with

Chinook (king) salmon in June and early July, followed by sockeye, pink, chum, and coho salmon through September. Harvests of spawning sockeye salmon occur in August and September. Harvests of marine fish, such as halibut and founder take place in the summer, often in association with commercial fishing activities. Harvests of freshwater species (Dolly Varden, whitefish, trout, Arctic grayling) occur in open water from late August into mid-November. Subsistence activities in the fall, beginning in August and extending into October, include hunting moose, caribou, small game, birds, and marine mammals, and gathering berries and other plants. With freeze-up in November, fishing through the ice for smelt, Dolly Varden, trout, and northern pike takes place into March. Winter subsistence activities include hunting large game, seals, ptarmigan, and small game, and trapping furbearers. Gathering of wood for home heating and steam baths takes place year-round.

WILD RESOURCE HARVESTS AND USES IN 2008

In the 2008 study year, 98% of Togiak households used at least one wild resource; 96% engaged in fishing, hunting, or gathering activities; 96% were successful harvesters of at least one wild resource; 94% received gifts of wild resources from other households; and 90% gave wild resources to other households. On average, Togiak households used 27 different kinds of wild resources in 2008, attempted to harvest 18 kinds, successfully harvested 16 kinds, received gifts of 16 kinds, and gave away 12 kinds (Table 4-7).

On average, Togiak households harvested 1,294 lb of wild foods in 2008, 303 lb per person (Table 4-7, Table 4-8). Salmon made up the largest portion of this harvest as measured in pounds usable weight, at 106 lb per person, 35% of total harvests (Table 4-8, Figure 4-3). Fish other than salmon ranked second, at 63 lb per person (21%), followed by land mammals (52 lb per person, 17%), marine mammals (32 lb per person, 11%), wild plants (23 lb per person, 8%), birds and eggs (17 lb per person, 6%), and shellfish (10 lb per person, 3%).

Ten resources made up about 75% of the total harvest in Togiak in 2008, as measured in pounds usable weight. These were Chinook salmon (16% of all resources harvested), sockeye salmon (9%), caribou (8%), moose (8%), spotted/harbor seals (8%), herring spawn on kelp (7%), berries (6%), herring (5%), coho salmon (4%), and Dolly Varden (4%) (Table 4-8, Figure 4-4). Resources used by the most Togiak households in 2008 included berries (90% using), Chinook salmon (88%), sockeye salmon (85%), Dolly Varden (83%), caribou (83%), moose (83%), cockles (83%), spotted/harbor seals (81%), other plants (80%), and herring spawn on kelp (79%) (Table 4-8).

Table 4-7.–Harvest and use characteristics of Togiak, 2008.

Mean number of resources used per household	27.1
Minimum	0.0
Maximum	53.0
95% confidence limit (±)	6.5%
Median	28.0
Mean number of resources attempted to harvest per household	17.8
Minimum	0.0
Maximum	43.0
95% confidence limit (±)	11.3%
Median	16.0
Mean number of resources harvested per household	16.3
Minimum	0.0
Maximum	40.0
95% confidence limit (±)	11.5%
Median	13.0
Mean number of resources received per household	15.7
Minimum	0.0
Maximum	51.0
95% confidence limit (±)	10.7%
Median	15.0
Mean number of resources given away per household	11.9
Minimum	0.0
Maximum	44.0
95% confidence limit (±)	13.8%
Median	9.5
Mean household harvest, pounds	1,293.7
Minimum	0.0
Maximum	6,646.8
Total pounds harvested	243,207.9
Community per capita harvest, pounds	303.5
Percent using any resource	97.5%
Percent attempting to harvest any resource	96.3%
Percent harvesting any resource	96.3%
Percent receiving any resource	93.8%
Percent giving away any resource	90.0%
Number of households in sample	80
Number of resources available	126

Source ADF&G Division of Subsistence household surveys, 2009.

Table 4-8.–Estimated harvests and uses of wild resources in Togiak, 2008.

	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95%
Resource name(s)	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	confidence limit
All resources	**97.5%**	**96.3%**	**96.3%**	**93.8%**	**90.0%**	**243,207.9**	**1,293.7**	**303.5**				**13.2%**
Fish	**97.5%**	**92.5%**	**91.3%**	**87.5%**	**81.3%**	**135,782.1**	**722.2**	**169.4**				**14.0%**
Salmon	**96.3%**	**87.5%**	**86.3%**	**70.0%**	**57.5%**	**84,980.3**	**452.0**	**106.0**	**15,232.6**	**81.0**	**ind**	**14.5%**
Chum salmon	50.0%	37.5%	41.3%	18.8%	18.8%	6,627.3	35.3	8.3	1,440.7	7.7	ind	27.6%
Coho salmon	72.5%	60.0%	60.0%	32.5%	32.5%	10,497.2	55.8	13.1	2,173.3	11.6	ind	24.7%
Chinook salmon	87.5%	76.3%	75.0%	51.3%	47.5%	40,225.7	214.0	50.2	3,643.6	19.4	ind	16.0%
Pink salmon	35.0%	22.5%	26.3%	18.8%	12.5%	1,644.1	8.7	2.1	634.8	3.4	ind	28.2%
Sockeye salmon	85.0%	66.3%	67.5%	43.8%	38.8%	21,223.1	112.9	26.5	4,958.7	26.4	ind	19.4%
Spawnouts	71.3%	38.8%	40.0%	45.0%	27.5%	4,762.9	25.3	5.9	2,381.4	12.7		22.4%
Spawning sockeye	71.3%	38.8%	40.0%	45.0%	27.5%	4,762.9	25.3	5.9	2,381.4	12.7	ind	22.4%
Nonsalmon fish	**93.8%**	**85.0%**	**83.8%**	**81.3%**	**72.5%**	**50,801.7**	**270.2**	**63.4**	**14,962.2**	**79.6**		**22.9%**
Herring	33.8%	17.5%	16.3%	21.3%	15.0%	11,660.7	62.0	14.6	1,943.5	10.3	gal	70.2%
Herring roe	78.8%	32.5%	30.0%	58.8%	45.0%	16,211.5	86.2	20.2	2,315.9	12.3		26.7%
Herring sac roe	10.0%	3.8%	3.8%	6.3%	5.0%	213.9	1.1	0.3	30.6	0.2	gal	65.6%
Herring spawn on kelp	78.8%	31.3%	28.8%	58.8%	45.0%	15,997.6	85.1	20.0	2,285.4	12.2	gal	26.9%
Smelt	73.8%	67.5%	65.0%	31.3%	46.3%	7,778.7	41.4	9.7	1,112.5	5.9		17.0%
Capelin (grunion)	2.5%	1.3%	1.3%	1.3%	0.0%	7.6	0.0	0.0	2.4	0.0	ind	0.0%
Rainbow smelt	73.8%	67.5%	65.0%	31.3%	46.3%	7,771.1	41.3	9.7	1,110.2	5.9	gal	16.9%
Cod	6.3%	3.8%	3.8%	2.5%	0.0%	52.6	0.3	0.1	16.5	0.1		68.9%
Pacific cod (gray)	2.5%	1.3%	1.3%	1.3%	0.0%	7.5	0.0	0.0	2.4	0.0	ind	0.0%
Pacific tomcod	3.8%	2.5%	2.5%	1.3%	0.0%	45.1	0.2	0.1	14.1	0.1	ind	80.3%
Flounder	8.8%	6.3%	6.3%	2.5%	2.5%	239.7	1.3	0.3	79.9	0.4		58.8%
Starry flounder	8.8%	6.3%	6.3%	2.5%	2.5%	239.7	1.3	0.3	79.9	0.4	ind	58.8%
Halibut	32.5%	7.5%	7.5%	27.5%	8.8%	85.1	0.5	0.1	85.1	0.5	lb	95.0%
Sculpin	7.5%	2.5%	3.8%	5.0%	0.0%	7.1	0.0	0.0	14.3	0.1	ind	83.7%
Sole	2.5%	1.3%	2.5%	1.3%	0.0%	16.5	0.1	0.0	16.5	0.1		114.3%
Yellowfin sole	2.5%	1.3%	2.5%	1.3%	0.0%	16.5	0.1	0.0	16.5	0.1	ind	114.3%
Alaska blackfish	10.0%	0.0%	0.0%	10.0%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Burbot	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Char	82.5%	65.0%	65.0%	46.3%	41.3%	9,483.4	50.4	11.8	6,773.9	36.0		20.8%

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Table 4-8.–Page 2 of 7.

Resource name(s)	Percentage of households: Use	Attempt	Harvest	Receive	Gave	Estimated pounds harvested: Harvested	Mean household	Per capita	Estimated amount harvested[a]: Harvested	Mean household	Unit	95% confidence limit
Fish, continued												
Dolly Varden	82.5%	63.8%	63.8%	46.3%	41.3%	9,450.3	50.3	11.8	6,750.2	35.9	ind	20.9%
Dolly Varden–freshwater	75.0%	58.8%	58.8%	37.5%	35.0%	7,024.2	37.4	8.8	5,017.3	26.7	ind	20.8%
Dolly Varden–saltwater	17.5%	7.5%	8.8%	10.0%	3.8%	784.5	4.2	1.0	560.3	3.0	ind	75.9%
Lake trout	5.0%	5.0%	5.0%	0.0%	1.3%	33.1	0.2	0.0	23.6	0.1	ind	73.1%
Arctic grayling	16.3%	8.8%	8.8%	10.0%	3.8%	57.9	0.3	0.1	82.7	0.4	ind	51.9%
Northern pike	42.5%	28.8%	26.3%	25.0%	20.0%	4,066.4	21.6	5.1	1,452.3	7.7	ind	34.3%
Longnose sucker	1.3%	1.3%	1.3%	0.0%	1.3%	105.8	0.6	0.1	70.5	0.4	ind	112.3%
Trout	28.8%	22.5%	22.5%	7.5%	10.0%	536.3	2.9	0.7	383.1	2.0	ind	46.1%
Rainbow trout	27.5%	21.3%	21.3%	7.5%	8.8%	493.5	2.6	0.6	352.5	1.9	ind	49.7%
Whitefishes	26.3%	16.3%	15.0%	17.5%	7.5%	500.1	2.7	0.6	615.7	3.3		66.3%
Broad whitefish	1.3%	1.3%	1.3%	1.3%	1.3%	282.0	1.5	0.4	70.5	0.4	ind	113.1%
Cisco	22.5%	15.0%	13.8%	12.5%	5.0%	218.1	1.2	0.3	545.2	2.9		40.9%
Least cisco	22.5%	15.0%	13.8%	12.5%	5.0%	218.1	1.2	0.3	545.2	2.9	ind	40.9%
Humpback whitefish	3.8%	1.3%	0.0%	3.8%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Round whitefish	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Land mammals	**92.5%**	**61.3%**	**50.0%**	**83.8%**	**50.0%**	**41,650.2**	**221.5**	**52.0**	**559.3**	**3.0**		**20.7%**
Large land mammals	92.5%	52.5%	37.5%	78.8%	47.5%	40,279.0	214.3	50.3	173.9	0.9		20.9%
Black bear	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Brown bear	3.8%	1.3%	1.3%	2.5%	0.0%	799.0	4.3	1.0	2.4	0.0	ind	114.3%
Caribou	82.5%	38.8%	30.0%	65.0%	36.3%	20,445.0	108.8	25.5	136.3	0.7		23.3%
Caribou, bull	82.5%	38.8%	30.0%	65.0%	36.3%	14,100.0	75.0	17.6	94.0	0.5	ind	28.5%
Caribou, cow	82.5%	38.8%	30.0%	65.0%	36.3%	2,115.0	11.3	2.6	14.1	0.1	ind	52.7%
Caribou, unknown sex	82.5%	38.8%	30.0%	65.0%	36.3%	4,230.0	22.5	5.3	28.2	0.2	ind	57.7%
Moose	82.5%	46.3%	18.8%	67.5%	32.5%	19,035.0	101.3	23.8	35.3	0.2		26.8%
Moose, bull	82.5%	46.3%	18.8%	67.5%	32.5%	16,497.0	87.8	20.6	30.6	0.2	ind	29.2%
Moose, cow	82.5%	46.3%	18.8%	67.5%	32.5%	0.0	0.0	0.0	0.0	0.0	ind	
Moose, unknown sex	82.5%	46.3%	18.8%	67.5%	32.5%	2,538.0	13.5	3.2	4.7	0.0	ind	80.3%

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Table 4-8.–Page 3 of 7.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Land mammals, continued												
Small land mammals	**47.5%**	**33.8%**	**32.5%**	**28.8%**	**21.3%**	**1,371.2**	**7.3**	**1.7**	**385.4**	**2.1**		**37.0%**
Beaver	35.0%	20.0%	17.5%	20.0%	12.5%	966.4	5.1	1.2	110.5	0.6	ind	44.6%
Coyote	1.3%	1.3%	1.3%	0.0%	1.3%	0.0	0.0	0.0	2.4	0.0	ind	
Fox	6.3%	3.8%	3.8%	2.5%	0.0%	0.0	0.0	0.0	11.8	0.1		
Arctic fox	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Red fox	6.3%	3.8%	3.8%	2.5%	0.0%	0.0	0.0	0.0	11.8	0.1	ind	
Red Fox–cross phase	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Hare	16.3%	8.8%	7.5%	10.0%	3.8%	56.4	0.3	0.1	28.2	0.2		45.2%
Arctic hare	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Snowshoe hare	6.3%	3.8%	2.5%	3.8%	0.0%	18.8	0.1	0.0	9.4	0.1	ind	80.3%
Alaska hare (jackrabbit)	10.0%	6.3%	5.0%	6.3%	3.8%	37.6	0.2	0.0	18.8	0.1	ind	56.1%
Unknown hare	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
River (land) otter	10.0%	6.3%	6.3%	6.3%	2.5%	0.0	0.0	0.0	37.6	0.2	ind	
Lynx	1.3%	1.3%	1.3%	0.0%	0.0%	9.4	0.1	0.0	2.4	0.0	ind	114.3%
Marten	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Mink	2.5%	0.0%	0.0%	2.5%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Muskrat	2.5%	1.3%	1.3%	1.3%	1.3%	1.8	0.0	0.0	2.4	0.0	ind	114.3%
Porcupine	21.3%	10.0%	10.0%	11.3%	2.5%	263.2	1.4	0.3	32.9	0.2	ind	41.5%
Squirrel	6.3%	5.0%	3.8%	2.5%	1.3%	74.0	0.4	0.1	148.1	0.8		95.2%
Arctic ground (parka) squirrel	6.3%	5.0%	3.8%	2.5%	1.3%	74.0	0.4	0.1	148.1	0.8	ind	95.2%
Red (tree) squirrel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Weasel	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gray wolf	5.0%	3.8%	2.5%	2.5%	1.3%	0.0	0.0	0.0	7.1	0.0	ind	
Wolverine	2.5%	2.5%	1.3%	1.3%	0.0%	0.0	0.0	0.0	2.4	0.0	ind	
Marine mammals	**85.0%**	**51.3%**	**46.3%**	**61.3%**	**57.5%**	**25,542.2**	**135.9**	**31.9**	**361.9**	**1.9**		**23.6%**
Porpoise	2.5%	1.3%	1.3%	1.3%	1.3%	105.8	0.6	0.1	2.4	0.0		114.3%
Harbor porpoise	2.5%	1.3%	1.3%	1.3%	1.3%	105.8	0.6	0.1	2.4	0.0	ind	114.3%
Seal	82.5%	50.0%	45.0%	55.0%	53.8%	20,172.4	107.3	25.2	350.2	1.9		25.3%
Seal, unknown sex	2.5%	0.0%	0.0%	2.5%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Bearded seal	5.0%	5.0%	2.5%	3.8%	2.5%	827.2	4.4	1.0	4.7	0.0		80.3%
Bearded seal, unknown sex	5.0%	5.0%	2.5%	3.8%	2.5%	827.2	4.4	1.0	4.7	0.0	ind	80.3%

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Table 4-8.–Page 4 of 7.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Marine mammals, continued												
Harbor seal[b]	81.3%	50.0%	45.0%	52.5%	53.8%	18,818.8	100.1	23.5	336.1	1.8		23.9%
Harbor seal, male	81.3%	50.0%	45.0%	52.5%	53.8%	9,606.8	51.1	12.0	171.6	0.9	ind	27.9%
Harbor seal, female	81.3%	50.0%	45.0%	52.5%	53.8%	2,237.2	11.9	2.8	40.0	0.2	ind	53.9%
Harbor seal, unknown sex	81.3%	50.0%	45.0%	52.5%	53.8%	6,974.8	37.1	8.7	124.6	0.7	ind	32.8%
Ribbon seal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Ringed seal	6.3%	3.8%	3.8%	2.5%	3.8%	526.4	2.8	0.7	9.4	0.1	ind	69.3%
Steller sea lion	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0		
Steller sea lion, male	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Steller sea lion, female	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Steller sea lion, unknown sex	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Walrus	36.3%	8.8%	5.0%	31.3%	11.3%	5,264.0	28.0	6.6	9.4	0.1	ind	56.1%
Birds and eggs	**90.0%**	**76.3%**	**73.8%**	**73.8%**	**60.0%**	**13,821.0**	**73.5**	**17.2**	**23,718.6**	**126.2**		**18.5%**
Migratory birds	78.8%	56.3%	55.0%	38.8%	43.8%	8,278.2	44.0	10.3	4,475.8	23.8		22.6%
Ducks	76.3%	55.0%	53.8%	33.8%	37.5%	6,180.4	32.9	7.7	3,305.2	17.6		24.8%
Bufflehead	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Canvasback	1.3%	1.3%	1.3%	0.0%	1.3%	18.1	0.1	0.0	16.5	0.1	ind	114.3%
Eider	57.5%	41.3%	40.0%	22.5%	22.5%	4,977.8	26.5	6.2	1,934.1	10.3		27.1%
Common eider	16.3%	13.8%	13.8%	2.5%	7.5%	278.2	1.5	0.3	173.9	0.9	ind	41.8%
King eider	52.5%	38.8%	37.5%	21.3%	21.3%	4,699.6	25.0	5.9	1,760.2	9.4	ind	27.7%
Gadwall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Goldeneye	3.8%	3.8%	3.8%	1.3%	2.5%	33.8	0.2	0.0	42.3	0.2	ind	72.9%
Harlequin	3.8%	3.8%	3.8%	0.0%	1.3%	23.5	0.1	0.0	47.0	0.3	ind	73.5%
Mallard	31.3%	26.3%	25.0%	8.8%	12.5%	275.0	1.5	0.3	275.0	1.5	ind	29.7%
Merganser	20.0%	18.8%	18.8%	1.3%	12.5%	218.6	1.2	0.3	312.6	1.7	ind	47.7%
Common merganser	12.5%	11.3%	11.3%	1.3%	8.8%	108.6	0.6	0.1	181.0	1.0	ind	50.7%
Red-breasted merganser	7.5%	7.5%	7.5%	0.0%	3.8%	93.1	0.5	0.1	103.4	0.6	ind	60.9%
Long-tailed duck (oldsquaw)	2.5%	2.5%	2.5%	1.3%	1.3%	5.7	0.0	0.0	7.1	0.0	ind	112.9%
Northern pintail	13.8%	16.3%	13.8%	1.3%	5.0%	126.0	0.7	0.2	157.5	0.8	ind	40.3%
Scaup	3.8%	3.8%	3.8%	1.3%	3.8%	42.3	0.2	0.1	47.0	0.3	ind	73.5%

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Table 4-8.–Page 5 of 7.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Scoter	18.8%	18.8%	17.5%	2.5%	10.0%	275.0	1.5	0.3	305.5	1.6		32.4%
Black scoter	18.8%	18.8%	17.5%	2.5%	10.0%	275.0	1.5	0.3	305.5	1.6	ind	32.4%
Northern shoveler	3.8%	2.5%	2.5%	1.3%	1.3%	11.3	0.1	0.0	18.8	0.1	ind	90.1%
Teal	3.8%	5.0%	3.8%	0.0%	2.5%	15.5	0.1	0.0	51.7	0.3		83.7%
Green-winged teal	3.8%	5.0%	3.8%	0.0%	2.5%	15.5	0.1	0.0	51.7	0.3	ind	83.7%
Wigeon	1.3%	1.3%	1.3%	0.0%	0.0%	6.6	0.0	0.0	9.4	0.1	ind	114.3%
Unknown ducks	12.5%	8.8%	6.3%	8.8%	7.5%	151.3	0.8	0.2	80.9	0.4	ind	62.6%
Geese	55.0%	43.8%	42.5%	20.0%	30.0%	1,702.1	9.1	2.1	1,118.9	6.0		23.6%
Brant	30.0%	26.3%	26.3%	6.3%	16.3%	468.1	2.5	0.6	390.1	2.1	ind	28.3%
Canada geese	40.0%	33.8%	32.5%	11.3%	21.3%	496.3	2.6	0.6	413.6	2.2		24.7%
Cacklers	30.0%	25.0%	25.0%	7.5%	15.0%	366.6	2.0	0.5	305.5	1.6	ind	29.8%
Lesser Canada geese (taverner/parvipes)	6.3%	7.5%	6.3%	0.0%	5.0%	93.1	0.5	0.1	77.6	0.4	ind	54.6%
Unknown Canada geese	6.3%	3.8%	3.8%	3.8%	2.5%	36.7	0.2	0.0	30.6	0.2	ind	67.9%
Emperor geese	6.3%	3.8%	3.8%	3.8%	3.8%	94.0	0.5	0.1	37.6	0.2	ind	77.7%
Snow geese	2.5%	2.5%	2.5%	0.0%	0.0%	37.8	0.2	0.0	16.5	0.1	ind	99.2%
White-fronted geese	21.3%	20.0%	20.0%	2.5%	10.0%	569.6	3.0	0.7	237.4	1.3	ind	38.9%
Unknown geese	3.8%	2.5%	2.5%	2.5%	2.5%	36.2	0.2	0.0	23.8	0.1	ind	112.9%
Swan	10.0%	8.8%	8.8%	1.3%	5.0%	139.1	0.7	0.2	21.2	0.1		44.1%
Trumpeter swan	1.3%	1.3%	1.3%	0.0%	1.3%	26.3	0.1	0.0	2.4	0.0	ind	114.3%
Tundra swan (whistling)	7.5%	7.5%	7.5%	0.0%	2.5%	112.8	0.6	0.1	18.8	0.1	ind	48.1%
Unknown swan	1.3%	0.0%	0.0%	1.3%	1.3%	0.0	0.0	0.0	0.0	0.0	ind	
Crane	11.3%	11.3%	11.3%	0.0%	3.8%	256.6	1.4	0.3	30.6	0.2		38.5%
Sandhill crane	11.3%	11.3%	11.3%	0.0%	3.8%	256.6	1.4	0.3	30.6	0.2	ind	38.5%
Shorebirds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Common snipe	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Seabirds and loons	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0		
Kittiwakes	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	

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Table 4-8.–Page 6 of 7.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Birds and eggs, continued												
Other birds	71.3%	46.3%	45.0%	37.5%	30.0%	2,101.4	11.2	2.6	3,002.0	16.0		25.1%
Upland game birds	71.3%	46.3%	45.0%	37.5%	30.0%	2,101.4	11.2	2.6	3,002.0	16.0		25.1%
Grouse	2.5%	2.5%	1.3%	1.3%	1.3%	32.9	0.2	0.0	47.0	0.3		114.3%
Spruce grouse	2.5%	2.5%	1.3%	1.3%	1.3%	32.9	0.2	0.0	47.0	0.3	ind	114.3%
Ptarmigan	71.3%	46.3%	45.0%	36.3%	30.0%	2,068.5	11.0	2.6	2,955.0	15.7	ind	24.2%
Bird eggs	85.0%	51.3%	51.3%	65.0%	36.3%	3,441.4	18.3	4.3	16,240.9	86.4		28.5%
Duck eggs	5.0%	3.8%	3.8%	1.3%	1.3%	6.0	0.0	0.0	40.0	0.2	ind	72.1%
Geese eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Swan eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Shorebird eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0		
Common snipe eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Seabird and loon eggs	83.8%	50.0%	50.0%	65.0%	36.3%	3,431.9	18.3	4.3	16,184.5	86.1		28.5%
Cormorant eggs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Gull eggs	65.0%	38.8%	37.5%	45.0%	23.8%	1,702.6	9.1	2.1	5,675.3	30.2	ind	32.5%
Murre eggs	77.5%	28.8%	30.0%	56.3%	25.0%	1,705.5	9.1	2.1	10,032.2	53.4	ind	30.6%
Tern eggs	17.5%	12.5%	12.5%	6.3%	5.0%	23.9	0.1	0.0	477.1	2.5	ind	48.9%
Unknown eggs	2.5%	2.5%	2.5%	0.0%	1.3%	3.5	0.0	0.0	16.5	0.1	ind	81.2%
Marine invertebrates	**91.3%**	**46.3%**	**46.3%**	**67.5%**	**42.5%**	**7,836.0**	**41.7**	**9.8**	**2,621.4**	**13.9**		**29.8%**
Clams	12.5%	3.8%	3.8%	7.5%	2.5%	655.7	3.5	0.8	218.6	1.2	gal	99.0%
Razor clams	2.5%	2.5%	2.5%	0.0%	0.0%	634.5	3.4	0.8	211.5	1.1	gal	102.3%
Softshell clams	1.3%	1.3%	1.3%	0.0%	0.0%	21.2	0.1	0.0	7.1	0.0	gal	114.3%
Cockles	82.5%	43.8%	43.8%	61.3%	40.0%	7,148.7	38.0	8.9	2,382.9	12.7	gal	31.1%
Crabs	2.5%	1.3%	1.3%	1.3%	0.0%	26.3	0.1	0.0	16.5	0.1		114.3%
Dungeness crab	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
King crab	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0		
Red king crab	1.3%	0.0%	0.0%	1.3%	0.0%	0.0	0.0	0.0	0.0	0.0	ind	
Tanner crab	1.3%	1.3%	1.3%	0.0%	0.0%	26.3	0.1	0.0	16.5	0.1	ind	114.3%
Mussels	2.5%	2.5%	2.5%	1.3%	0.0%	5.3	0.0	0.0	3.5	0.0		84.8%
Blue mussels	2.5%	2.5%	2.5%	1.3%	0.0%	5.3	0.0	0.0	3.5	0.0	gal	84.8%
Shrimp	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	

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Table 4-8.–Page 7 of 7.

Resource name(s)	Percentage of households					Estimated pounds harvested			Estimated amount harvested[a]			95% confidence limit
	Use	Attempt	Harvest	Receive	Gave	Harvested	Mean household	Per capita	Harvested	Mean household	Unit	
Vegetation	**91.3%**	**88.8%**	**88.8%**	**61.3%**	**60.0%**	**18,576.5**	**98.8**	**23.2**	**7,612.0**	**40.5**		**14.7%**
Berries	90.0%	82.5%	82.5%	57.5%	46.3%	14,854.8	79.0	18.5	3,713.7	19.8		14.5%
Blueberry	70.0%	63.8%	62.5%	18.8%	23.8%	1,539.3	8.2	1.9	384.8	2.0	gal	17.1%
Lowbush cranberry	53.8%	46.3%	45.0%	17.5%	20.0%	1,254.9	6.7	1.6	313.7	1.7	gal	27.9%
Highbush cranberry	5.0%	5.0%	5.0%	0.0%	1.3%	49.4	0.3	0.1	12.3	0.1	gal	64.7%
Crowberry	70.0%	61.3%	61.3%	27.5%	26.3%	5,643.4	30.0	7.0	1,410.9	7.5	gal	19.7%
Huckleberry	20.0%	3.8%	3.8%	17.5%	5.0%	159.8	0.9	0.2	40.0	0.2	gal	74.6%
Raspberry	11.3%	11.3%	11.3%	0.0%	2.5%	55.2	0.3	0.1	13.8	0.1	gal	41.9%
Salmonberry	77.5%	62.5%	61.3%	33.8%	28.8%	3,788.8	20.2	4.7	947.2	5.0	gal	19.1%
Crowberry (blackberry)	21.3%	20.0%	20.0%	5.0%	11.3%	2,364.1	12.6	3.0	591.0	3.1	gal	32.4%
Other wild berry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Plants/Greens/Mushrooms	80.0%	80.0%	78.8%	27.5%	33.8%	3,721.7	19.8	4.6	3,721.7	19.8		22.7%
Other beach greens	8.8%	8.8%	8.8%	1.3%	5.0%	96.0	0.5	0.1	96.0	0.5	gal	51.2%
Fiddlehead ferns	46.3%	45.0%	43.8%	11.3%	18.8%	323.0	1.7	0.4	323.0	1.7	gal	19.7%
Cow parsnip (wild celery)	17.5%	10.0%	10.0%	8.8%	5.0%	124.6	0.7	0.2	124.6	0.7	gal	49.2%
Hudson's Bay tea	17.5%	16.3%	16.3%	1.3%	3.8%	108.0	0.6	0.1	108.0	0.6	gal	62.3%
Sourdock	45.0%	36.3%	36.3%	13.8%	15.0%	1,629.1	8.7	2.0	1,629.1	8.7	gal	31.9%
Other wild greens	13.8%	13.8%	13.8%	0.0%	5.0%	200.3	1.1	0.3	200.3	1.1	gal	41.8%
Stinkweed	43.8%	43.8%	42.5%	5.0%	10.0%	1,034.0	5.5	1.3	1,034.0	5.5	gal	33.7%
Unknown greens from land	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0	0.0	0.0	gal	
Sea chickweed	21.3%	20.0%	20.0%	6.3%	6.3%	206.8	1.1	0.3	206.8	1.1	gal	36.8%
Wood	45.0%	43.8%	45.0%	11.3%	16.3%	0.0	0.0	0.0	176.6	0.9	Cord	

Source ADF&G Division of Subsistence household surveys, 2009.

a. Summary rows that include incompatible units of measure have been left blank.

b. Residents of Togiak and other Central Yup'ik-speaking communities of Bristol Bay do not distinguish between adult harbor seals and spotted seals; both are called *issuriq* (Jacobson 1984:741;Wolfe and Mishler 1993:61–69). Therefore, these species are combined in harvest estimates in this report. In the annual harvest assessment program jointly administered by ADF&G and the Alaska Native Harbor Seal Commission, the species were separated based on their harvest in association with ice. Seals taken in the spring in association with ice were assumed to be spotted seals and seals taken in open water conditions in the fall were assumed to be harbor seals. These assumptions were based on the Yup'ik sea taxonomy recorded in Togiak and Manokotak as well as other traditional knowledge of Togiak and Manokotak seal hunters (Wolfe and Mishler 1993:61–69).

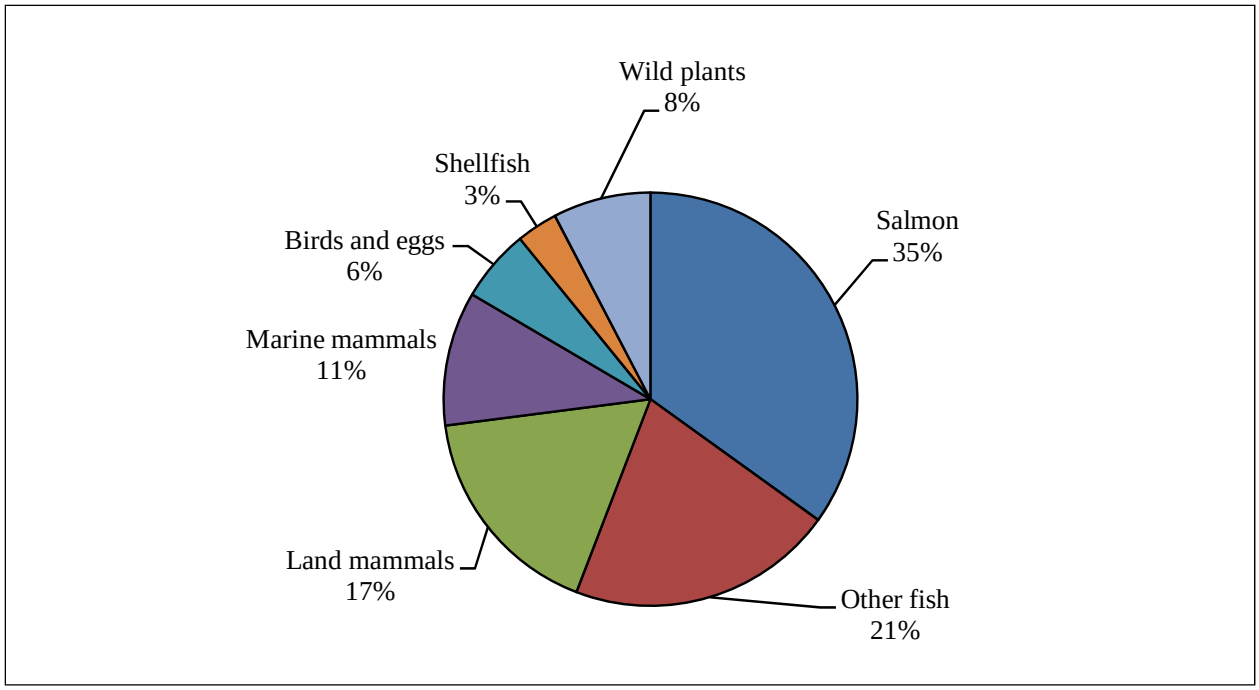

Figure 4-3.–Composition of harvest, Togiak, 2008.

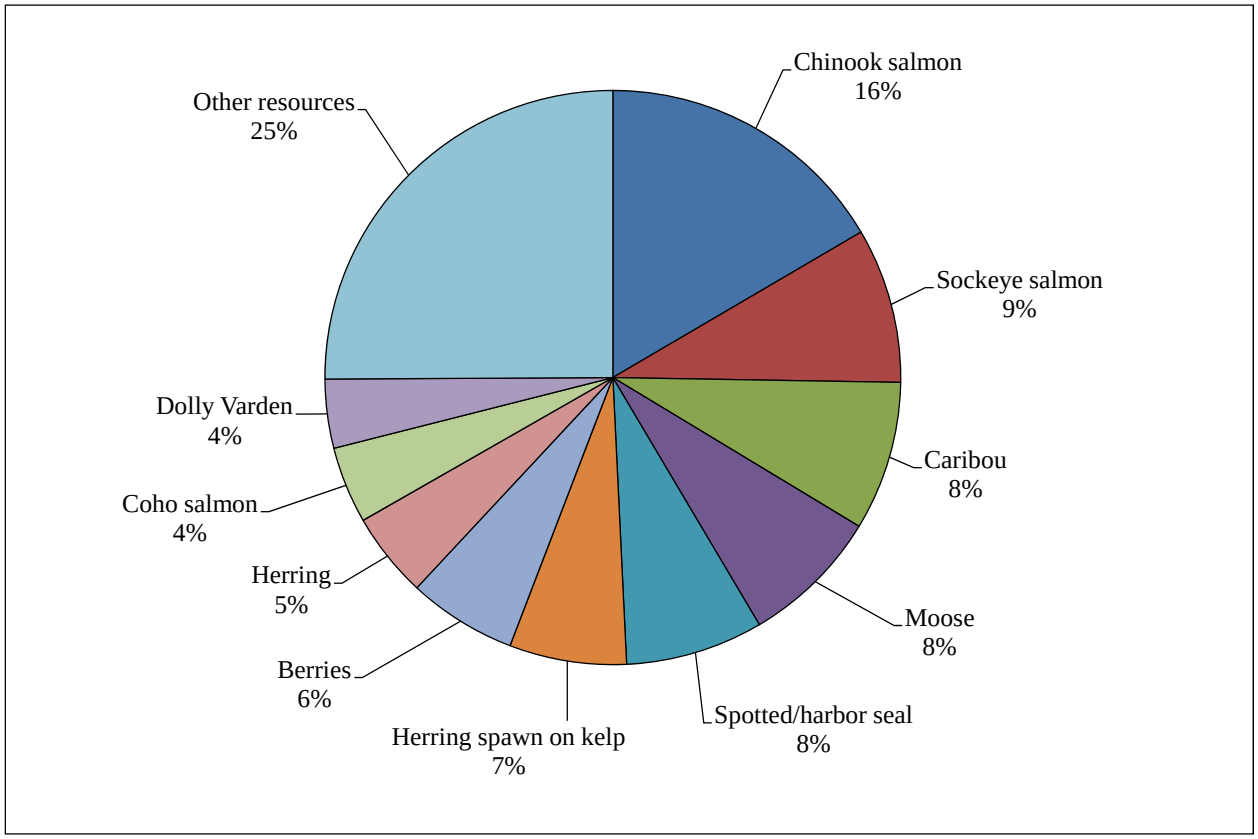

Figure 4-4.–Top 10 resources harvested ranked by estimated usable weight, Togiak, 2008.

Household Level Harvests and Patterns

As in most other rural Alaska communities (Wolfe 1987, Wolfe et al. 2010), specialization in subsistence harvesting was evident in Togiak in 2008. As shown in Figure 4-5, about 31% of Togiak households accounted for 70% of the community's total harvest of wild foods as estimated in usable pounds. These "super-households" shared their harvests with others in the community.

As show in Table 4-9 and Figure 4-6, Togiak households that were involved in commercial fishing in 2008 had higher subsistence harvests than other households. On average, commercial fishing households harvested 1,519 lb of wild foods in 2008, for 86% of the community total, compared to an average of 679 lb (15%) for other households. Compared to other households, Togiak's fishing households had significantly higher harvests of total resources, large game, furbearers, marine mammals, and birds and eggs.

Salmon and Other Fish: Harvest Methods

In 2008, Togiak households used several methods to harvest salmon for home use (Figure 4-8). As estimated in numbers of fish, subsistence nets accounted for 62% of the total salmon harvest for home use, removal from commercial harvests provided 29%, and rod and reel accounted for 9% (Table 4-10). As estimated in pounds usable weight, subsistence nets provided 57% of the salmon, commercial removal added 35%, and rod and reel contributed 8% (Table 4-11). Commercial removal was particularly significant for Chinook salmon, contributing 46% of the total Chinook harvest for home use, as well as for pink salmon (54%). Rod and reel fishing was a particularly important source of coho salmon, providing 36% of the total coho harvest.

A majority of Togiak households (58%) removed some salmon from their commercial harvests for home use in the 2008 study year; 55% used subsistence nets, and 36% used rod and reel (mostly for coho salmon) (Table 4-12).

For fish other than salmon, "other methods" accounted for 64% of total harvests as estimated in pounds usable weight for Togiak households in 2008 (Table 4-11). "Other methods" included jigging through the ice (for smelt and freshwater species), hand picking (for herring spawn on kelp), and longlining for halibut. Subsistence nets produced 32% of the total nonsalmon fish harvest, rod and reel added 4%, and commercial removal added 0.4%. The latter derived primarily from incidental harvests of other fish in the salmon commercial fishery rather than from directed commercial fisheries for nonsalmon species.

Most Togiak households (78%) used "other methods" to harvest nonsalmon fish, such as jigging through the ice and hand picking (Table 4-12). Also, 31% used subsistence nets, 28% used rod and reel, and 11% removed nonsalmon fish from commercial harvests.

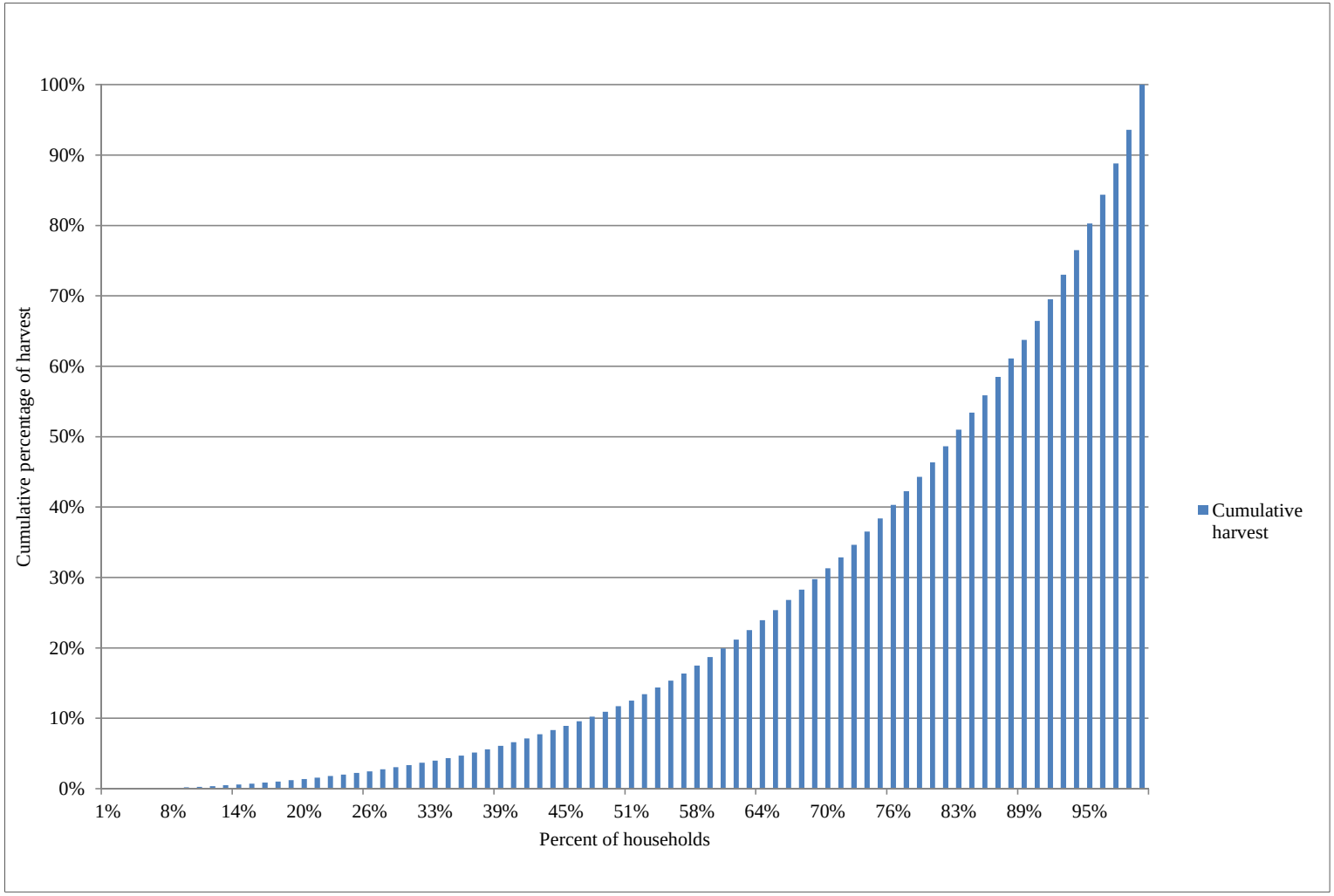

Figure 4-5.–Cumulative harvest in pounds, Togiak, 2008.

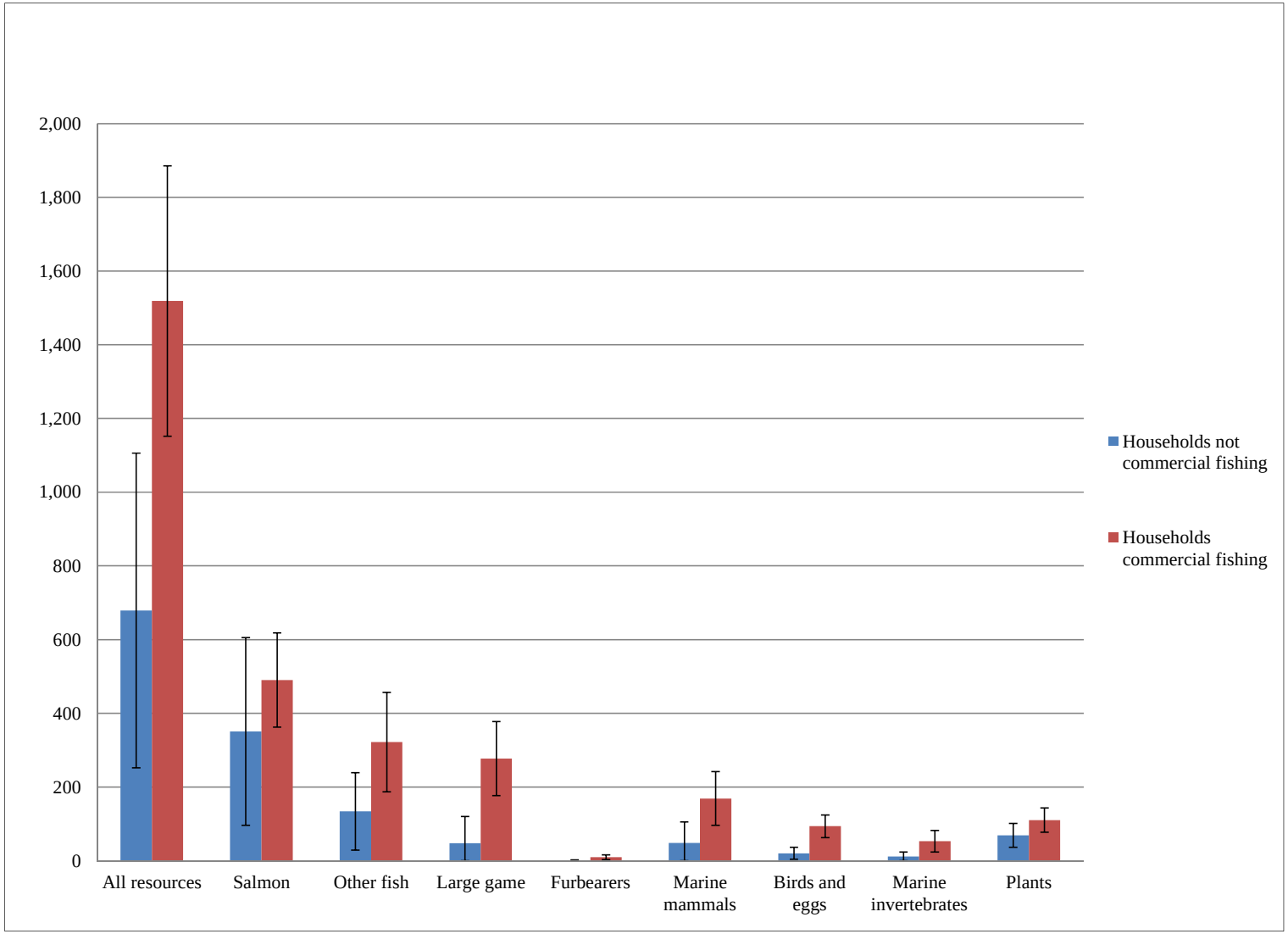

Figure 4-6.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Togiak, 2008

Table 4-9.–Comparison of households' subsistence harvest amounts—households that participated in commercial fisheries with those that do not, Togiak, 2008.

	Pounds harvested per household						
	Households not commercial fishing (n=22)		Households commercial fishing (n=58)				
Resource category	Mean	Percentage of total reported pounds	Mean	Percentage of total reported pounds	t	Significance	
Salmon	350.7	21.3%	490.5	78.7%	-1.092	0.278	No
Other fish	133.8	13.6%	322.0	86.4%	-1.54	0.121	No
Large game	47.7	6.1%	277.4	93.9%	-3.763	0	Yes
Furbearers	1.1	4.2%	9.6	95.8%	-2.586	0.012	Yes
Marine mammals	48.4	9.8%	169.1	90.2%	-2.65	0.01	Yes
Birds and eggs	20.2	7.6%	93.7	92.4%	-4.278	0	Yes
Marine invertebrates	11.5	7.6%	53.1	92.4%	-2.644	0.1	No
Plants	68.9	19.2%	110.1	80.8%	-1.457	0.149	No
All resources	**679.2**	**14.5%**	**1,518.6**	**85.5%**	**-2.592**	**0.011**	**Yes**

Source ADF&G Division of Subsistence household surveys, 2009.

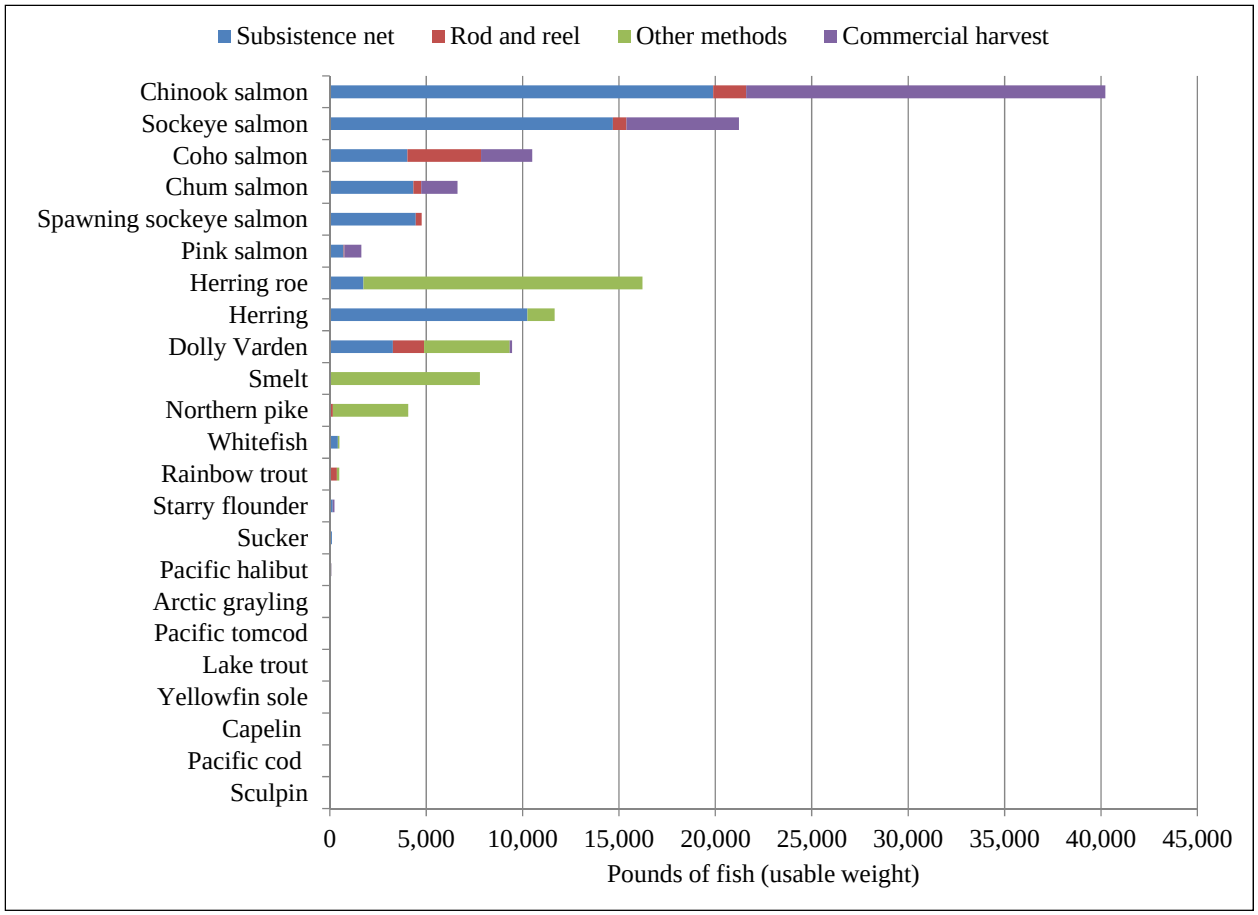

Figure 4-7.–Fish harvests by gear type, Togiak, 2008.

Table 4-10.–Estimated harvest of salmon and other fish by gear type, in numbers of fish, Togiak 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
Resource name	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
Fish	**4,498.0**	**14.9%**	**14,365.8**	**47.6%**	**2,895.8**	**9.6%**	**8,435.1**	**27.9%**	**30,194.7**
Salmon	**4,365.3**	**28.7%**	**9,501.9**	**62.4%**	**1,365.4**	**9.0%**	**0.0**	**0.0%**	**15,232.6**
Chum salmon	411.5	28.6%	940.3	65.3%	88.9	6.2%	0.0	0.0%	1,440.7
Coho salmon	549.8	25.3%	833.0	38.3%	790.6	36.4%	0.0	0.0%	2,173.3
Chinook salmon	1,687.5	46.3%	1,801.5	49.4%	154.7	4.2%	0.0	0.0%	3,643.6
Pink salmon	344.0	54.2%	279.0	43.9%	11.8	1.9%	0.0	0.0%	634.8
Sockeye salmon	1,365.0	27.5%	3,429.8	69.2%	163.9	3.3%	0.0	0.0%	4,958.7
Spawnouts	0.0	0.0%	2,226.7	93.5%	154.7	6.5%	0.0	0.0%	2,381.4
Spawning sockeye	0.0	0.0%	2,226.7	93.5%	154.7	6.5%	0.0	0.0%	2,381.4
Nonsalmon fish	**135.7**	**0.9%**	**4,867.2**	**32.5%**	**1,530.3**	**10.2%**	**8,428.9**	**56.3%**	**14,962.2**
Herring[a]	0.0	0.0%	1,708.5	87.9%	0.0	0.0%	235.0	12.1%	1,943.5
Herring roe[a]	0.0	0.0%	247.9	10.7%	0.0	0.0%	2,068.0	89.3%	2,315.9
Herring sac roe[a]	0.0	0.0%	9.4	30.8%	0.0	0.0%	21.2	69.2%	30.6
Herring spawn on kelp[a]	0.0	0.0%	238.5	10.4%	0.0	0.0%	2,046.9	89.6%	2,285.4
Smelt[a]	0.0	0.0%	0.0	0.0%	0.0	0.0%	1,112.5	100.0%	1,112.5
Capelin (grunion)	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.4	100.0%	2.4
Rainbow smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	1,110.2	100.0%	1,110.2
Cod	0.0	0.0%	0.0	0.0%	0.0	0.0%	16.5	100.0%	16.5
Pacific cod (gray)	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.4	100.0%	2.4
Pacific tomcod	0.0	0.0%	0.0	0.0%	0.0	0.0%	14.1	100.0%	14.1
Flounder	28.2	35.3%	51.7	64.7%	0.0	0.0%	0.0	0.0%	79.9
Starry flounder	28.2	35.3%	51.7	64.7%	0.0	0.0%	0.0	0.0%	79.9
Halibut[b]	9.9	11.6%	0.0	0.0%	4.7	5.5%	70.5	82.8%	85.1
Sculpin	14.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	14.3
Sole	0.0	0.0%	0.0	0.0%	16.5	100.0%	0.0	0.0%	16.5
Yellowfin sole	0.0	0.0%	0.0	0.0%	16.5	100.0%	0.0	0.0%	16.5
Alaska blackfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

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Table 4-10.–Page 2 of 2.

Resource name	Commercial harvest		Subsistence net		Rod and reel		Other method		Total harvest
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
Burbot	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Char	83.3	1.2%	2,338.3	34.5%	1,165.6	17.2%	3,186.7	47.0%	6,773.9
Dolly Varden	83.3	1.2%	2,338.3	34.6%	1,151.5	17.1%	3,177.2	47.1%	6,750.2
Dolly Varden–freshwater	0.0	0.0%	1,828.3	36.4%	498.2	9.9%	2,690.8	53.6%	5,017.3
Dolly Varden–saltwater	83.3	14.9%	359.6	64.2%	117.5	21.0%	0.0	0.0%	560.3
Lake trout	0.0	0.0%	0.0	0.0%	14.1	59.7%	9.5	40.3%	23.6
Arctic grayling	0.0	0.0%	35.3	42.6%	11.8	14.2%	35.7	43.2%	82.7
Northern pike	0.0	0.0%	11.8	0.8%	47.0	3.2%	1,393.6	96.0%	1,452.3
Longnose sucker	0.0	0.0%	70.5	100.0%	0.0	0.0%	0.0	0.0%	70.5
Trout	0.0	0.0%	11.8	3.1%	284.4	74.2%	87.0	22.7%	383.1
Rainbow trout	0.0	0.0%	11.8	3.3%	253.8	72.0%	87.0	24.7%	352.5
Whitefishes	0.0	0.0%	390.1	63.4%	0.0	0.0%	225.6	36.6%	615.7
Broad whitefish	0.0	0.0%	70.5	100.0%	0.0	0.0%	0.0	0.0%	70.5
Cisco	0.0	0.0%	319.6	58.6%	0.0	0.0%	225.6	41.4%	545.2
Least cisco	0.0	0.0%	319.6	58.6%	0.0	0.0%	225.6	41.4%	545.2
Humpback whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Round whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

Source ADF&G Division of Subsistence household surveys, 2009.

a. Gallons

b. Pounds

Table 4-11.–Estimated harvest, in pounds of salmon and other fish in Togiak, 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest
Resource name(s)	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Fish	**30,145.0**	**22.2%**	**64,082.3**	**47.2%**	**9,168.9**	**6.8%**	**32,385.9**	**23.9%**	**135,782.1**
Salmon	**29,928.4**	**35.2%**	**48,074.4**	**56.6%**	**6,977.5**	**8.2%**	**0.0**	**0.0%**	**84,980.3**
Chum salmon	1,893.1	28.6%	4,325.4	65.3%	408.9	6.2%	0.0	0.0%	6,627.3
Coho salmon	2,655.3	25.3%	4,023.2	38.3%	3,818.7	36.4%	0.0	0.0%	10,497.2
Chinook salmon	18,629.8	46.3%	19,888.2	49.4%	1,707.7	4.2%	0.0	0.0%	40,225.7
Pink salmon	890.9	54.2%	722.5	43.9%	30.6	1.9%	0.0	0.0%	1,644.1
Sockeye salmon	5,842.1	27.5%	14,679.5	69.2%	701.5	3.3%	0.0	0.0%	21,223.1
Spawnouts	0.0	0.0%	4,453.5	93.5%	309.4	6.5%	0.0	0.0%	4,762.9
Spawning sockeye	0.0	0.0%	4,453.5	93.5%	309.4	6.5%	0.0	0.0%	4,762.9
Nonsalmon fish	**218.3**	**0.4%**	**16,009.2**	**31.5%**	**2,191.6**	**4.3%**	**32,382.6**	**63.7%**	**50,801.7**
Herring	0.0	0.0%	10,250.7	87.9%	0.0	0.0%	1,410.0	12.1%	11,660.7
Herring roe	0.0	0.0%	1,735.5	10.7%	0.0	0.0%	14,476.0	89.3%	16,211.5
Herring sac roe	0.0	0.0%	65.8	30.8%	0.0	0.0%	148.1	69.2%	213.9
Herring spawn on kelp	0.0	0.0%	1,669.7	10.4%	0.0	0.0%	14,328.0	89.6%	15,997.6
Smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	7,778.7	100.0%	7,778.7
Capelin (grunion)	0.0	0.0%	0.0	0.0%	0.0	0.0%	7.6	100.0%	7.6
Rainbow smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	7,771.1	100.0%	7,771.1
Cod	0.0	0.0%	0.0	0.0%	0.0	0.0%	52.6	100.0%	52.6
Pacific cod (gray)	0.0	0.0%	0.0	0.0%	0.0	0.0%	7.5	100.0%	7.5
Pacific tomcod	0.0	0.0%	0.0	0.0%	0.0	0.0%	45.1	100.0%	45.1
Flounder	84.6	35.3%	155.1	64.7%	0.0	0.0%	0.0	0.0%	239.7
Starry flounder	84.6	35.3%	155.1	64.7%	0.0	0.0%	0.0	0.0%	239.7
Halibut	9.9	11.6%	0.0	0.0%	4.7	5.5%	70.5	82.8%	85.1
Sculpin	7.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	7.1
Sole	0.0	0.0%	0.0	0.0%	16.5	100.0%	0.0	0.0%	16.5
Yellowfin sole	0.0	0.0%	0.0	0.0%	16.5	100.0%	0.0	0.0%	16.5
Alaska blackfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Burbot	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

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Table 4-11.–Page 2 of 2.

Resource name(s)	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest
	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage	Pounds
Char	116.6	1.2%	3,273.6	34.5%	1,631.8	17.2%	4,461.4	47.0%	9,483.4
Dolly Varden	116.6	1.2%	3,273.6	34.6%	1,612.1	17.1%	4,448.1	47.1%	9,450.3
Dolly Varden–freshwater	0.0	0.0%	2,559.6	36.4%	697.5	9.9%	3,767.1	53.6%	7,024.2
Dolly Varden–saltwater	116.6	14.9%	503.4	64.2%	164.5	21.0%	0.0	0.0%	784.5
Lake trout	0.0	0.0%	0.0	0.0%	19.7	59.7%	13.3	40.3%	33.1
Arctic grayling	0.0	0.0%	24.7	42.6%	8.2	14.2%	25.0	43.2%	57.9
Northern pike	0.0	0.0%	32.9	0.8%	131.6	3.2%	3,901.9	96.0%	4,066.4
Longnose sucker	0.0	0.0%	105.8	100.0%	0.0	0.0%	0.0	0.0%	105.8
Trout	0.0	0.0%	16.5	3.1%	398.1	74.2%	121.7	22.7%	536.3
Rainbow trout	0.0	0.0%	16.5	3.3%	355.3	72.0%	121.7	24.7%	493.5
Whitefishes	0.0	0.0%	409.8	82.0%	0.0	0.0%	90.2	18.0%	500.1
Broad whitefish	0.0	0.0%	282.0	100.0%	0.0	0.0%	0.0	0.0%	282.0
Cisco	0.0	0.0%	127.8	58.6%	0.0	0.0%	90.2	41.4%	218.1
Least cisco	0.0	0.0%	127.8	58.6%	0.0	0.0%	90.2	41.4%	218.1
Humpback whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Round whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0

Source ADF&G Division of Subsistence household surveys, 2009.

Table 4-12.–Percentage of households using gear type to harvest salmon and other fish by gear type, Togiak 2008.

	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest	
Resource	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Fish	**108.1**	**57.5%**	**117.5**	**62.5%**	**77.6**	**41.3%**	**145.7**	**77.5%**	**171.6**	**91.3%**
Salmon	**108.1**	**57.5%**	**103.4**	**55.0%**	**68.2**	**36.3%**	**0.0**	**0.0%**	**162.2**	**86.3%**
Chum salmon	44.7	23.8%	44.7	23.8%	7.1	3.8%	0.0	0.0%	77.6	41.3%
Coho salmon	40.0	21.3%	42.3	22.5%	65.8	35.0%	0.0	0.0%	112.8	60.0%
Chinook salmon	98.7	52.5%	75.2	40.0%	23.5	12.5%	0.0	0.0%	141.0	75.0%
Pink salmon	37.6	20.0%	21.2	11.3%	2.4	1.3%	0.0	0.0%	49.4	26.3%
Sockeye salmon	79.9	42.5%	77.6	41.3%	18.8	10.0%	0.0	0.0%	126.9	67.5%
Spawnouts	0.0	0.0%	65.8	35.0%	11.8	6.3%	0.0	0.0%	75.2	40.0%
Spawning sockeye	0.0	0.0%	65.8	35.0%	11.8	6.3%	0.0	0.0%	75.2	40.0%
Nonsalmon fish	**21.2**	**11.3%**	**58.8**	**31.3%**	**51.7**	**27.5%**	**145.7**	**77.5%**	**157.5**	**83.8%**
Herring	0.0	0.0%	21.2	11.3%	0.0	0.0%	9.4	5.0%	30.6	16.3%
Herring roe	0.0	0.0%	4.7	2.5%	0.0	0.0%	54.1	28.8%	56.4	30.0%
Herring sac roe	0.0	0.0%	2.4	1.3%	0.0	0.0%	4.7	2.5%	7.1	3.8%
Herring spawn on kelp	0.0	0.0%	2.4	1.3%	0.0	0.0%	51.7	27.5%	54.1	28.8%
Smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	122.2	65.0%	122.2	65.0%
Capelin (grunion)	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.4	1.3%
Rainbow smelt	0.0	0.0%	0.0	0.0%	0.0	0.0%	122.2	65.0%	122.2	65.0%
Cod	0.0	0.0%	0.0	0.0%	0.0	0.0%	4.7	2.5%	7.1	3.8%
Pacific cod (gray)	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.4	1.3%
Pacific tomcod	0.0	0.0%	0.0	0.0%	0.0	0.0%	4.7	2.5%	4.7	2.5%
Flounder	7.1	3.8%	4.7	2.5%	0.0	0.0%	0.0	0.0%	11.8	6.3%
Starry flounder	7.1	3.8%	4.7	2.5%	0.0	0.0%	0.0	0.0%	11.8	6.3%
Halibut	9.4	5.0%	0.0	0.0%	2.4	1.3%	2.4	1.3%	14.1	7.5%
Sculpin	7.1	3.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	7.1	3.8%
Sole	0.0	0.0%	0.0	0.0%	4.7	2.5%	0.0	0.0%	4.7	2.5%
Yellowfin sole	0.0	0.0%	0.0	0.0%	4.7	2.5%	0.0	0.0%	4.7	2.5%
Alaska blackfish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Burbot	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Char	9.4	5.0%	32.9	17.5%	44.7	23.8%	68.2	36.3%	122.2	65.0%
Dolly Varden	9.4	5.0%	32.9	17.5%	42.3	22.5%	68.2	36.3%	119.9	63.8%
Dolly Varden–freshwater	0.0	0.0%	28.2	15.0%	28.2	15.0%	65.8	35.0%	110.5	58.8%
Dolly Varden–saltwater	9.4	5.0%	4.7	2.5%	2.4	1.3%	0.0	0.0%	16.5	8.8%

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Table 4-12.–Page 2 of 2.

Resource	Commercial harvest		Subsistence net		Rod and reel		Other methods		Total harvest	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Lake trout	0.0	0.0%	0.0	0.0%	4.7	2.5%	4.7	2.5%	9.4	5.0%
Arctic grayling	0.0	0.0%	4.7	2.5%	4.7	2.5%	7.1	3.8%	16.5	8.8%
Northern pike	0.0	0.0%	2.4	1.3%	4.7	2.5%	44.7	23.8%	49.4	26.3%
Longnose sucker	0.0	0.0%	2.4	1.3%	0.0	0.0%	0.0	0.0%	2.4	1.3%
Trout	0.0	0.0%	2.4	1.3%	23.5	12.5%	21.2	11.3%	42.3	22.5%
Rainbow trout	0.0	0.0%	2.4	1.3%	21.2	11.3%	21.2	11.3%	40.0	21.3%
Whitefishes	0.0	0.0%	18.8	10.0%	0.0	0.0%	9.4	5.0%	28.2	15.0%
Broad whitefish	0.0	0.0%	2.4	1.3%	0.0	0.0%	0.0	0.0%	2.4	1.3%
Cisco	0.0	0.0%	16.5	8.8%	0.0	0.0%	9.4	5.0%	25.9	13.8%
Least cisco	0.0	0.0%	16.5	8.8%	0.0	0.0%	9.4	5.0%	25.9	13.8%
Humpback whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Round whitefish	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Source ADF&G Division of Subsistence household surveys, 2009.

Harvest Areas in 2008

Figures 4-8 through 4-19 are maps that depict areas within which Togiak residents searched for and harvested subsistence resources in 2008. Areas used by Togiak residents for hunting, fishing, and gathering from the 1960s to the mid-1980s are depicted on maps included in the Alaska Habitat Management Guide (ADF&G 1985; Wright et al. 1985). Coiley-Kenner et al (2003:103,111,117,125) includes maps of areas used by Togiak residents to hunt moose and caribou during the period 1980 to 1999 and during the 1999–2000 study year.

In 2008, community residents used the Togiak River corridor from Togiak Bay to Togiak Lake for a variety of subsistence activities, including fishing for salmon and other fish, trapping beavers and other small land mammals, and wood gathering. Smelting through the ice occurred in the lower Togiak River near the community. Togiak Bay was used for salmon fishing, clamming, marine fishing (flounders, halibut, Pacific tomcod), herring fishing, and harvesting spawn on kelp. Clamming also occurred in Kulukak Bay, which was also used for harvesting bird eggs and seal hunting. Other areas used for clamming included beaches from Tongue Point west to Asigyukpak Spit. Marine mammal hunting (seals and walrus) took place throughout Togiak Bay, from near Crooked, High, and Hagemeister islands, west to Cape Peirce. Waterfowl hunting and egging took place on and around the Walrus Islands, along the lower Togiak River, and along western Togiak Bay. Moose hunting generally took place within the Togiak River corridor. This was also the location of caribou hunting, as well as areas to the west of the community as far west as Goodnews Bay.

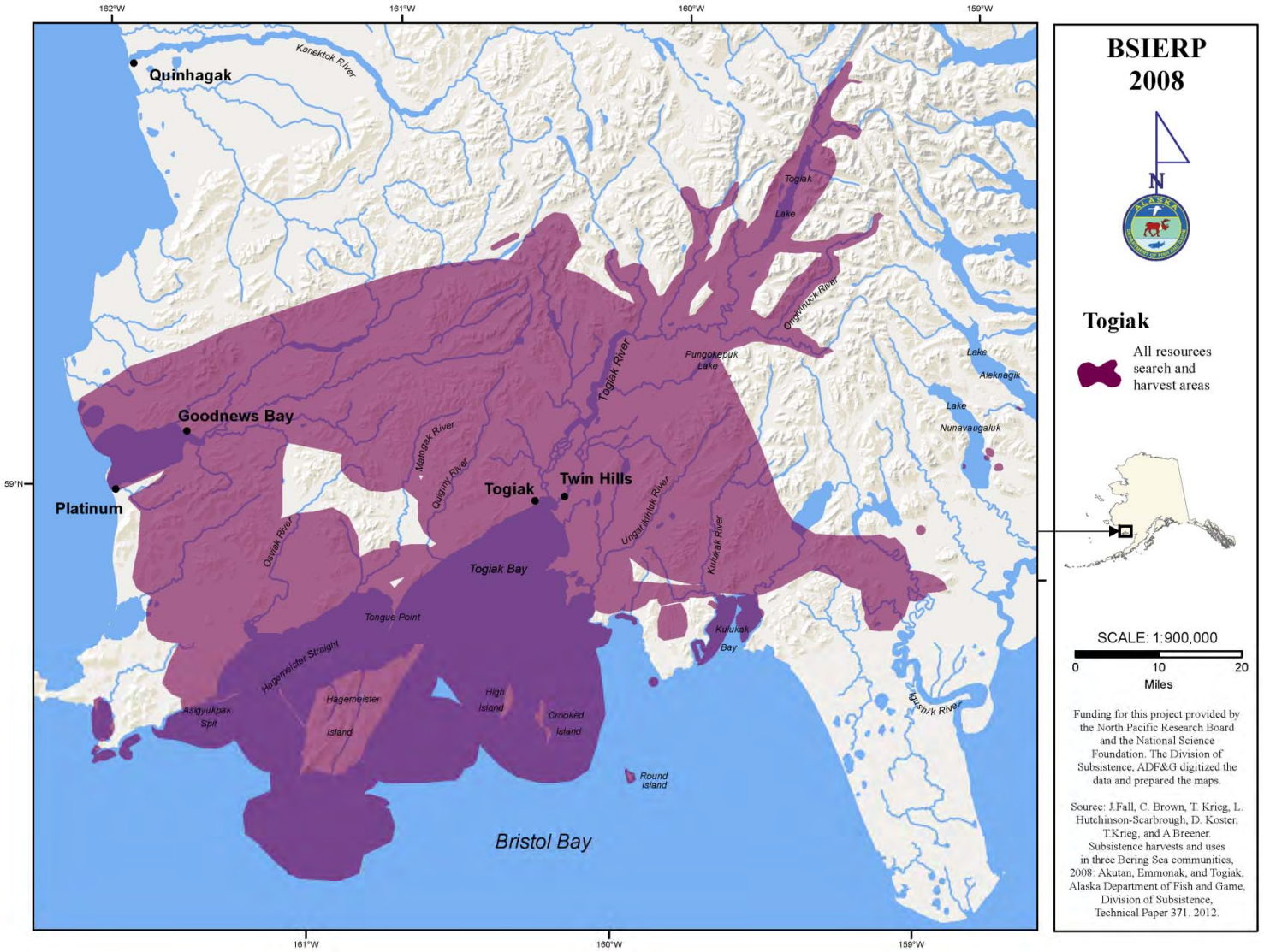

Figure 4-8.–All resources search and harvest areas, Togiak, 2008.

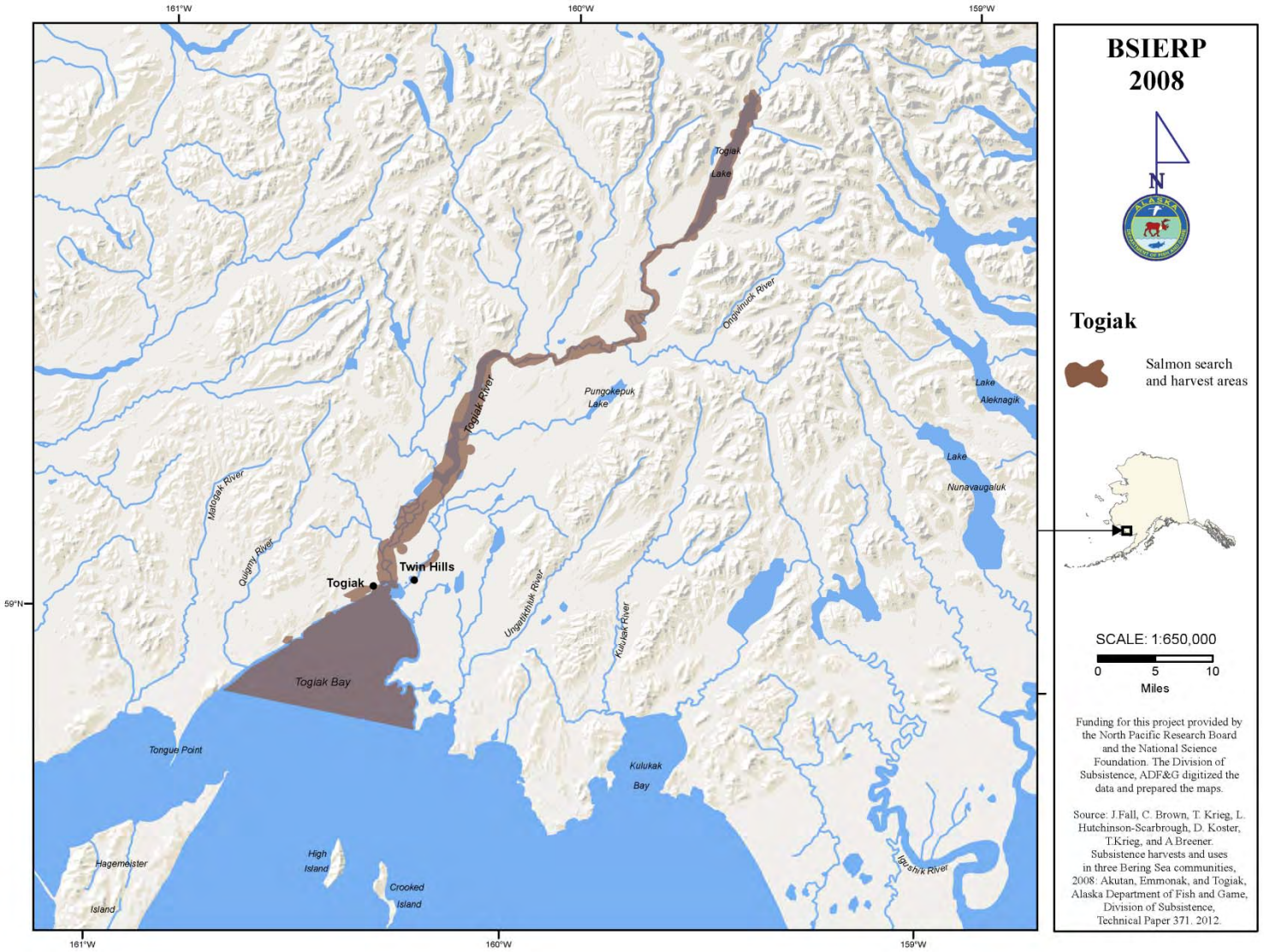

Figure 4-9.–Salmon search and harvest areas, Togiak, 2008.

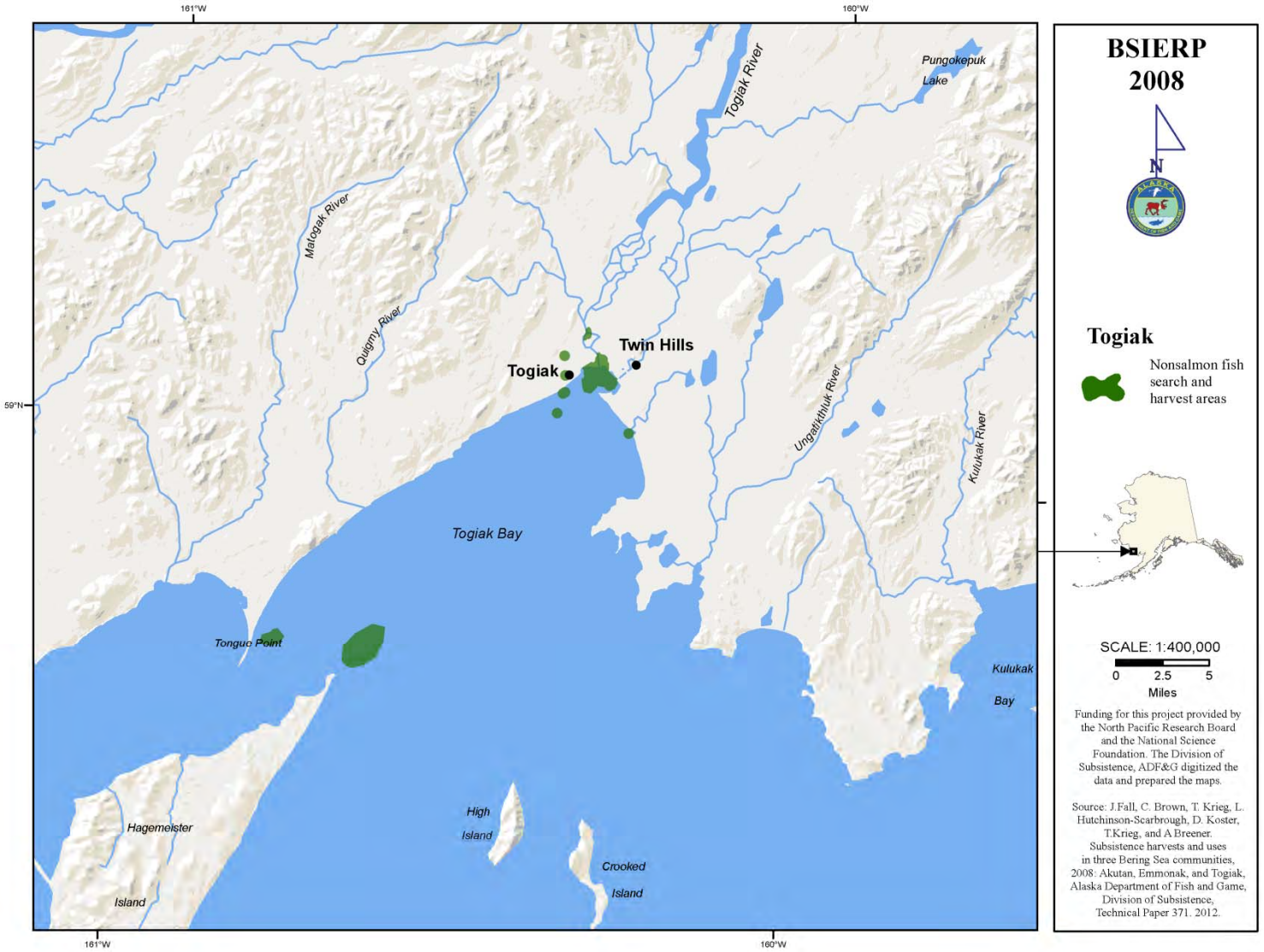

Figure 4-10.–Marine fish search and harvest areas, Togiak, 2008.

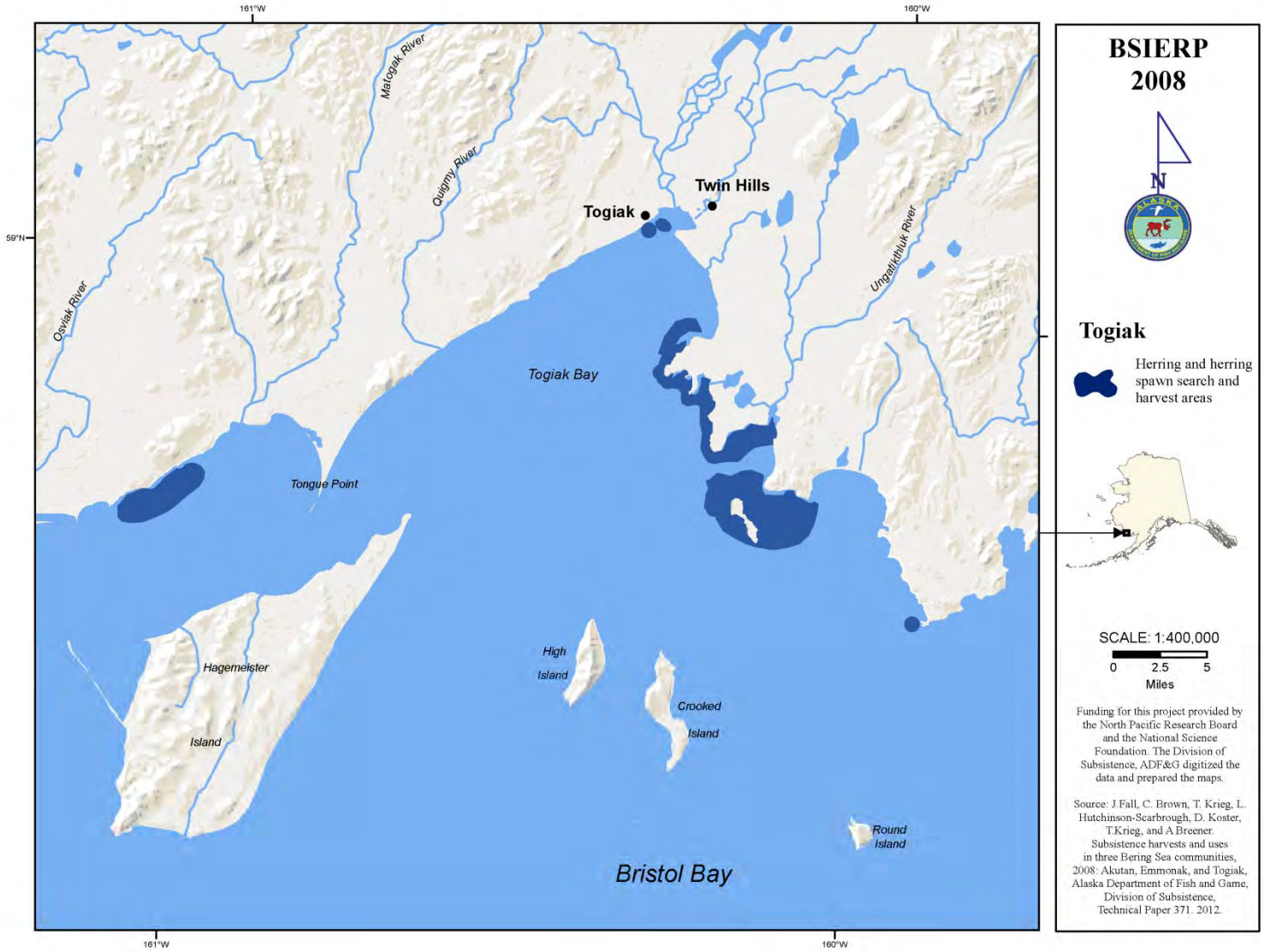

Figure 4-11.–Herring search and harvest areas, Togiak, 2008.

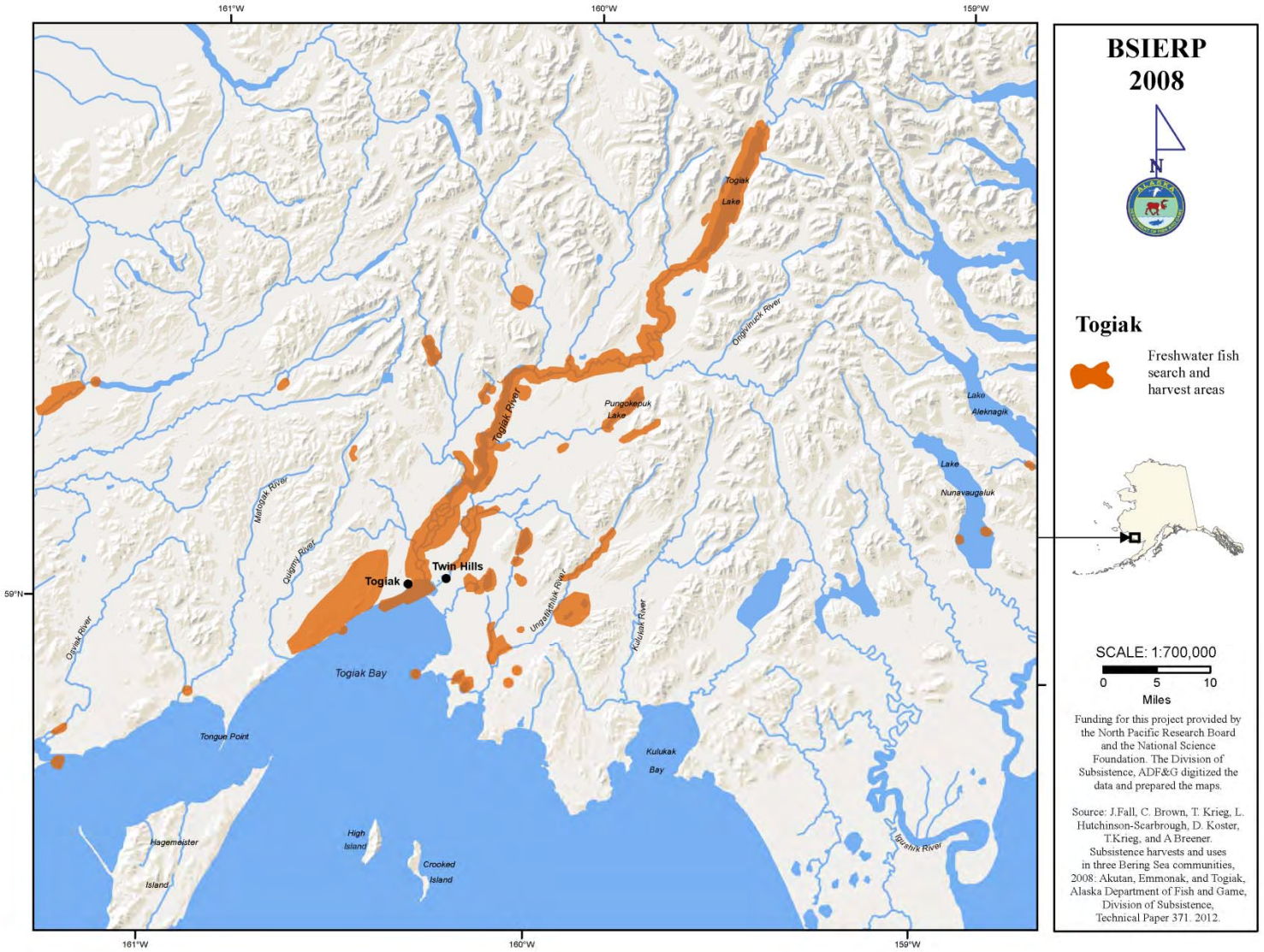

Figure 4-12.–Freshwater fish search and harvest areas, Togiak, 2008.

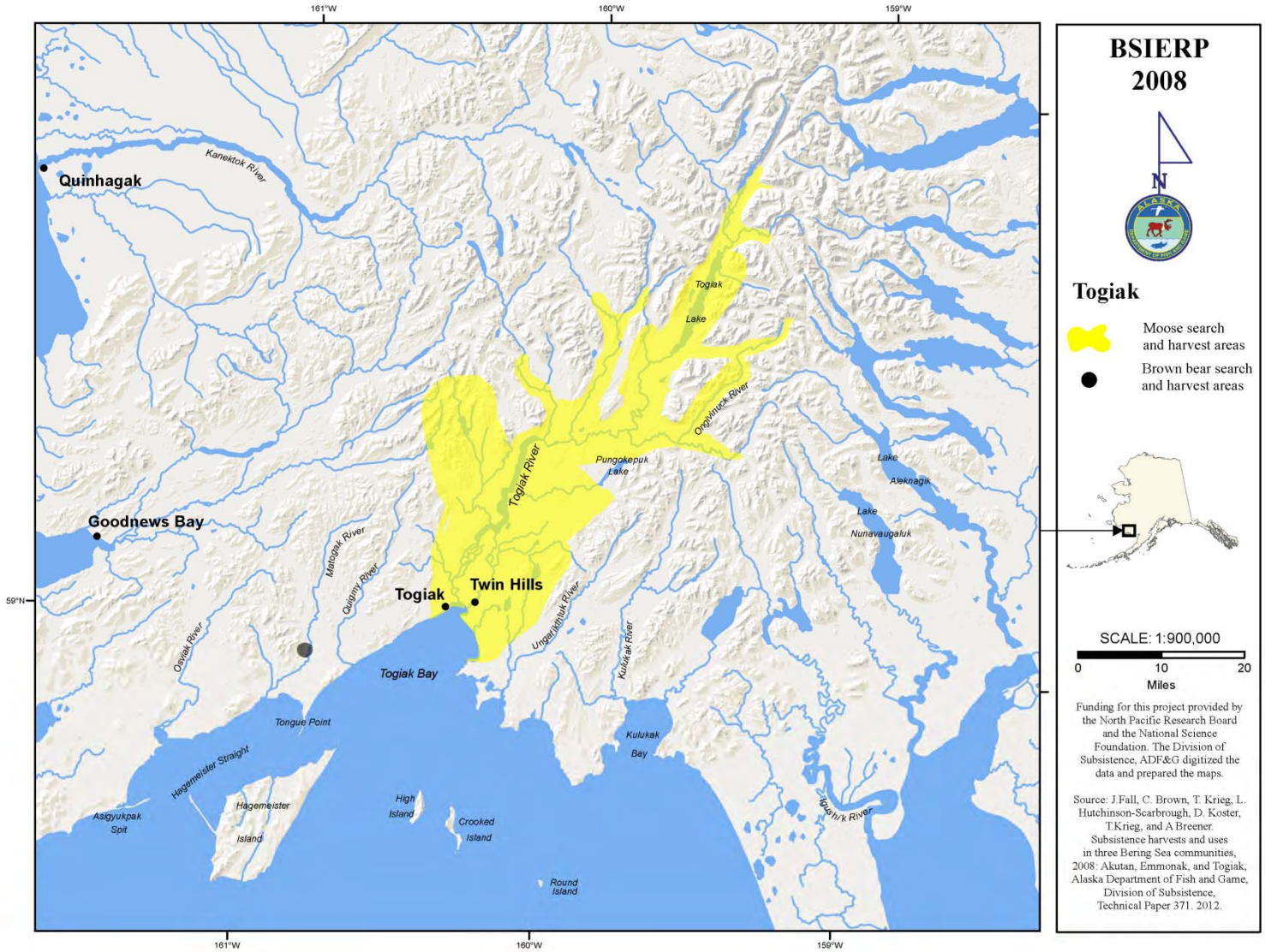

Figure 4-13.–Moose and brown bear search and harvest areas, Togiak, 2008.

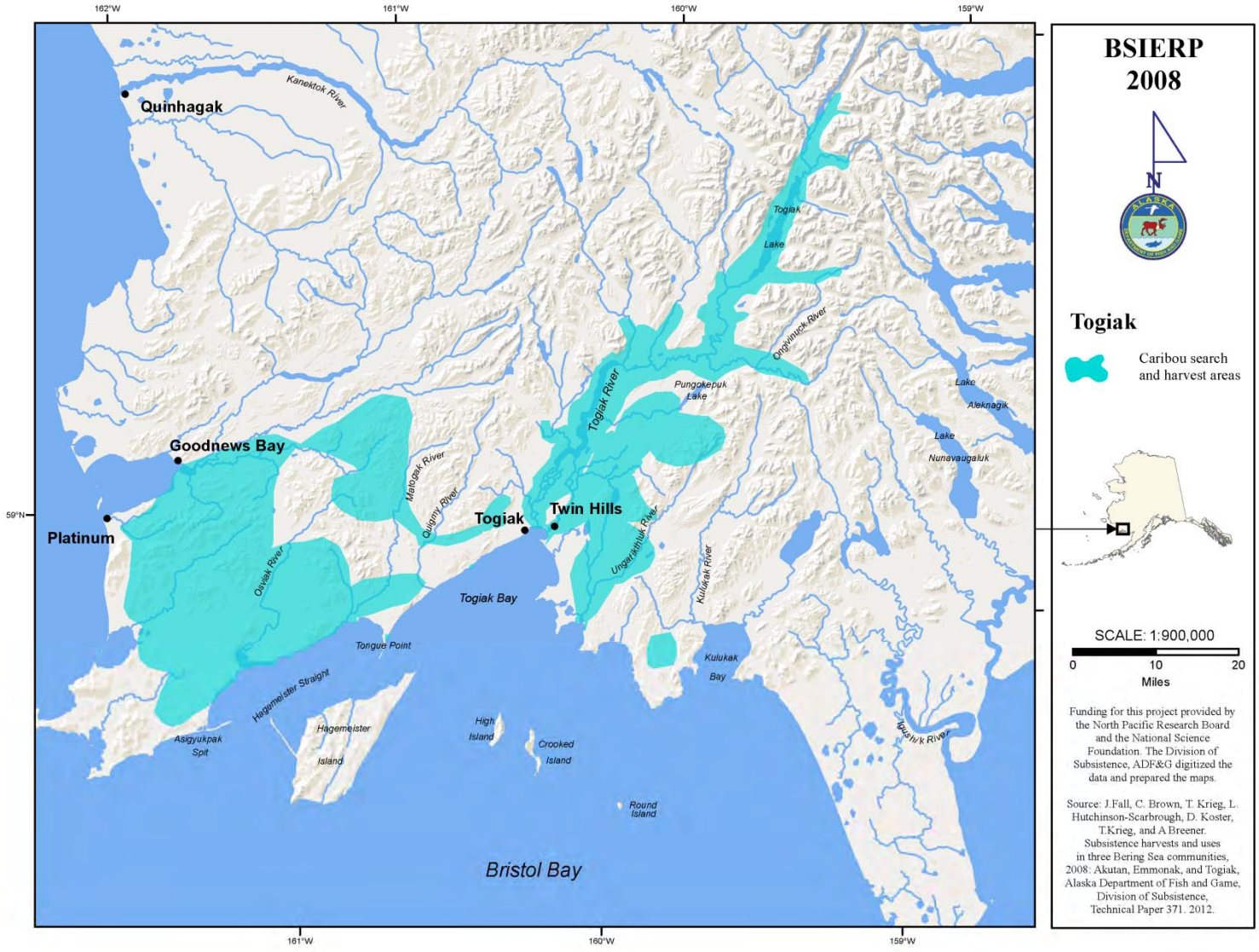

Figure 4-14.–Caribou search and harvest areas, Togiak, 2008.

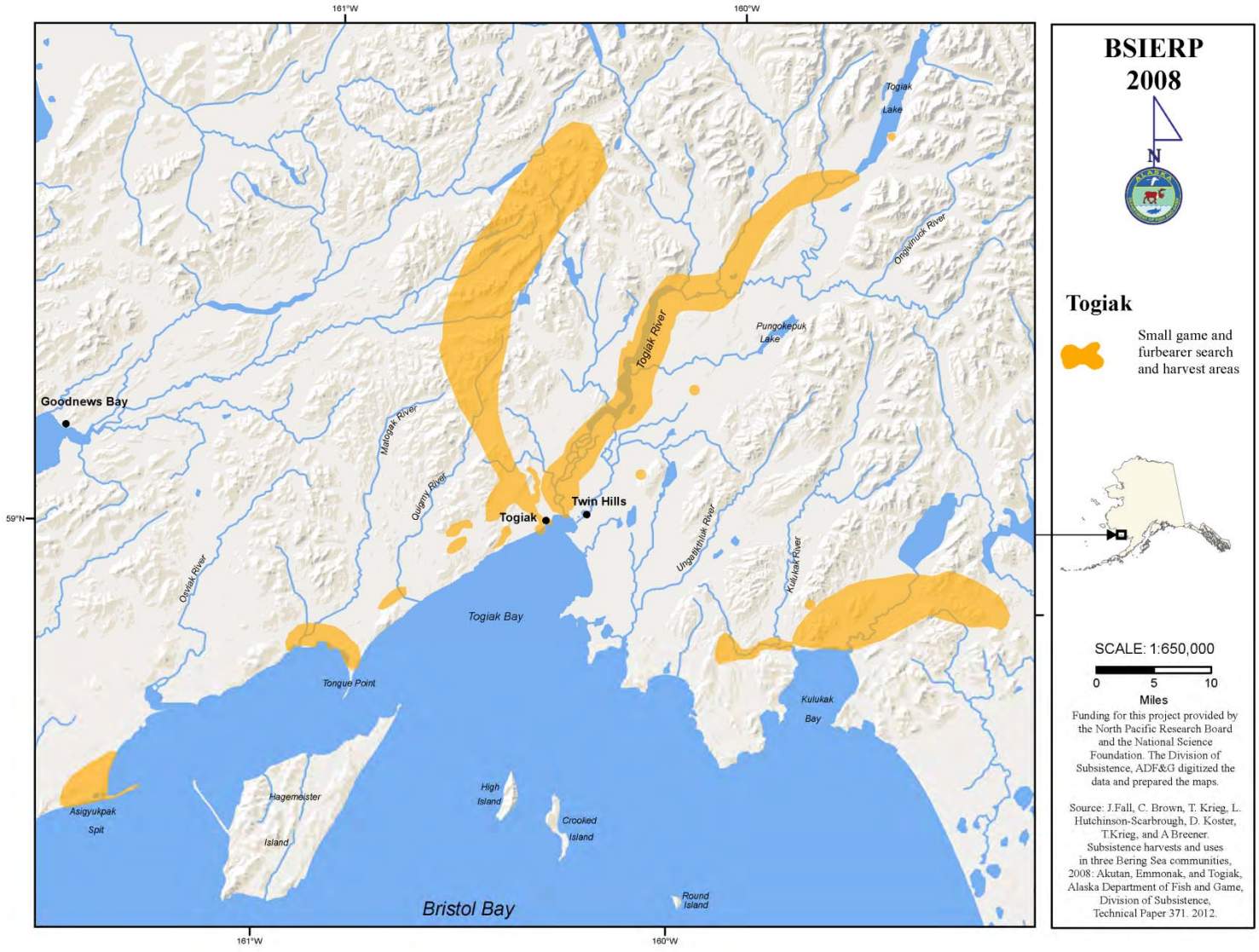

Figure 4-15.–Small land mammals search and harvest areas, Togiak, 2008.

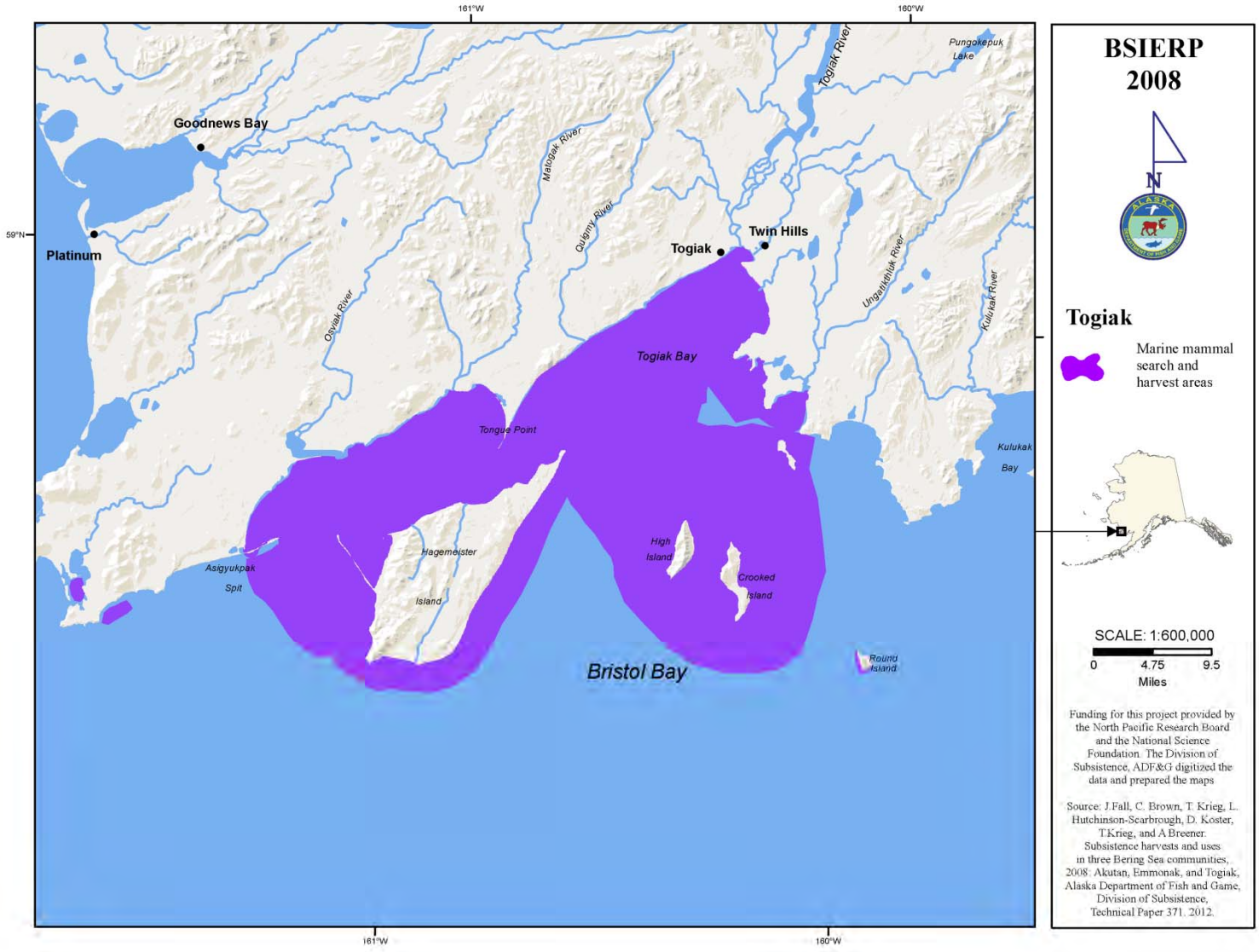

Figure 4-16.–Marine mammals search and harvest areas, Togiak, 2008.

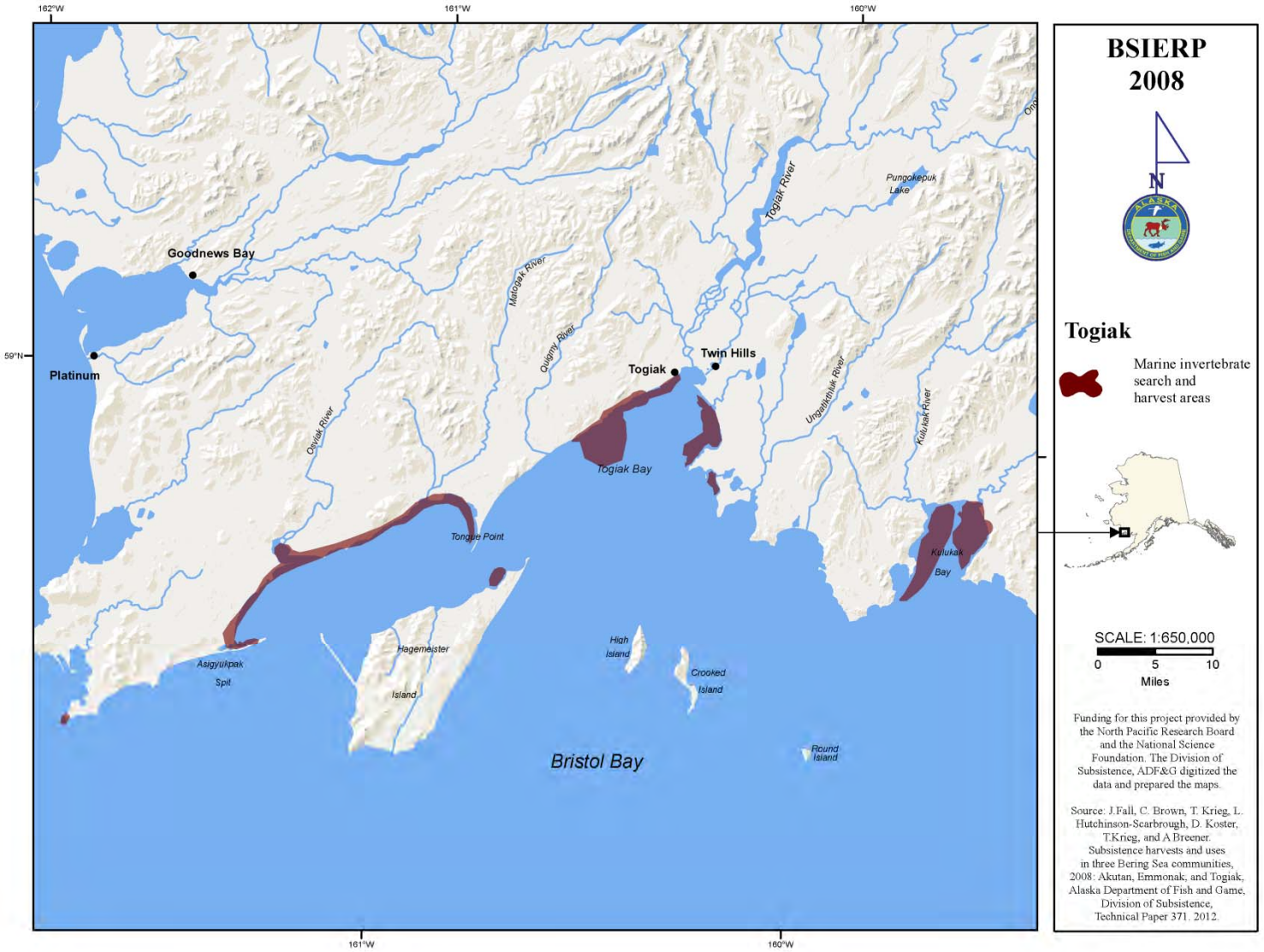

Figure 4-17.–Marine invertebrates search and harvest areas, Togiak, 2008.

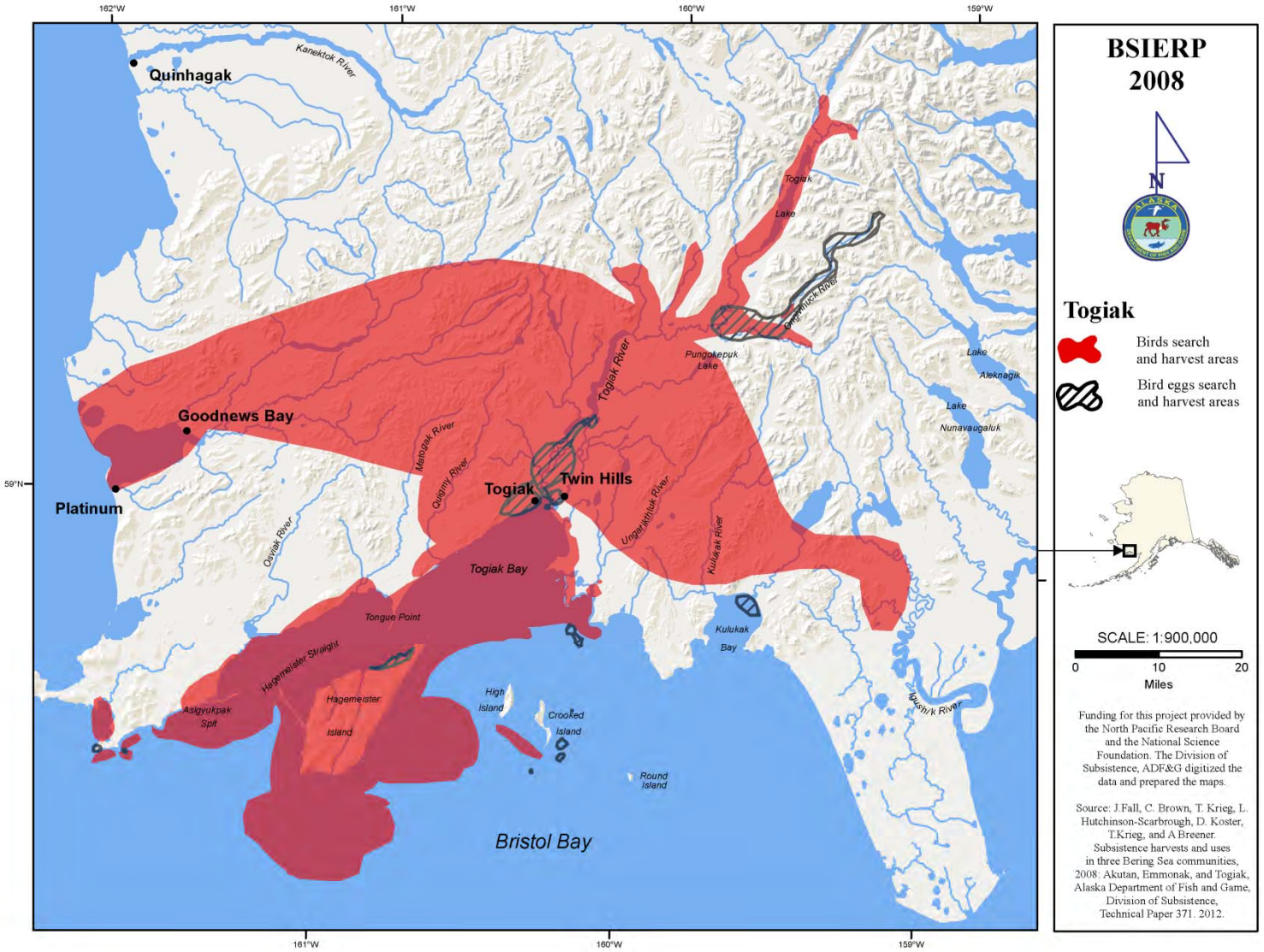

Figure 4-18.–Birds and eggs search and harvest areas, Togiak, 2008.

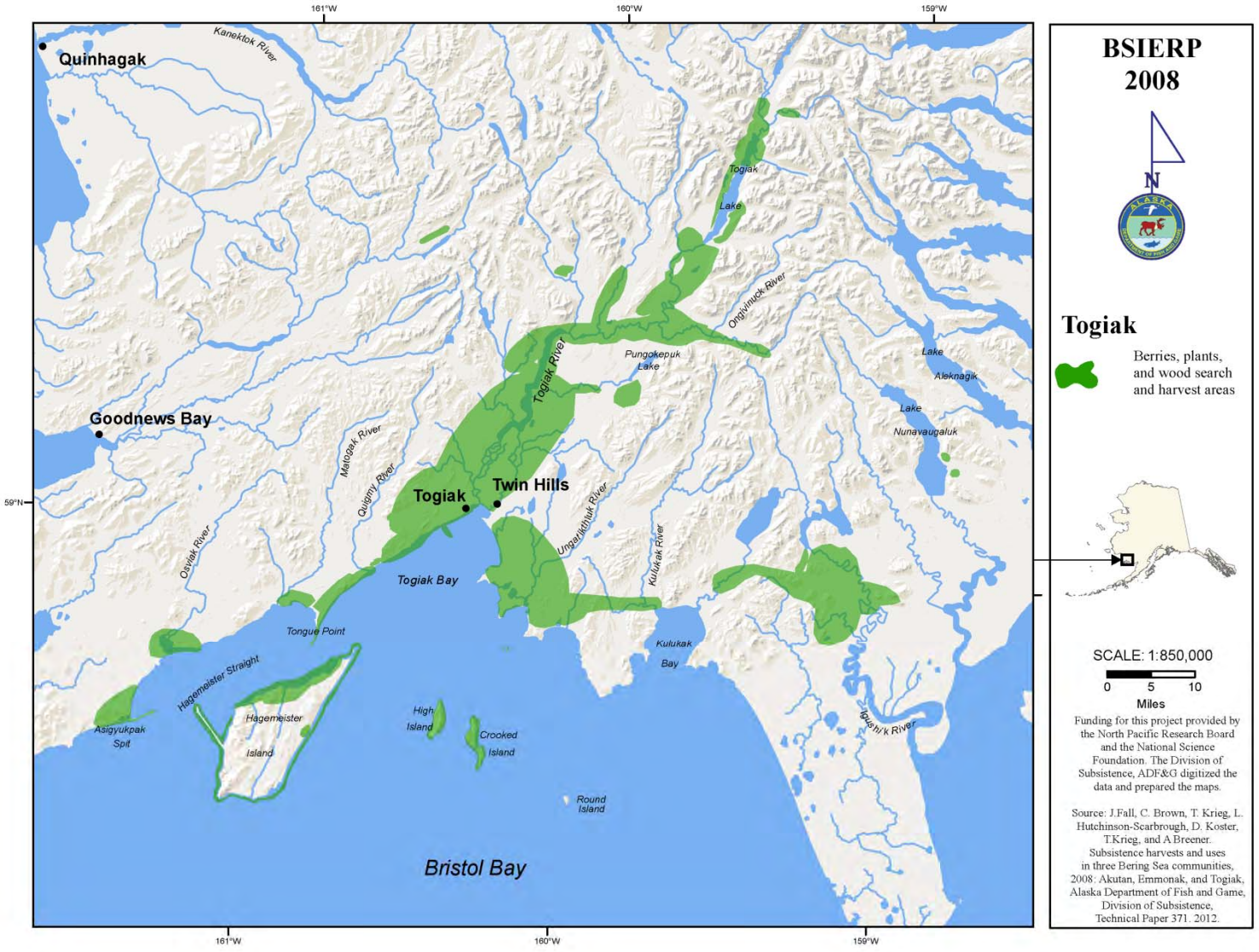

Figure 4-19.–Vegetation search and harvest areas, Togiak, 2008.

COMPARISONS WITH PREVIOUS FINDINGS

Overall Harvest Patterns

The only previous comprehensive harvest survey for Togiak was conducted for study year April 1999–March 2000 (called "study year 1999" below) by the Division of Subsistence (Coiley-Kenner et al. 2003). Study methods were similar to those applied for the present study—for 1999, a stratified random sample of 100 households (57%) was interviewed.

In 1999, Togiak households on average harvested 1,017 lb usable weight (±19.4%) of wild resources, 246 lb (±19.6%) per capita. Estimated harvests were higher in 2008: 1,294 lb (±13.2%) per household and 303 lb per capita.

Figure 4-20 compares per capita harvests for Togiak for 1999 and 2008 for 7 primary resource categories. Figure 4-21 shows the percentage of total harvest by resource category for the 2 study years. The primary differences between the years were lower harvests of land mammals in 2008 (52 lb per person) compared to 1999 (77 lb per person), and corresponding higher harvests of fish (salmon and other fish) (107 lb per person in 1999, 169 lb per person in 2008). The per capita harvest of land mammals (mostly moose and caribou) declined from 77 lb per person and 31% of the total harvest in 1999 to 52 lb per person and 17% in 2008. In contrast, salmon harvests rose from 62 lb per person and 25% of the harvest in 1999 to 106 lb and 35% in 2008. Harvests of other fish were also higher in 2008 (63 lb per person) than in 1999 (45 lb). Harvests were also higher in 2008 compared to 1999 for 3 other categories: marine mammals (27 lb per person in 1999, 32 lb in 2008), birds and eggs (9 lb per person in 1999, 17 lb in 2008), and shellfish (3 lb per person in 1999, 10 lb in 2008). Estimated per capita harvests of wild plants were about the same for the 2 study years at 23 lb per capita.

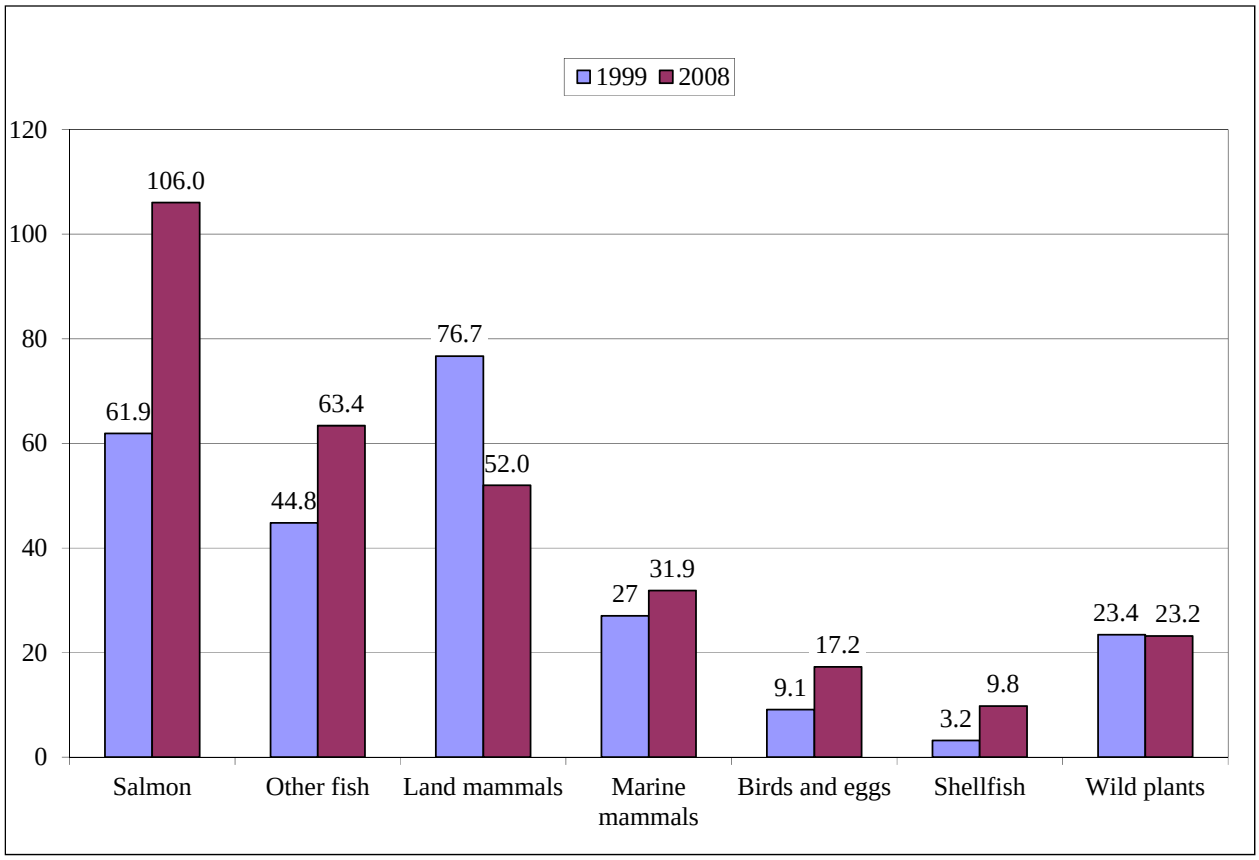

Figure 4-20.–Estimated harvests by resource category, pounds per capita, Togiak, 1999 and 2008.

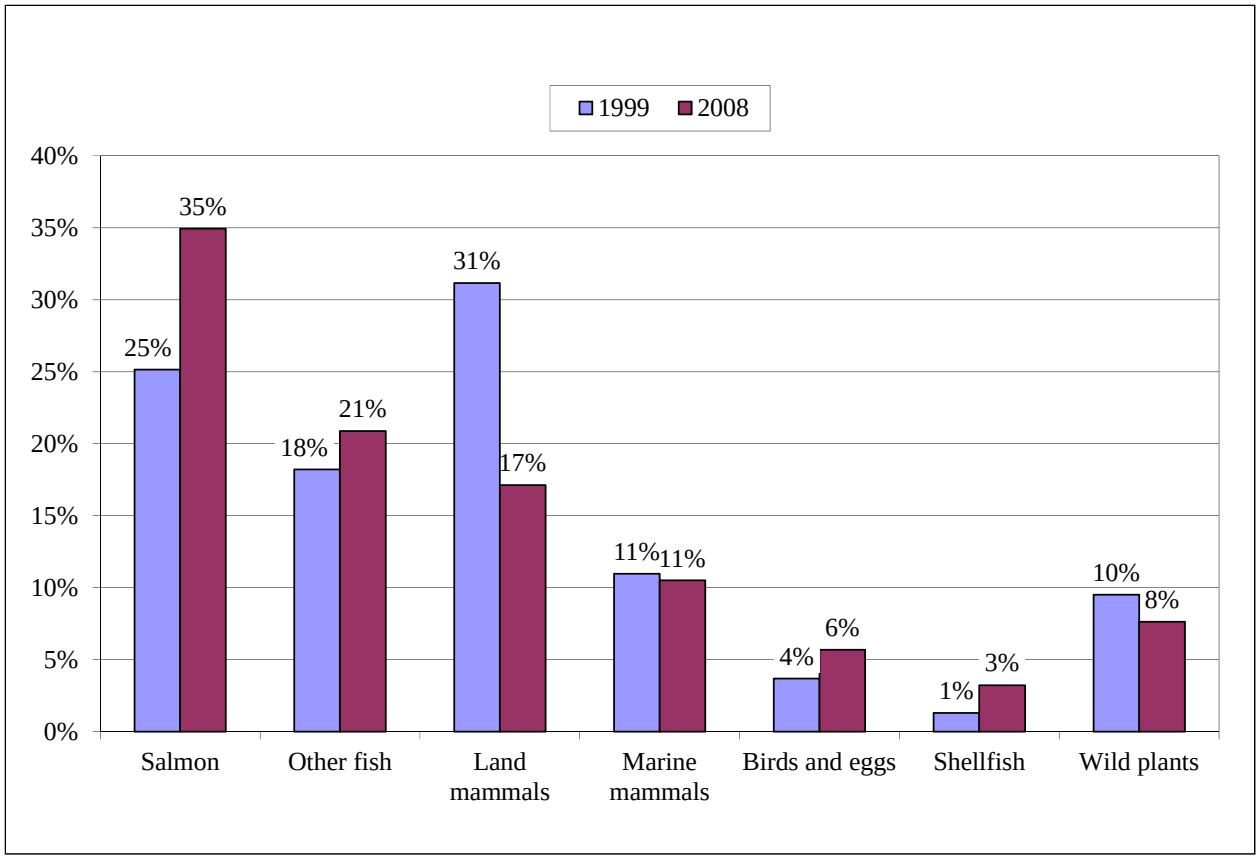

Figure 4-21.–Percentage of total resource harvest by category, Togiak, 1999 and 2008.

Figure 4-22 shows changes in harvests of the 10 resources taken in the largest quantities in 1999 compared to 2008. In 1999, caribou and moose were the resources with the largest per capita harvests in Togiak, but harvests of caribou dropped about 30% and moose 33% in 2008. Harvests of berries and herring were down also, about 16% and 22%, respectively. In contrast, harvests of 4 resources were notably higher in 2008 compared to 1999: Chinook salmon, up 85%; sockeye salmon, up 126%; herring spawn on kelp, up 146%; and harbor/spotted seals, up 58%. There were more modest increases in harvests of coho salmon (up 27%) and smelt (up 33%).

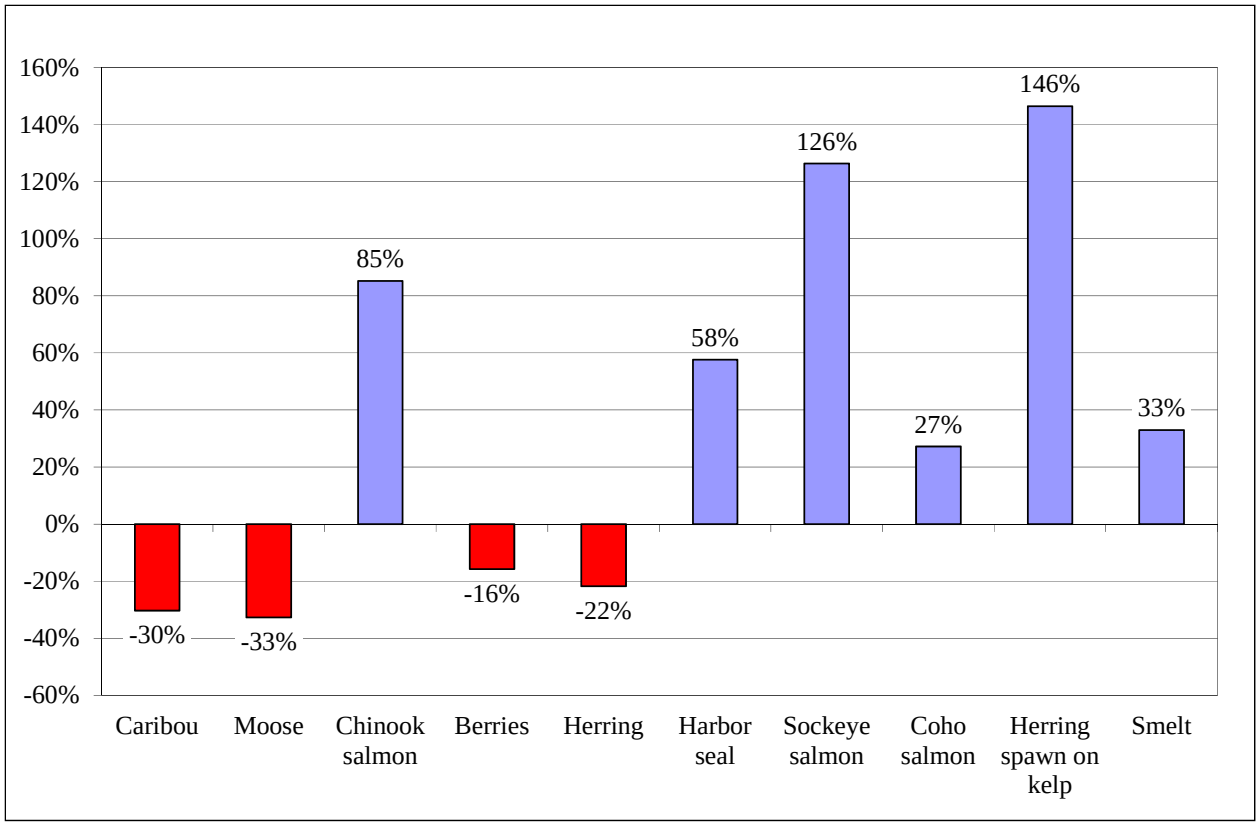

Figure 4-22.–Percentage change in 2008 in harvests (pounds usable weight per capita) of 10 resources harvested in the largest amounts in 1999.

Generally, Togiak households reported using a wider variety of wild foods in 2008 compared to 1999: an average of 27 kinds of wild resources used per household in 2008 compared to 17 kinds on average in 1999. In 1999, 19 resources were used by 50% or more of Togiak households. As shown in Figure 4-23, the percentage of households using 17 of these resources increased in 2008 compared to 1999; the percentage declined, slightly, only for smelt (down 3%) and walrus (down 1%). For 12 resources, there was a 25% or more increase in the percentage of households that used the resource in the 2008 study year compared to 1999. In 2008 compared to 1999, 39% more households used moose, 38% more used murre eggs, 38% more used Chinook salmon, 37% more used cockles, 36% more used gull eggs, and 35% more used coho salmon.

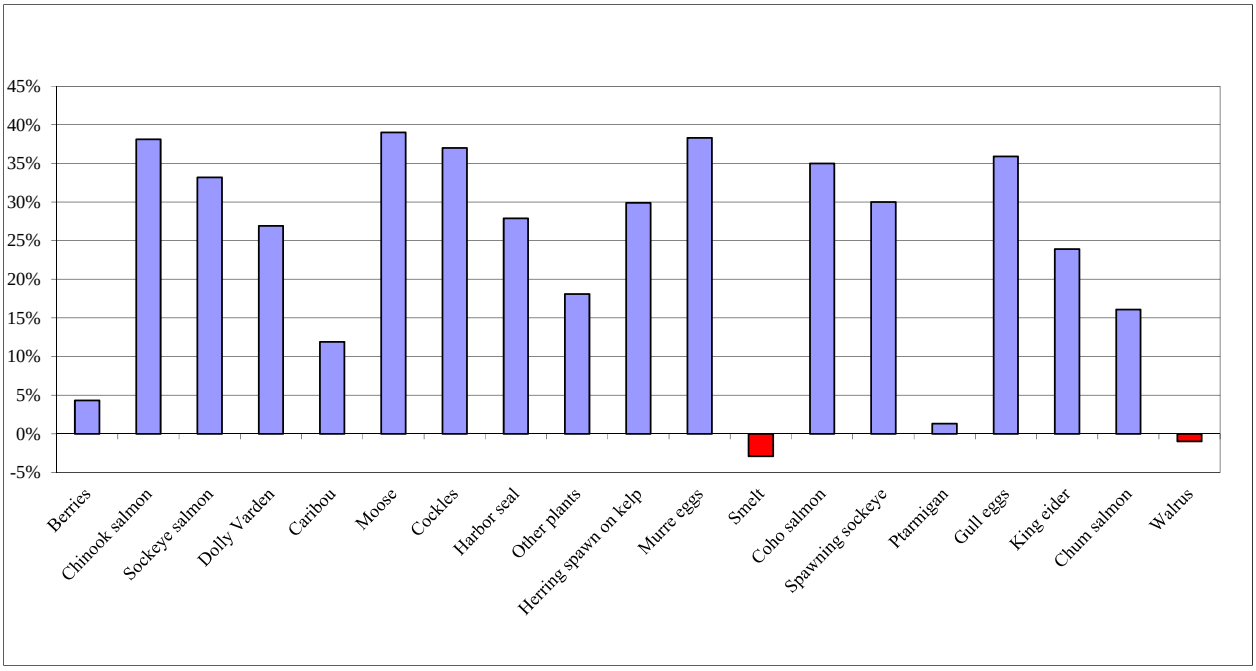

Figure 4-23.–Change in percentage of Togiak households using resources, 1999 and 2008.

Salmon

Subsistence salmon harvests are monitored annually in the Bristol Bay Area, including the Togiak District, through a permit system administered by the Division of Subsistence. Table 4-13 and Figure 4-24 report estimated harvests for Togiak from 1983 to 2008. These estimates do not include harvests with rod and reel (which by regulation is defined as sport fishing). Over this period, total salmon harvests by Togiak subsistence permit holders averaged 4,989 fish annually, composed of 54% sockeye, 18% Chinook, 15% coho, 12% chum, and 2% pink salmon. On average, 44 Togiak households have obtained subsistence salmon permits annually since 1983, although 89 held permits for 2008. The higher number of permits issued in 2008 is likely a result of the post-season surveys administered for this project. Interviewed households that reported subsistence salmon harvests but had not obtained a permit during the season were added to the permit rolls to improve the annual program's estimate. Gross (1991:11–13,96–98), addressing subsistence salmon harvest estimates for Togiak in 1987, had concluded that permit returns alone underestimated subsistence salmon harvests in Togiak because many fishing households did not obtain permits.

As noted earlier, salmon made up a larger portion of Togiak's subsistence harvests in 2008 (35%) compared to 1999 (25%). Also, as estimated in pounds usable weight per person, total salmon harvests were larger in 2008 (106 lb) than in 1999 (61.9 lb), as were harvests for all 5 species. In addition, a larger percentage of Togiak households used each salmon species in 2008 than had done so in 1999.

An active subsistence harvester commented on Chinook salmon:

> What I recollect is that king salmon enter Togiak Bay on the west side. They swim with the Kuskokwim fish and they split with them at Cape Newenham. The kings start showing up first in the Asigyukpak and Osviak area. After that they start showing up in this bay (near Togiak). Quinhagak starts catching kings the early part of June and they start showing up one or two weeks later in Togiak Bay. The population of king salmon is really going down and I don't know what's wrong. Maybe it is the trawler bycatch, it seems like it's affecting us in this bay too. There used to be lots of king salmon when there weren't any trawlers like in the 1970s and early 80s. The run would go from June to

> around the Fourth of July, there would be lots of king salmon returning to the Togiak Bay, but now not that much. Last year [2009] the kings were real small, there weren't any of those big kings that we use to catch, there were just small kings and there weren't very many. Maybe the trawlers are affecting the fish that are bound for Togiak Bay because we've been conserving on commercial fishing for kings for maybe 20 years and the numbers are still going down. We use small mesh, ADF&G restricts us to 5 and 3/8 inch mesh, we don't even use king salmon nets anymore for commercial fishing. During spring people subsistence fish for king salmon, our main diet in the spring, we make dried strips. For subsistence we set nets farther out [from Togiak] in Togiak Bay, and I usually drift in the [Togiak] river for king salmon too. Subsistence is first priority, even though there's lots of sports fishermen on the Togiak River I just drift. When we get the amount we want we stop, we don't waste.

He also commented on sockeye salmon.

> It seems like reds [sockeye] arrive from past Cape Constantine, before Cape Constantine some of the reds go into Nushagak Bay. Reds continue west toward Togiak and after they show up at Kulukak, two or three days later they start showing up in the Togiak Area. Whenever reds show up at Anchor Point the next day they show up by the Hawaiian Islands [just southwest of Togiak]. The current goes that direction from Anchor Point. From the Hawaiian Islands they go northeast toward the Togiak River. From Anchor Point some reds also go along the east shore from Anchor Point toward the Togiak River. It seems like reds are smaller, we used to catch big red salmon. For commercial fishing I usually use five and a quarter, five and one-eighth inch mesh and some of them still go through the net.

Table 4-13.–Estimated subsistence harvests of salmon, subsistence permit returns, Togiak, 1983–2008.

	Number of permits		Estimated number of salmon harvested					
Year	Issued	Returned	Chinook	Sockeye	Coho	Chum	Pink	Total
1983	35	25	594	2,295	636	705	148	4,378
1984	31	21	534	3,553	3,575	1,768	285	9,715
1985	45	32	640	3,065	1,423	937	75	6,141
1986	24	20	660	2,135	420	781	56	4,052
1987	40	30	769	3,311	862	908	5	5,854
1988	30	28	370	1,980	673	608	37	3,667
1989	38	31	533	2,913	973	887	102	5,408
1990	35	31	482	3,826	1,230	843	57	6,438
1991	40	37	424	3,520	1,177	529	21	5,670
1992	34	22	1,141	3,341	1,209	564	83	6,338
1993	35	27	658	1,966	620	570	8	3,822
1994	24	23	888	1,722	871	378	80	3,939
1995	23	22	799	1,365	784	389	0	3,337
1996	21	7	541	762	281	341	99	2,024
1997	30	30	685	1,472	275	390	0	2,822
1998	42	42	836	2,393	317	457	84	4,087
1999	73	70	1,181	3,718	217	460	87	5,662
2000	52	40	1,014	2,945	342	533	83	4,917
2001	90	89	1,582	4,122	378	362	31	6,475
2002	35	34	718	2,358	241	605	10	3,932
2003	84	81	1,037	4,283	778	483	446	7,027
2004	44	38	1,094	1,770	204	383	108	3,559
2005	43	36	1,444	2,223	281	259	26	4,232
2006	59	46	1,589	2,699	408	487	342	5,525
2007	45	33	1,227	2,521	110	420	19	4,298
2008	89	88	1,303	3,744	535	691	114	6,387
Annual mean	44	38	875	2,692	724	605	92	4,989
Percentage by species			17.5%	54.0%	14.5%	12.1%	1.9%	

Source ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009).

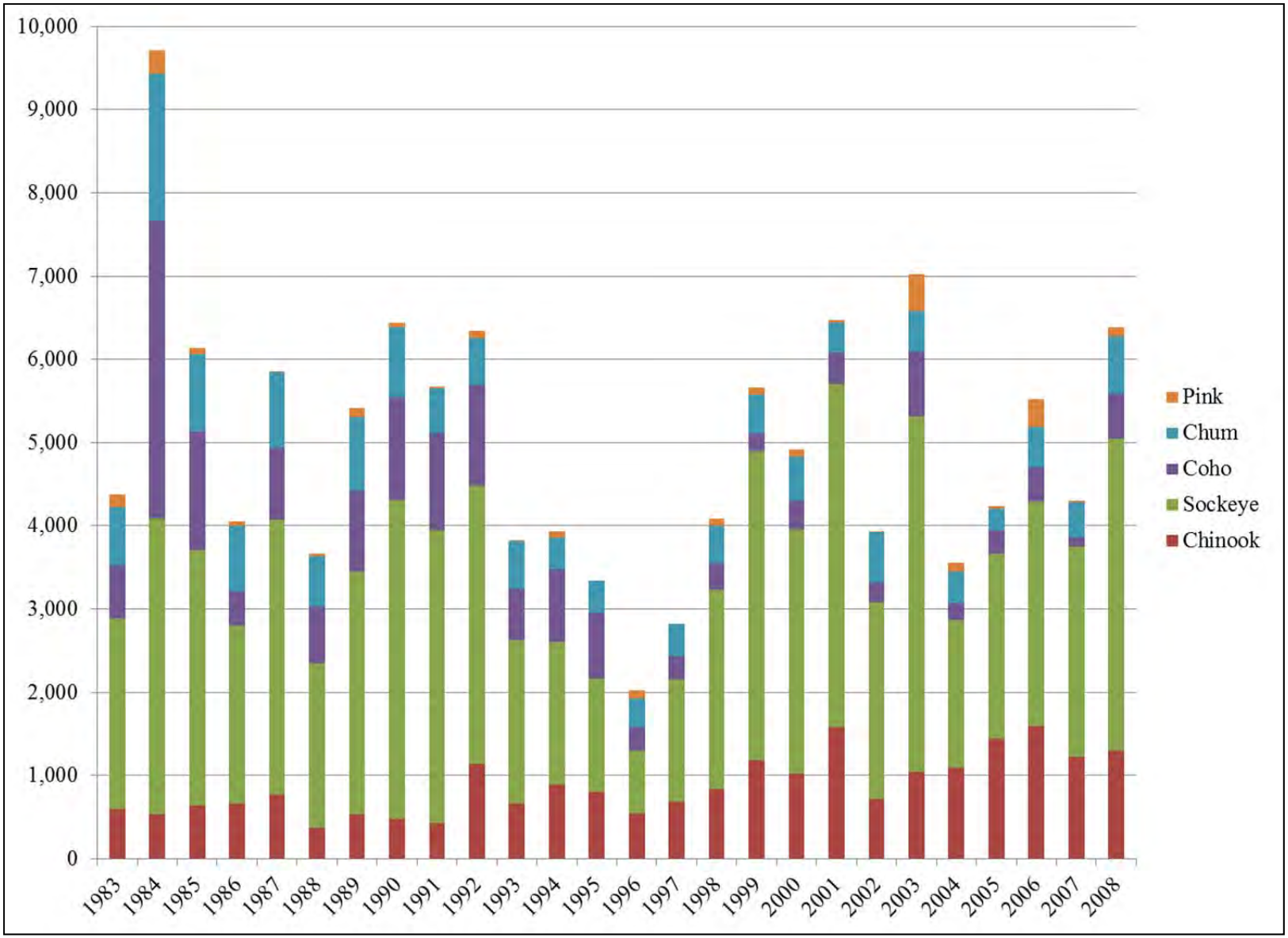

Figure 4-24.–Estimated subsistence harvests of salmon, subsistence permit returns, Togiak, 1983–2008.

Fish Other than Salmon

Three annual harvest estimates for nonsalmon fish are available for Togiak based on household surveys conducted by the Division: 2 from comprehensive surveys pertaining to 1999–2000 (Coiley-Kenner et al. 2003) and 2008 (this study) and another for 1994 (conducted in partnership with the Bristol Bay Native Association [BBNA]) based on a survey of 50 randomly selected households (32%) which focused only on nonsalmon fish harvests occurring in fresh water (Alaska blackfish, burbot, Arctic grayling, northern pike, whitefish, smelt, Dolly Varden, lake trout, rainbow trout) (Bristol Bay Native Association and ADF&G 1996). Findings for these studies are summarized in Table 4-14.

For all nonsalmon fish, per capita harvests were 45 lb in 1999, and 63 in 2008. For only those nonsalmon fish taken in fresh water, harvests were 53 lb per person in 1994, 17 lb per person in 1999, and 28 lb per person in 2008. In both 1999 and 2008, herring spawn and herring were by far the primary component of the marine fish harvest (96% in 1999 and 99% in 2008). Dolly Varden ranked first among freshwater fish harvests in 1994 and 2008, and ranked second in 1999. Rainbow smelt ranked first in 1999 and second in 1994 and 2008. Lower harvests of Dolly Varden and rainbow smelt in 1999 (14 lb per person combined) and 2008 (20 lb) compared to 1994 (43 lb) accounted for most of the differences in freshwater fish harvests across the 3 study years.

A key respondent commented on the former abundance of herring and herring spawn:

> Herring would spawn on points where kelp is growing extending from Rocky Point all the way to Kulukak and other areas, but they don't spawn near fresh water where the rivers are. Herring spawn in the areas where there are rocks that the kelp grow on, like on Hagemeister and Summit islands, all the way around to Cape Newenham and even inside Chagvan Bay. The herring spawn in the grass in Nanvak Bay and the brant geese are waiting there to fly on to the north. In Nanvak Bay when the tide goes out after the herring have spawned, I have observed what I thought might be 75–80,000 birds in the mudflats where the grass is. It is solid with birds eating the eggs.

An elder woman recalled that *cikaaqs* (capelin) follow right after the herring and people ate them in large numbers in the past. Cikaaq arrive right after the herring and the elders used to say that the cikaaq tell the herring that it is time to leave. Widows and elders can pick capelin off the beach. "They are good for widows because they are easy to gather (on the beach)," she said. They used grass to dry them on. The intestines of the cikaaq are removed right away because they cannot be hung with the "guts" still inside.

A key respondent reported that in the spring they used to gather herring spawn on kelp in large quantities and lay it out on a tarp to dry and then they would store it. When they wanted to eat the spawn, they soaked it in fresh water and it would be just like it was freshly picked. Formerly, the kelp was thick with 2 inches of spawn on kelp. Even the tops of the rocks were covered with kelp, making it difficult to walk because they were so slippery. But, he commented:

> It's not like that anymore. Probably 20 years from now if they keep letting them purse seine there will be no more herring. Then those purse seiners will move out. That's the reason why hardly anyone from Togiak commercial fishes for herring.

He added that the only place that there is enough herring spawn on kelp for Togiak subsistence harvesters to get after the purse seiners have fished is Summit Island. Before the commercial fishery, subsistence harvesters used to be able to find spawn on kelp at all the places where there are rocks**.**

An elder reported than another elder told her that in the past when the herring arrived "it looked like the ocean was smoking when the first batch [run] was spawning." The "second batch" was larger. However, the seiners fish for herring commercially on the first run's spawn and Togiak residents feel they should wait until the second spawn. That is why there is not as much spawn on kelp today.

Another man commented on the widespread declines in various subsistence resources, a decline that he attributes to the commercial herring fishery:

> After the commercialization of herring, seems like the numbers of geese, and whales, seals, sea lions went way down. My grandpa used to take my grandma and me, when I was about 9 or 10 years old, and to hunt squirrels on the other side of the bay from Togiak near where Twin Hills is today. When my grandpa was taking us across Togiak Bay with a skiff, it seemed like we were hitting bottom with the prop but when I looked back there were herring flying up from the prop because there were so many herring.
>
> I remember going hunting at the Anchor Point area when the herring were spawning. We would see hundreds of seals all over and herds of sea lion families, like 4 or 5 to a group, little groups here and there. I believe that's how sea lions hunt, is in a group. Nowadays it is rare to see that many sea lions. Now we just see 1 big bull and 1 sea lion when we're going west to hunt. Early before the herring start showing up, we start seeing 1 or 2 sea lions coming this way, probably from the Cape Newenham area.
>
> Emperor geese like to feed on the herring roe. I remember my grandpa commenting that the geese are fatter after herring season. That's when my grandpa preferred to do his geese hunting, when the birds were nice and fat, not skinny.
>
> I remember that all kinds of whales that used to come around. I think they were fin whales, and humpback whales, and grey whales, and those big one, I think they were blue whales. The [air released from the] blowhole seemed to take forever for it to go out, at least that's how I thought it was. I remember one time when [person's name] shot a whale, I think it was a gray whale, and it beached across from Togiak at Anchor Point, and there were a whole bunch of people that went to go get whale meat and blubber from the whale.

Table 4-14.–Harvests of nonsalmon fish, Togiak, 1994, 1999, and 2008.

	Harvests pounds usable weight per person		
	1994	1999	2008
Fish harvested in freshwater			
Alaska blackfish	0.11	0.10	0.00
Burbot	0.00	0.00	0.00
Dolly Varden	28.50	6.30	11.79
Arctic grayling	0.22	0.00	0.07
Lake trout	0.99	0.20	0.04
Northern pike	4.90	1.60	5.07
Rainbow smelt	14.85	7.30	9.70
Rainbow trout[a]	2.27	0.50	0.67
Longnose sucker			0.13
Whitefish	1.27	0.60	0.62
Subtotal	**53.12**	**16.60**	**28.10**
Fish harvested in marine waters			
Capelin		0.00	0.01
Pacific halibut		1.00	0.11
Herring		18.60	14.55
Herring roe		8.40	20.23
Pacific cod		0.00	0.01
Pacific tomcod		0.00	0.06
Sculpin		0.00	0.01
Starry flounder		0.10	0.30
Yellowfin sole		0.00	0.02
Subtotal		28.10	35.29
All nonsalmon fish		**44.70**	**63.40**

Sources Bristol Bay Native Association and ADF&G 1996; Coiley-Kenner et al. 2003, ADF&G Division of Subsistence household surveys, 2009.

Note Blank cells indicate data not collected.

a. Rainbow trout includes "unknown trout."

Halibut

Federal regulations (68 FR 18145, April 15, 2003) recognize the rural community of Togiak and the Togiak Tribe as having traditional uses of halibut. Therefore, since the regulations were established in 2003, community residents and tribal members are eligible to participate in the federal subsistence halibut fishery after they obtain a Subsistence Halibut Registration Certificate (SHARC) from the National Marine Fisheries Service. The Division of Subsistence, through a grant from NOAA, conducts an annual survey of SHARC holders to estimate the subsistence halibut harvest in Alaska (e.g., Fall and Koster 2011). On average, about 7 Togiak residents have held SHARCs since 2003; no harvests have been reported in the survey of SHARC holders (Table 4-15). In the 2008 study year, according to the household survey results, 8% of Togiak households fished for and harvested halibut (about 14 households); many more (33%) used halibut, with most (28% of all households) receiving halibut from other households (Table 4-8). Most Togiak households that fished for halibut in 2008 using any method (about 9 of 14 households; 64%) removed a few fish from commercial harvests.[29] One-half of the

29. Togiak is one of 28 Bristol Bay communities that are members of the Bristol Bay Economic Development Corporation (BBEDC). The BBEDC holds a Community Development Quota (CDQ) for commercial halibut fishing in Area 4E (the

remaining households used rod and reel and the others used longlines ("other methods" in the tables) (Table 4-12). Subsistence longlines accounted for 83% of the community's total halibut harvest in 2008 (Table 4-11). In 1999, 20% of Togiak households used halibut and 3% harvested halibut; the estimated harvest was 702 lb, about 1 lb per person (Coiley-Kenner et al. 2003:47). Eighty percent of this total was removed from commercial harvests (Coiley-Kenner et al. 2003:78).

Table 4-15.–Estimated subsistence harvests of halibut, Togiak, 2003–2010.

				Estimated harvests	
	SHARCs[a] issued	Surveys returned	Estimated fishers	Number of fish	Usable pounds
2003	2	1	0	0	0
2004	5	0			
2005	10	6	0	0	0
2006	10	7	2	0	0
2007	10	6	0	0	0
2008	9	5	0	0	0
2009	9	4	0	0	0
2010	4	1	0	0	0
8-year average	7	4	0	0	0

Sources Fall et al. 2004b.; Fall et al. 2005a; Fall et al. 2006b; Fall et al. 2007b; Fall and Koster 2008; Fall and Koster 2010a; Fall and Koster 2011; and Fall and Koster 2012.

Note Blank cells indicate data not collected.

a. SHARC = subsistence halibut registration certificate.

Large Land Mammals

Three annual harvest estimates for large land mammals (caribou, moose, brown bears) are available for Togiak based on division household surveys, 2 from comprehensive surveys pertaining to 1999–2000 (Coiley-Kenner et al. 2003) and 2008 (this study) and another for 2001–2002 (conducted in partnership with BBNA) based on surveys asking only about large land mammal harvests (Holen et al. 2005). Findings for these studies are summarized in Table 4-15.

Togiak hunters have access to 2 caribou herds: the Nushagak Peninsula herd and the Mulchatna herd. The Nushagak Peninsula herd was established in 1988 when caribou were transplanted from the Alaska Peninsula. Hunting began in 1995 (Holen et al. 2005:28), but there was no harvestable surplus to support a hunt in 2008. In February 2011, the herd numbered about 800 caribou and was increasing in size (ADF&G 2011). The Mulchatna herd ranges in GMUs 9B, 17, 18 south, 19A, and 19B. Its numbers have fluctuated widely, and the population peaked at about 200,000 animals in the late 1990s, after which it began a rapid decline to about 45,000 animals by 2007 (Woolington 2009). In March 2011, ADF&G estimated the herd's size at about 30,000–40,000 caribou (ADF&G 2011).

Caribou harvests by Togiak hunters vary from year to year based on the location of the Mulchatna herd and traveling conditions. The highest available harvest estimate, about 178 caribou (range 136 to 219) is for 1999–2000 when the herd was generally accessible to Togiak hunters. The lowest harvest estimate, about 106 caribou (range 77 to 134), is for 2001–2002, when the herd was less accessible. The estimated harvest for the 2008 study year was about midway between these previous estimates, at 136 caribou

Bering Sea). Regulations adopted by the International Pacific Halibut Commission allow CDQ organization halibut fishers to retain "U32" (halibut under 32" in length, the legal size for commercial halibut; also called "sublegal" halibut) for personal use. In 2008, the BBEDC reported retaining 1,816 lb of halibut that were landed in Togiak and Dillingham (Williams 2011). This may account for the halibut "removed from commercial harvests" reported by survey respondents.

(range 105 to 168) (Table 4-15). Survey respondents reported that caribou were more distant from the village in 2008 than in other recent years, resulting, along with higher fuel costs, in lower hunting success.

Moose were rare in GMU 17A historically, but the population rose markedly in the 1980s and 1990s, and continued to increase into the late 2000s (Holen et al. 2005:51; Woolington 2008:246; ADF&G 2011). Regulations allowed hunting by registration permit beginning in 1997 (Coiley-Kenner et al. 2003:93).

The 2 moose harvest estimates for Togiak prior to the 2008 study year differed significantly from each other: about 48 moose (range 32 to 63) in 1999–2000 compared to about 18 moose (range 7 to 29) in 2001–2002 (Table 4-15). In the latter year, 83% of interviewed Togiak households reported that their needs for moose had not been met (Holen et al. 2005:65). Reasons for the large differences between the 2 years are uncertain, although the low harvest in 2001–2002 was attributed to "a relative scarcity of moose in GMU 17A" (Holen et al. 2005:54).

For 2008, the harvest estimate of 35 moose (range 26 to 45) was about double the 2001–2002 estimate and not significantly different from the estimate for 1999–2000. A much larger percentage of Togiak households reported using moose in 2008 (83%) compared to either 1999 (44%) or 2001 (25%), with 68% of households reporting receiving moose in 2008, compared to 36% in 1999 and just 18% in 2001 (Table 4-16).

In response to a survey question about why lower uses of large game were reported in 2008 compared to other recent years, one respondent reported that airplane traffic and float planes landing along the Togiak River were keeping the moose away from the river so that they were harder to hunt in the fall. Several respondents noted that the high price of gasoline was a deterrent to traveling very far up the river to hunt. Another reported that poor weather in the fall inhibited hunting effort for moose.

Few Togiak households used, hunted, or harvested brown bears in any of the 3 study years (Table 4-16). Historically, brown bears have been a source of meat and fat for Bristol Bay communities, including Togiak (Behnke 1981; Holen et al. 2005:77–79).

Table 4-16.–Uses and harvests of caribou, moose, and brown bears, Togiak, 1999, 2001, and 2008.

	Percentage of households					Estimated harvests		
Study year	Use	Attempt	Harvest	Receive	Give	Number of animals	95% confidence limit	Pounds per person
Caribou								
1999–2000	70.6%	55.6%	47.4%	45.0%	40.6%	177.6	23.2%	36.6
2001–2002	49.0%	49.0%	36.8%	17.0%	28.1%	105.6	27.1%	22.6
2008	82.5%	38.8%	30.0%	65.0%	36.3%	136.3	23.3%	25.5
Moose								
1999–2000	43.5%	31.8%	18.9%	36.1%	24.3%	47.6	32.2%	35.3
2001–2002	24.7%	25.1%	8.7%	18.0%	7.7%	17.7	63.0%	13.7
2008	82.5%	46.3%	18.8%	67.5%	32.5%	35.3	26.8%	23.8
Brown bears								
1999–2000	4.0%	4.0%	4.0%	0.0%	3.3%	8.2	31.0%	1.1
2001–2002	2.0%	2.0%	2.0%	0.0%	2.0%	3.1	82.1%	0.4
2008	3.8%	1.3%	1.3%	2.5%	0.0%	2.4	114.3%	1.0

Sources Coiley-Kenner et al. 2003; Holen et al. 2005; ADF&G Division of Subsistence household surveys, 2009.

Marine Mammals

From 1992 through 2008 (except 1999), the Division of Subsistence and the Alaska Native Harbor Seal Commission (ANHSC) interviewed households in Togiak (and approximately 60 other coastal Alaska communities) about annual subsistence harvests of harbor/spotted seals and Steller sea lions. Estimates for 1999 for Togiak are available based on the comprehensive survey (Coiley-Kenner et al. 2003). Table 4-17 and Figure 4-25 report the results for harbor/spotted seals. Annual harvests averaged about 156 seals in the 1990s and about 83 seals from 2000 through 2007. The harvest survey estimate for 2008 of 336 seals (±24%; range 256–416) (Table 4-8), which was based on a simple random sample of households, exceeded any annual estimate since 1992 and did not conform to a general declining harvest trend in the 1990s and 2000s. The annual survey estimate (as reported in Table 4-17 and in Wolfe et al. 2009a), based on a stratified sample of 21 of 28 seal hunting households and 118 randomly selected "other" households, was 214 harbor/spotted seals, with a range of 172 to 256 seals (Wolfe et al. 2009a:19,C-125). While lower than the estimate based on the comprehensive survey, this second estimate is also substantially above the recent annual average of 83 seals.

The ANHSC/ADF&G survey estimated Steller sea lion harvests by Togiak residents at about 4 in 1992, 3 in 1993, and 1 in 1994. No Steller sea lion harvests have been reported at Togiak since 1994 (Wolfe et al. 2009a:C-124).

Bearded seals and ringed seals were important subsistence resources at Togiak in the past (Wolfe et al. 1984:331–332, 403), but harvests have declined substantially over the last several decades. Estimated harvests were 23 bearded seals (±129%) in 1999 and just 5 (±80%) in 2008. No ringed seals were reported harvested for 1999; the estimate was 9 (±69%) ringed seals in 2008. Wolfe et al (1984:331) noted that, at Togiak, "seals, particularly bearded and ringed, are commonly hunted during winter. These seals migrate into the area with the formation of the sea ice."

In commenting on climate-related changes, Togiak key respondents in 2008 and 2009 noted that over the last 2 decades, warming has resulted in later formation of sea ice, less extensive and predictable sea ice and shorefast ice, and more rapid disappearance of ice in spring, probably because it is not as thick as in the past. This change has especially affected opportunities to hunt bearded seals and ringed seals, with

consequent reduced harvests. According to Togiak hunters, seals remember their birth locations and return to them annually. With less ice and thinner ice, bearded and ringed seals are not pupping in bays near Togiak and therefore seals are not returning to the area. Additionally, Togiak respondents stated that changes in ice conditions as well as less predictable weather and more frequent storms, have reduced the window of opportunity for travel to access wild resource populations.

A key respondent who is an active marine mammal hunter noted that while he was growing up in the 1970s, during spring, up to the end of May, ice was abundant in Togiak Bay. He observed the weather changing in the early part of the 1980s. When he started hunting seals, *maklaks* (bearded seals) were plentiful, but now he sees them infrequently. Togiak residents used to hunt maklak in February and March and some of them in April but the ice melts real fast now, it disappears in April. He noted:

> [There is] no place for the mother [bearded seal] to give birth, because they usually give birth on the ice, they follow the ice. We hardly catch any bearded seals during spring [now].
>
> In Togiak Bay (near Togiak) there are hardly any bearded seals [now]. They stay further down behind Summit Island, on the south side of Summit Island and from there to Tongue Point in deeper water. They hardly come in the bay closer to Togiak. Whenever we want to hunt bearded seals we go down by Summit Island. I always go down by Summit and look around. It seems like bearded seals usually stay in deeper water, not in the shallow parts.

He also noted that bearded seals are associated with ringed seals (*nayiq*), "those small seals."

> I call them their *iluraqs* [cousins] because whenever there are nayiqs, the bearded seal will also be around somewhere nearby. Mostly the ringed seals are in Togiak Bay [in the shallower water areas] because their main diet is smelts and tomcod. Ringed seals are found in front of the rivers where smelt go in, like Togiak, Ungalikthluk, Guik, Matogak, and Osviak rivers because their diet is smelts. But bearded seal are mostly in deeper water sometimes they go in the bay closer to Togiak.

The disappearance of spring ice has also affected spring walrus hunting at Togiak, as this key respondent explained:

> During spring we usually harvest walrus while they're on the ice. That's our number one rule that elders tell us, not to shoot them in the water, they'll sink. Walrus are like a rock in the water. That's why in the fall we try to hunt them while they're on the beach. Whenever we see them on the beach we try to hunt them. Seems like my uncle use to say while he was growing up walrus use to come in this bay too [Togiak Bay near Togiak] in front of the Togiak River. But now there's hardly any walrus that goes in this bay [closer to Togiak] I haven't seen any in the bay close to Togiak since like the '80s and '90s but further down in [Hagemeister] Strait, and further down where there's ice.

Another hunter cited the growth of the commercial herring fishery in Togiak Bay as a cause of reduced local seal populations:

> There used to be lots of seals in the bay in spring time when the herring would start spawning. But now days there are just a few seals. Even the maklak seals, we hardly see any when we go hunting.

He speculated that herring numbers are low because of harvests in the commercial seine fishery.

Another elder told a story of his former experience at Metervik Bay. When the herring hit there were so many seals that when the breeze was blowing in from the ocean you could smell their breath—"that's a lot of seals." Also, near Rocky Point there were so many seals that came into the rocks where the herring were spawning that they could be shot right there, some even at point blank range. Hunters left the [shot]

seals among the rocks and retrieved them when the tide went out so they did not even need a skiff to hunt them.

Regarding the traditional uses of bearded seals, an active hunter recalled:

> My grandfather always wanted the bearded seals because of their intestines. They would scrape the inside of the intestines and then put it in a bowl, and make sushi out of it with seal oil, and it tastes really good. And my grandma used the gut to make a raincoat out of it. She made one for my grandpa but he said that they tear easy so you have to keep them damp all of the time so they don't get too dry. Also, they used the whole stomach for floats tied to the harpoon and sometimes for a water jug. Their skin was used for making mukluk boots and kayaks. Their meat was dried and stored because it is very different than the meat of other seals. Also they make very clear seal oil and there is hardly any taste to it. To make clear seal oil my mom and grandma cut the fat from the skin and from the meat and they would take all of the blood and meat off of the fat and the clean part would be cut up to make the seal oil. They kept it in a cold place all the time when they were making seal oil out of it; they didn't keep it in a warm place.

Another hunter said he no longer hunts bearded seals because there are fewer coming back than there were in the past. He said that bearded seals used to have their pups in the Togiak Bay area and they would return to the same place that they were born. He recalled that young bearded seals used to go "way up the Togiak River in the fall." He also said that bearded seals have "nice thick skin for soles of mukluks."

Table 4-17.–Estimated subsistence harvests of harbor and spotted seals, Togiak, 1992–2008.

	Estimated number of seals harvested		
Year	Spotted	Harbor	Total
1992	250.2	24.3	274.5
1993	174.7	24.9	199.6
1994	154.2	0.0	154.2
1995	111.5	3.3	114.8
1996	101.9	3.9	105.8
1997	79.2	6.7	85.9
1998	105.0	14.1	119.1
1999	173.2	20.7	193.9
2000	147.0	5.1	152.1
2001	60.8	5.3	66.1
2002	79.2	13.9	93.1
2003	32.8	22.0	54.8
2004	63.8	6.9	70.7
2005	82.0	10.8	92.8
2006	50.9	11.5	62.4
2007	63.3	7.8	71.1
2008	167.7	46.0	213.7
Annual average, 1990s	143.7	12.2	156.0
Annual average, 2000–2008	72.5	10.4	82.9
Annual average, 1992–2008	111.6	13.4	125.0
Percentage of total	89.3%	10.7%	

Source Wolfe et al. 2009a.

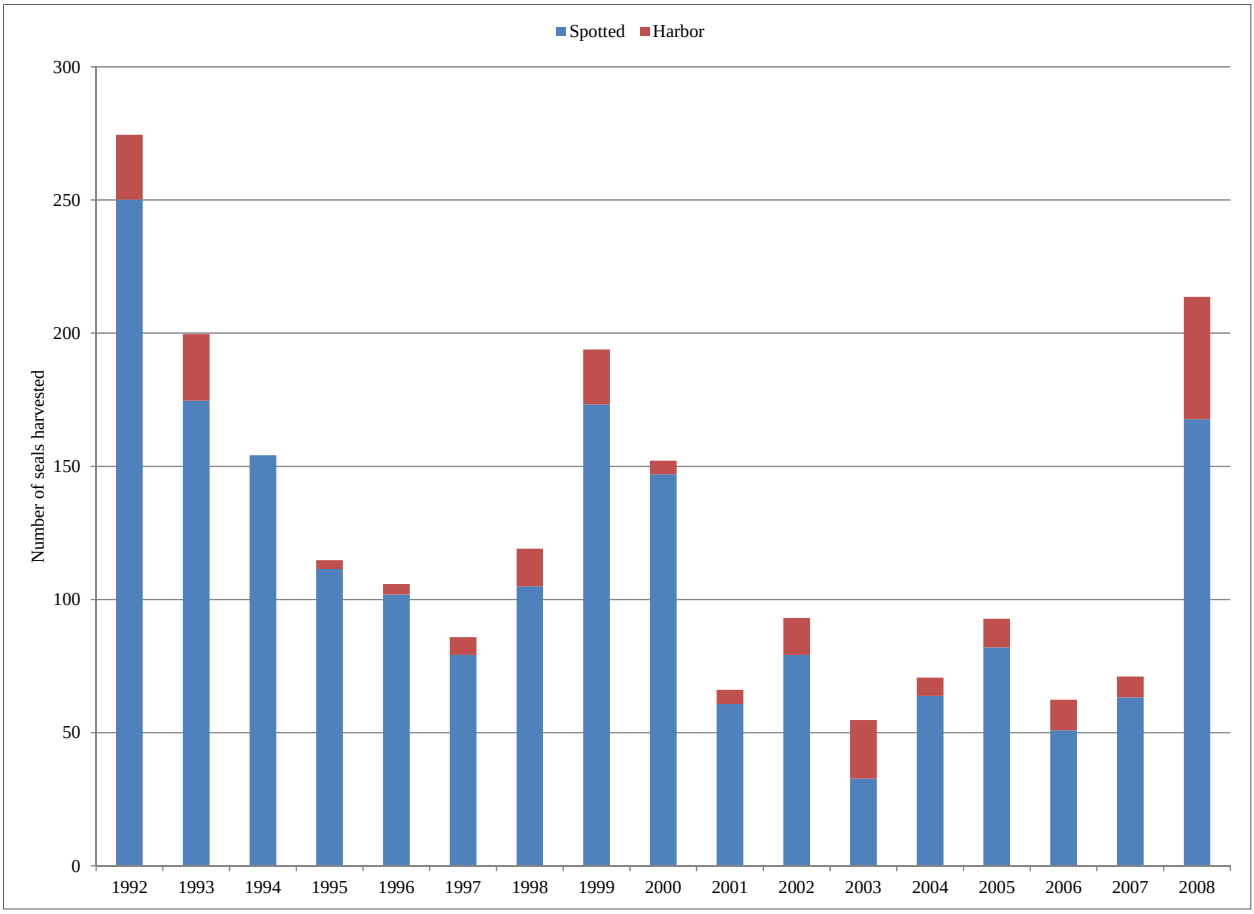

Figure 4-25.–Estimated harvests of spotted and harbor seals, Togiak, 1992–2008.

Birds and Eggs

A theme in key respondent interviews was that various species of birds were more abundant in the past. One hunter said:

> In the past there used to be a whole bunch of tents on Tongue Point where people went to hunt eiders in the spring. The eiders used to fly through Hagemeister Strait—but now they fly through or south of the other islands east of Hagemeister, and along the east side and south of Hagemeister Island. We used to be able to see the reflection of the king eiders on the water because there were so many of them way out on the horizon—they were like clouds between High Island and Hagemeister—there's not as many like that anymore. We used to hunt them and bring them back to Togiak in our skiffs to share with those that couldn't get out.

Togiak respondents blamed the decline in eiders in part on the reduction in populations of "forage fish," such as herring and capelin, caused by commercial fishing.

A key respondent reported that king eiders are traditionally hunted the end of April. His aunt said that king eiders flew on the north side of Round Island (closer to the mainland) and then to what is locally known as the Hawaiian Islands (within about 7 miles of Togiak along the coast south west of Togiak) and then they flew into Hagemeister Strait and to Asigyukpak Spit. Now king eiders stay south of Round Island and then fly toward Hagemeister Island. South of High Island they used to veer around the northern

end of Hagemeister Island and fly through Hagemeister Strait to Asigyukpak Spit. Now they mostly stay off of the south end of Hagemeister Island. He said that he thought this change may have happened because tenders anchor in Asigyukpak during commercial herring fishing, displacing the migratory route of the eiders. That is why Togiak residents now hunt king eiders before the tenders start showing up at the end of April, according to the respondent.

HARVEST COMPARISON–EVALUATION OF STUDY YEAR'S HARVEST COMPARED TO OTHER RECENT YEARS

Survey respondents in Togiak were asked to compare their harvests and uses of 10 resource categories in 2008 with other recent years (Table 4-18, Figure 4-26). If they indicated a change, they were asked to provide a reason. The only category for which the most respondents indicated lower use was salmon (47% of all respondents who usually use salmon). For the other 9 categories, the most respondents (at least 43% or more) said uses were about the same. However, about 25% or more of respondents who were regular users of each of these categories said uses were lower in 2008 (Table 4-18).

Respondents were also asked to evaluate their uses of subsistence resources overall in 2008 compared to other recent years. Most of the households who regularly used wild resources (39%) responded "about the same," while 33% said uses overall were lower and 28% said they were higher (Table 4-18).

Table 4-18.–Changes in patterns of use, Togiak, 2008.

		Compared to recent years, the household's use of resource was …[b]							
	Use or	Less		Same		More		No response/unknown	
Resource category	attempt[a]	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
All resources	**78**	**26.0**	**33.3%**	**30.0**	**38.5%**	**22.0**	**28.2%**	**0.0**	**0.0%**
Salmon	76	36.0	47.4%	25.0	32.9%	15.0	19.7%	0.0	0.0%
Nonsalmon	72	23.0	31.9%	36.0	50.0%	12.0	16.7%	1.0	1.4%
Large game	74	31.0	41.9%	32.0	43.2%	11.0	14.9%	0.0	0.0%
Furbearers	38	13.0	34.2%	18.0	47.4%	5.0	13.2%	2.0	5.3%
Marine mammals	68	28.0	41.2%	32.0	47.1%	8.0	11.8%	0.0	0.0%
Migratory birds	63	25.0	39.7%	28.0	44.4%	10.0	15.9%	0.0	0.0%
Other birds	58	17.0	29.3%	32.0	55.2%	9.0	15.5%	0.0	0.0%
Bird eggs	68	18.0	26.5%	43.0	63.2%	7.0	10.3%	0.0	0.0%
Marine invertebrates	73	18.0	24.7%	42.0	57.5%	12.0	16.4%	1.0	1.4%
Plants and berries	73	22.0	30.1%	40.0	54.8%	10.0	13.7%	1.0	1.4%

Source ADF&G Division of Subsistence household surveys, 2009.

a. 80 households were interviewed.

b. Percentage based on number of households usually using or attempting.

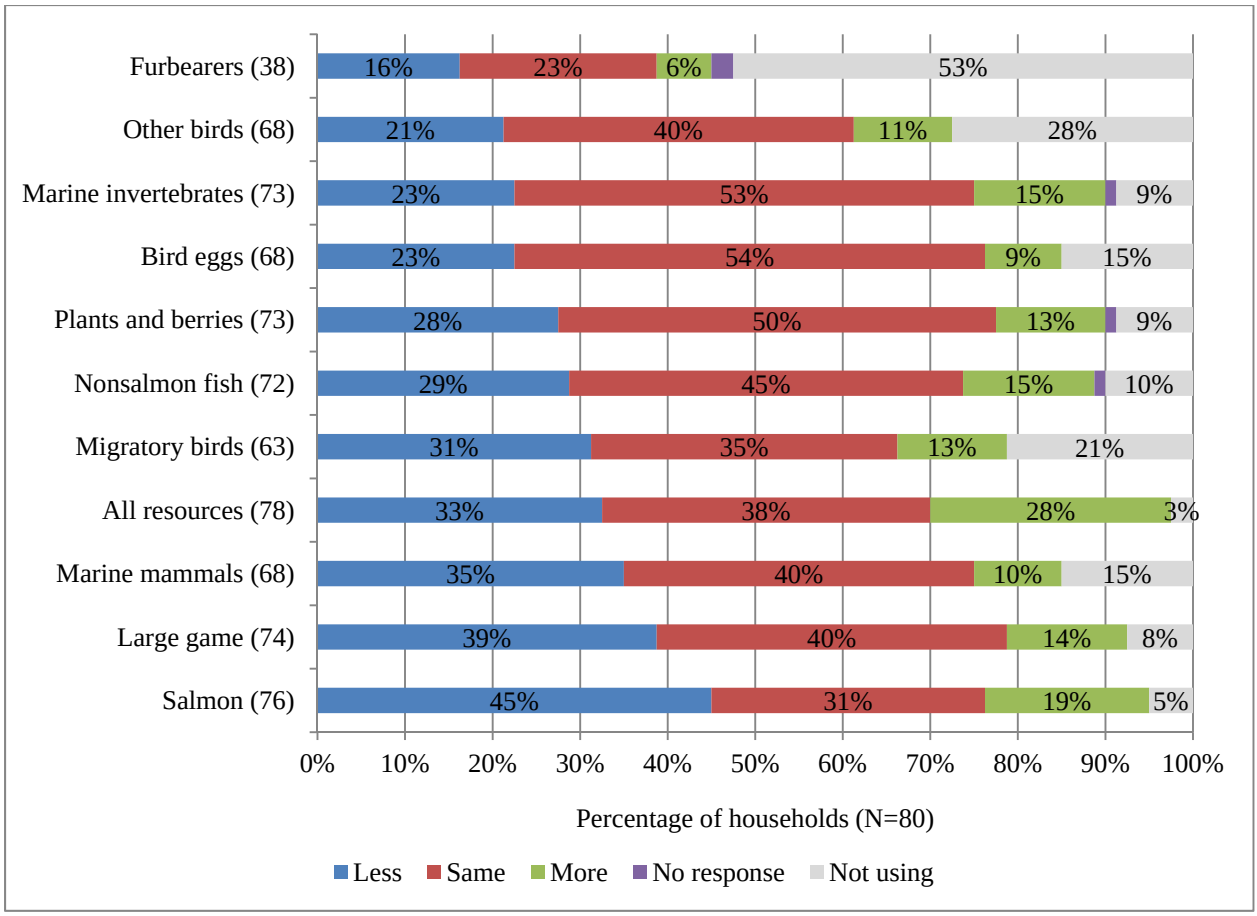

Figure 4-26.–Togiak households' assessments of uses in 2008.

If respondents reported a change in their uses/harvests of a resource category, they were asked to provide an explanation for the change. This question was designed for open-ended responses, and the responses were coded into categories for analysis. As shown in Table 4-18, there were 234 cases in which households reported lower uses of a resource category in 2008 compared to other recent years. In 53% of these cases, "personal factors" were cited for the lower uses/harvests. "Personal factors" included illness or injury, age, being "too busy," or disinterest, among other things. Receiving fewer resources from other households ranked second, at 14%, and reductions in animal populations ranked third at 12%. In 9% of the cases of lower uses, respondents cited poor weather or a changing climate as the cause of the change. Examples include:

> I didn't go hunting as much because the weather was so bad. There was no snow during the [winter] moose hunting season.
>
> We didn't go out as much [for shellfish] because of the cold, wet summer.
>
> We shot a walrus at Hagemeister Island but we lost it because of bad swells that wouldn't end.
>
> The weather was not good for drying salmon.
>
> There were not as many eggs to find. Maybe it was too cold.

Economic factors, usually linked to the high price of gasoline, were cited in 7.3% of the cases of lower resource uses.

As also shown in Table 4-19, personal factors were also the primary reason cited for overall lower resource uses/harvests in 2008, at 73% of the 26 interviewed households with lower overall uses. Lower animal populations were a factor for 19% of these households, 12% cited economic factors, and 8% named weather or climate conditions. Regarding animal population changes and climate/weather factors, comments were

> Because of the weather warming up, the fish [salmon] were late and the plants were smaller.
>
> There are not as many animals and fish available. I'm not sure why. It just seems like they're going away and decreasing overall.
>
> Some of the wild resources are less [abundant] because the climate [is changing].
>
> Everything is getting less.

As shown in Table 4-20, there were 81 cases in which interviewed Togiak households reported higher uses or harvests of a resource category in 2008 compared to other recent years. Again, "personal factors" were cited most often (43%) as a cause of the change, including such comments as: "We got lucky [fishing]!" and "I had good luck hunting birds." Receiving more gifts of wild foods from other households accounted for 20% of the cases of higher levels of use. More abundant animal populations were cited as a cause of higher harvest levels in 16% of the cases. For example:

> There seemed to be more clams than other years because more showed up when it was windy. [Note: the waves washed the clams out of the mud for easy harvesting.]
>
> We used more birds because they were plentiful.
>
> More ptarmigan were flying close to my house.
>
> Porcupine are getting more [abundant].

Economic factors were cited in 14% of the cases of higher levels of use in 2008, with respondents citing growing families and obligations to provide subsistence foods to elderly parents.

Table 4-19.–Reasons for using/harvesting less resources in 2008 than in other recent years.

	Total (all) resources[a]	Any resource category[b]
Climate/weather	7.7%	8.5%
Resource condition	0.0%	1.7%
Habitat changes	0.0%	1.3%
Population factors	19.2%	12.0%
Animal behavior	0.0%	1.7%
Economic factors	11.5%	7.3%
Personal factors	73.1%	53.0%
Given less	0.0%	13.7%
Other	7.7%	2.6%

Source ADF&G Division of Subsistence household surveys, 2009.

Note Respondents could provide more than one reason for the change.

a. N = 26 households that reported using/harvesting less resources and who provided reasons for the change.

b. N = 234 cases in which households reported using/harvesting less of a resource category and who provided reasons for the change.

Table 4-20.–Reasons for using/harvesting more resources in 2008 than in other recent years.

	Total (all) resources[a]	Any resource category[b]
Climate/weather	0.0%	2.5%
Population factors	10.0%	16.0%
Animal behavior	0.0%	2.5%
Economic factors	30.0%	13.6%
Personal factors	55.0%	43.2%
Given more	0.0%	19.8%
Other	5.0%	2.5%

Source ADF&G Division of Subsistence household surveys, 2009.

Note Respondents could provide more than one reason for the change.

a. N = 20 households that reported using/harvesting more resources and who provided reasons for the change.

b. N = 81 cases in which households reported using/harvesting more of a resource category and who provided reasons for the change.

Twenty Togiak households (of the 80 that were surveyed) said that, overall, their uses/harvests of wild resources were higher in 2008 than in other recent years and offered reasons for this change. Again, personal factors were the most frequent explanation, for 55% of the households. For example:

> We used more subsistence resources because of our growing family.
>
> Our freezer was filled with more birds and caribou and moose and fish, but we ran out of freezer space for blackberries. I had more time to go out hunting.

Economic factors played an important role in increasing subsistence uses and harvests as well, for 30.0% of the households with higher levels of use. For example:

> We used more subsistence resources because of the [poor] economy.
>
> Our children grew so we needed more [subsistence foods]. They were able to help me out more.

> Prices [in the store] went up and we like to eat subsistence foods. Subsistence is good food. It's what we eat and thrive on and it gets me out of the house. My shooting improves when the prices go up.
>
> We needed more subsistence foods because our family is growing and my parents want me to get foods for them too. We're trying to eat more subsistence foods so we don't have to buy expensive store-bought foods.

As shown in Figure 4-27, personal reasons predominated as an explanation for both lower uses/harvests and higher uses/harvests in Togiak in 2008 (53% and 43%, respectively, of all cases of a lower or higher use). Changes in sharing patterns, either less sharing (14% of cases) or more sharing (20%) were cited frequently, as were changes in animal populations (often not explained) and economic factors (high costs of fuel and food purchased in stores; growing families requiring more food). A changing climate or weather conditions were cited infrequently—in just 9% of the cases involving a lower resource use and 2% of cases of higher uses)—as a factor explaining differences between use and harvest levels in 2008 and other recent years. However, as noted previously, key respondents were more likely to cite changing climate patterns as a cause of more long-term changes to subsistence uses, related to resource abundance and travel conditions, for key resources such as marine mammals.

Indeed, when exploring reasons for changes in subsistence patterns, these subsequent key respondent interviews in Togiak provided a longer time perspective than the 2 surveys from 1999 and 2008. These interviews identified a general theme of decline of many species of importance to subsistence uses, such as bearded seals, ringed seals, herring, herring spawn, capelin, king eiders, murres, long-tailed ducks, shorebirds, common eiders, snow geese, cormorants, Arctic terns and other gulls, halibut, and Chinook salmon. Togiak respondents noted that, in addition to their general abundance, the timing of arrival of animals, birds, and fish, as well as their migration routes, pupping locations, haulouts, and nesting locations, are keys to subsistence harvest success. Narratives also emphasized the importance of "forage fish" (herring, smelt, capelin) both as human food and as food for other resources; their decline affects timing, migration routes, and abundance of other resources

Togiak key respondents recognized 2 general causes of changes in subsistence resources: 1) environmental changes related to "climate change" or "warming" that they did not attribute to a broader cause; and 2) over-commercial fishing, causing depletion, especially of forage fish, as well as other human activities resulting in "disturbance," for example of marine mammals.

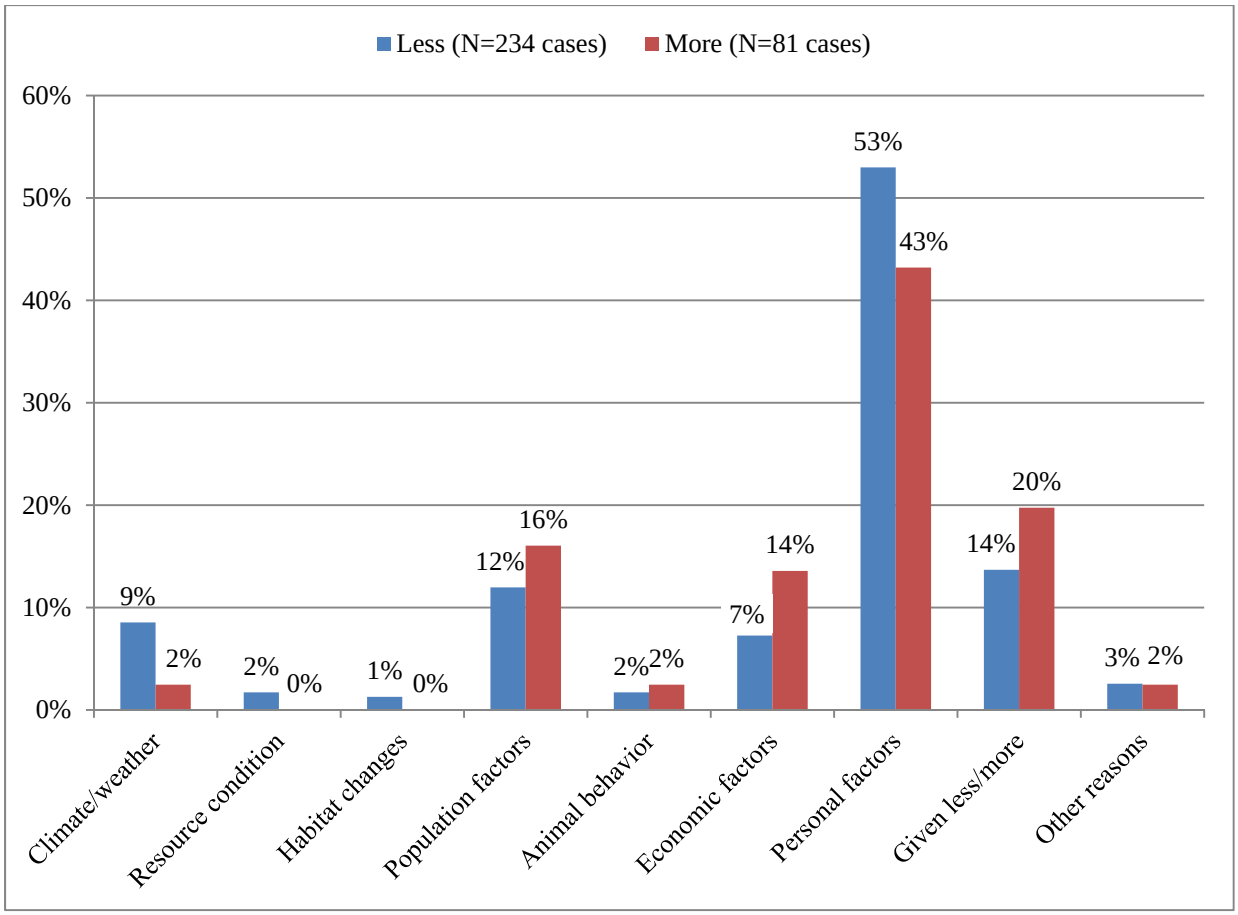

Figure 4-27.–Reasons for change in use/harvest of any resource category in 2008 compared to other recent years, Togiak.

JOBS AND INCOME

Of all Togiak's adults (age 16 and over), 74% earned cash through employment in the 2008 study year (Table 4-21). Cash employment was generally seasonal: on average, employed adults worked 7 months, and only 31% worked year-round. Most households (88%) included at least one member with cash employment.

Most jobs in Togiak in 2008 were related to commercial fishing (40%), followed by local government (this includes the school) (24%) and services (22%) (Table 4-22). However, local government ranked first as a source of earned income (39%), followed by commercial fishing (32%) and services (19%) (Figure 4-28).

Table 4-21.–Employment characteristics, Togiak, 2008.

Characteristics	Togiak
Adults	
Number	468.0
Mean weeks employed	9.0
Employed adults	
Number	347.8
Percentage	74.3%
Jobs	
Number	488.8
Mean	1.4
Minimum	1
Maximum	6
Months employed	
Mean	6.5
Minimum	0
Maximum	12
Percent employed year-round	31.1%
Mean weeks employed	12.1
Households	
Number	188
Employed	
Number	166.9
Percentage	88.8%
Jobs per employed household	
Mean	2.9
Minimum	1
Maximum	9
Employed adults	
Minimum	1
Maximum	7
Mean	
Employed households	2.1
Total households	1.9
Mean person weeks of employment	36.0

Source ADF&G Division of Subsistence household surveys, 2009.

Table 4-22.–Employment by industry, Togiak, 2008.

	Jobs	Households	Employed individuals	Percentage of income
Estimated total number	**455.9**	**188**	**347.8**	**100.0%**
Federal government	**2.1%**	**5.0%**	**2.7%**	**0.9%**
Executive, administrative, and managerial occupations	0.5%	1.3%	0.7%	0.5%
Teachers, librarians, and counselors	0.5%	1.3%	0.7%	0.2%
Technologists and technicians, except health	0.5%	1.3%	0.7%	0.2%
Military occupations	0.5%	1.3%	0.7%	0.0%
State government	**2.1%**	**5.0%**	**2.7%**	**0.9%**
Executive, administrative, and managerial occupations	1.5%	3.8%	2.0%	0.3%
Teachers, librarians, and counselors	0.5%	1.3%	0.7%	0.6%
Local government	**24.2%**	**45.0%**	**31.1%**	**39.5%**
Executive, administrative, and managerial occupations	1.5%	3.8%	2.0%	3.9%
Social scientists, social workers, religious workers and lawyers	2.1%	5.0%	2.7%	1.1%
Teachers, librarians, and counselors	12.4%	26.3%	16.2%	21.8%
Administrative support occupations, including clerical	1.5%	3.8%	2.0%	2.6%
Service occupations	1.0%	2.5%	1.4%	0.8%
Mechanics and repairers	0.5%	1.3%	0.7%	1.8%
Construction and extractive occupations	1.5%	3.8%	2.0%	1.0%
Precision production occupations	1.5%	3.8%	2.0%	4.3%
Transportation and material moving occupations	1.5%	3.8%	2.0%	2.1%
Handlers, equipment cleaners, helpers, and laborers	0.5%	1.3%	0.7%	0.0%
Agriculture, forestry and fishing	**40.2%**	**66.3%**	**52.0%**	**32.3%**
Agricultural, forestry and fishing occupations	40.2%	66.3%	52.0%	32.3%
Mining	**2.1%**	**5.0%**	**2.7%**	**3.2%**
Construction and extractive occupations	1.5%	3.8%	2.0%	2.6%
Handlers, equipment cleaners, helpers, and laborers	0.5%	1.3%	0.7%	0.5%
Construction	**0.5%**	**1.3%**	**0.7%**	**0.0%**
Handlers, equipment cleaners, helpers, and laborers	0.5%	1.3%	0.7%	0.0%
Manufacturing	**0.5%**	**1.3%**	**0.7%**	**0.0%**
Production working occupations	0.5%	1.3%	0.7%	0.0%
Transportation, communication and utilities	**3.1%**	**7.5%**	**4.1%**	**3.2%**
Executive, administrative, and managerial occupations	0.5%	1.3%	0.7%	0.2%
Technologists and technicians, except health	0.5%	1.3%	0.7%	0.7%
Marketing and sales occupations	0.5%	1.3%	0.7%	0.4%
Transportation and material moving occupations	1.0%	2.5%	1.4%	1.4%
Handlers, equipment cleaners, helpers, and laborers	0.5%	1.3%	0.7%	0.5%
Retail trade	**1.0%**	**2.5%**	**1.4%**	**0.6%**
Marketing and sales occupations	0.5%	1.3%	0.7%	0.5%
Service occupations	0.5%	1.3%	0.7%	0.1%
Services	**21.6%**	**33.8%**	**23.6%**	**19.3%**
Executive, administrative, and managerial occupations	0.5%	1.3%	0.7%	0.9%
Social scientists, social workers, religious workers and lawyers	1.0%	2.5%	1.4%	0.6%
Teachers, librarians, and counselors	0.5%	1.3%	0.7%	0.5%
Registered nurses, pharmacists, dietitians, therapists, and physician's assistants	0.5%	1.3%	0.7%	2.6%
Writers, artists, entertainers, and athletes	3.6%	7.5%	4.7%	1.7%
Health technologists and technicians	0.5%	1.3%	0.7%	0.5%
Technologists and technicians, except health	1.0%	2.5%	1.4%	1.3%
Administrative support occupations, including clerical	1.0%	2.5%	1.4%	1.3%
Service occupations	9.3%	18.8%	12.2%	7.4%
Agricultural, forestry and fishing occupations	0.5%	1.3%	0.7%	0.5%
Mechanics and repairers	1.0%	2.5%	1.4%	0.5%
Construction and extractive occupations	0.5%	1.3%	0.7%	1.2%
Transportation and material moving occupations	0.5%	1.3%	0.7%	0.1%
Handlers, equipment cleaners, helpers, and laborers	1.0%	2.5%	1.4%	0.1%
Miscellaneous occupations				

Source ADF&G Division of Subsistence household surveys, 2009.

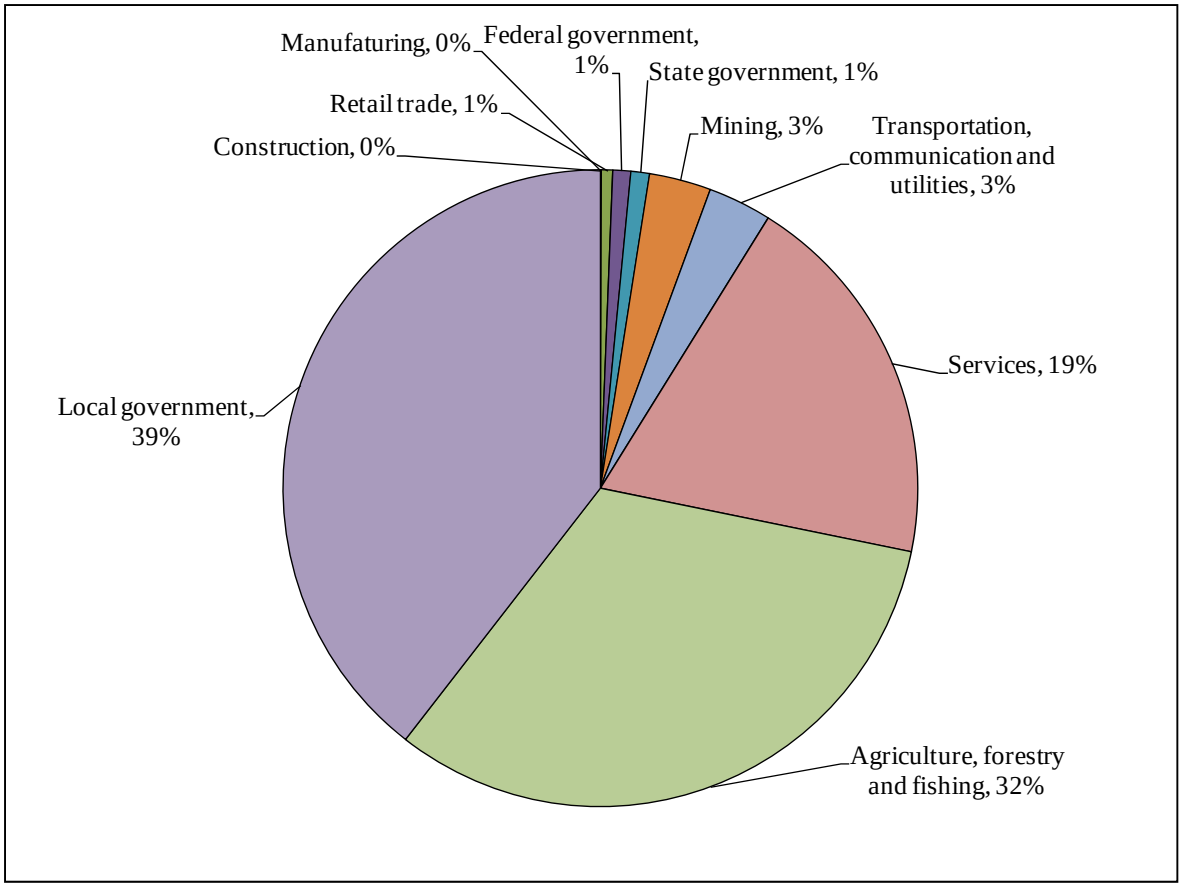

Figure 4-28.–Percentage of earned income by industry category, Togiak, 2008.

Of sources of income other than jobs, the Alaska Permanent Fund Dividend (PFD) ranked first by far, contributing 66% of all income from this category (Table 4-23). Alaska residents received a record PFD and "energy rebate" in 2008 of $3,267 per person. Other major sources of "other income" included food stamps (9% of "other" income), Native corporation dividends (8%), and Social Security (7%).

Household cash income in Togiak in 2008 from all sources averaged $50,356, or $11,814 per capita (Table 4-24). Of this, 64% derived from jobs and 34% from other sources. Figure 4-29 shows the top 10 sources of income for Togiak in 2008. Local government ranked first (25%), followed closely by the Alaska PFD (24%) and commercial fishing (21%). "Services" (12%) was the only other category to contribute more than 10% of the total community income.

Table 4-23.–Togiak income from sources other than employment, 2008.

Income source	Households Number	Households Percentage	Total for community	Mean per household	Percentage of total
Alaska Permanent Fund Dividend	183.3	97.5%	2,237,976.7	11,904.1	65.9%
Food stamps	49.4	26.3%	290,065.7	1,542.9	8.5%
Native corporation dividend	166.9	88.7%	281,748.4	1,498.7	8.3%
Social Security	42.3	22.5%	246,583.9	1,311.6	7.3%
Supplemental Security Income	21.2	11.3%	100,420.9	534.2	3.0%
Rental assistance	70.5	37.5%	86,592.2	460.6	2.5%
Unemployment	30.6	16.3%	62,723.2	333.6	1.8%
Longevity bonus	23.5	12.5%	32,104.6	170.8	0.9%
Adult public assistance	16.5	8.8%	18,078.1	96.2	0.5%
Pension/retirement	11.8	6.3%	16,409.0	87.3	0.5%
Child support	14.1	7.5%	12,326.4	65.6	0.4%
Other	9.4	5.0%	11,536.5	61.4	0.3%
Workers' compensation/insurance	0.0	0.0%	0.0	0.0	0.0%
Fishing permit revenues	0.0	0.0%	0.0	0.0	0.0%
Disability	0.0	0.0%	0.0	0.0	0.0%
Investments/stocks/bonds	0.0	0.0%	0.0	0.0	0.0%
Foster care	0.0	0.0%	0.0	0.0	0.0%
Total	**188.0**	**100.0%**	**3,396,565.6**	**18,066.8**	**100.0%**

Source ADF&G Division of Subsistence household surveys, 2009.

Table 4-24.–Selected study findings for Togiak, 2008.

Demography	
Population	801.4
Percent Alaska Native	94.1%
Percent of household head born in Alaska	90.5%
Average length of residency, household heads (years)	37.2
Cash economy	
Percent of jobs located in community	95.5%
Average number of months employed	7.4
Percent of employed adults working year-round	31.1%
Average household income	$50,356.25
Per capita income	$11,813.78
Percent of household income from employment	64.1%
Percent of household income from other sources[a]	35.9%
Resource harvest and use	
Per capita harvest, pounds usable weight	303.5
Average household harvest, pounds usable weight	1,293.7
Number of resources used by 50 percent or more of households	27
Average number of resources used per household	27.1
Average number of resources attempted to harvest per household	17.8
Average number of resources harvested per household	16.3
Average number of resources received per household	15.7
Average number of resources given away per household	11.9
Percent of total harvest taken by top 25 percent	61.6%
Percent of households taking 70 percent of harvest	31.3%
Per capita harvest of lowest 50 percent of households, pounds usable weight per person	87.2
Average number of resources used by lowest 50 percent of households	21.4
Average number of resources used by top 25 percent of households	32.8

Source ADF&G Division of Subsistence household surveys, 2009.

a. Includes record Alaska Permanent Fund Dividend and Energy Rebate of $3,267 per person.

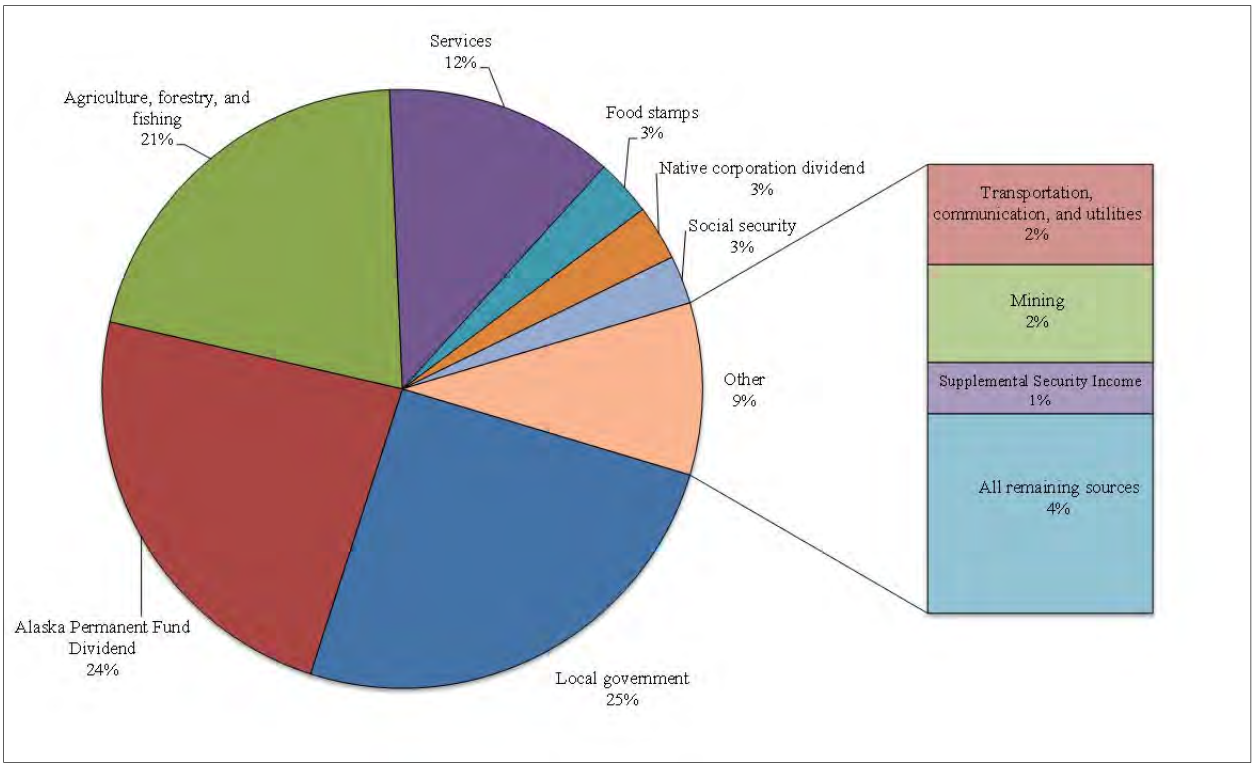

Figure 4-29.–Top 10 income sources ranked by estimated amount, Togiak, 2008.

The U.S. Census Bureau's American Community Survey (ACS) for the period 2005–2009 estimated a mean household income for Togiak of $44,718 (±$5,668), a median household income of $42,778 (±5,547), and a per capita income of $10,401 (±1,637) (2010). According to the ACS, the mean household income for Alaska for 2005–2009 was $79,908 (±1,128), the median household income was $64,635 (±747) and the per capita income was $29,382 (±357) (U.S. Census Bureau 2010). Thus, Togiak's per capita cash income was just 35% of the state average for this 5-year period.

Commercial fishing played an important role in the local economy of Togiak in 2008, as it did in the previous study year of 1999 (Figure 4-30). Commercial fishing jobs (this does not include processing jobs) represented 40% of all jobs held by Togiak residents in 2008, compared to 50% of all jobs in 1999. Of all Togiak households, 66% in 2008 had at least one member employed in commercial fishing, as had 70% in 1999. For Togiak households with any cash employment, 75% in 2008 and 79% in 1999 had members involved in commercial fishing. Of all Togiak adults who had employment in 2008, 52% worked in commercial fishing jobs (about 181 individuals), compared to 65% (195 individuals) in 1999. Commercial fishing jobs produced 32% of the earned income and 21% of all income in Togiak in 2008; in 1999, 29% of earned income and 20% of all income derived from commercial fishing.

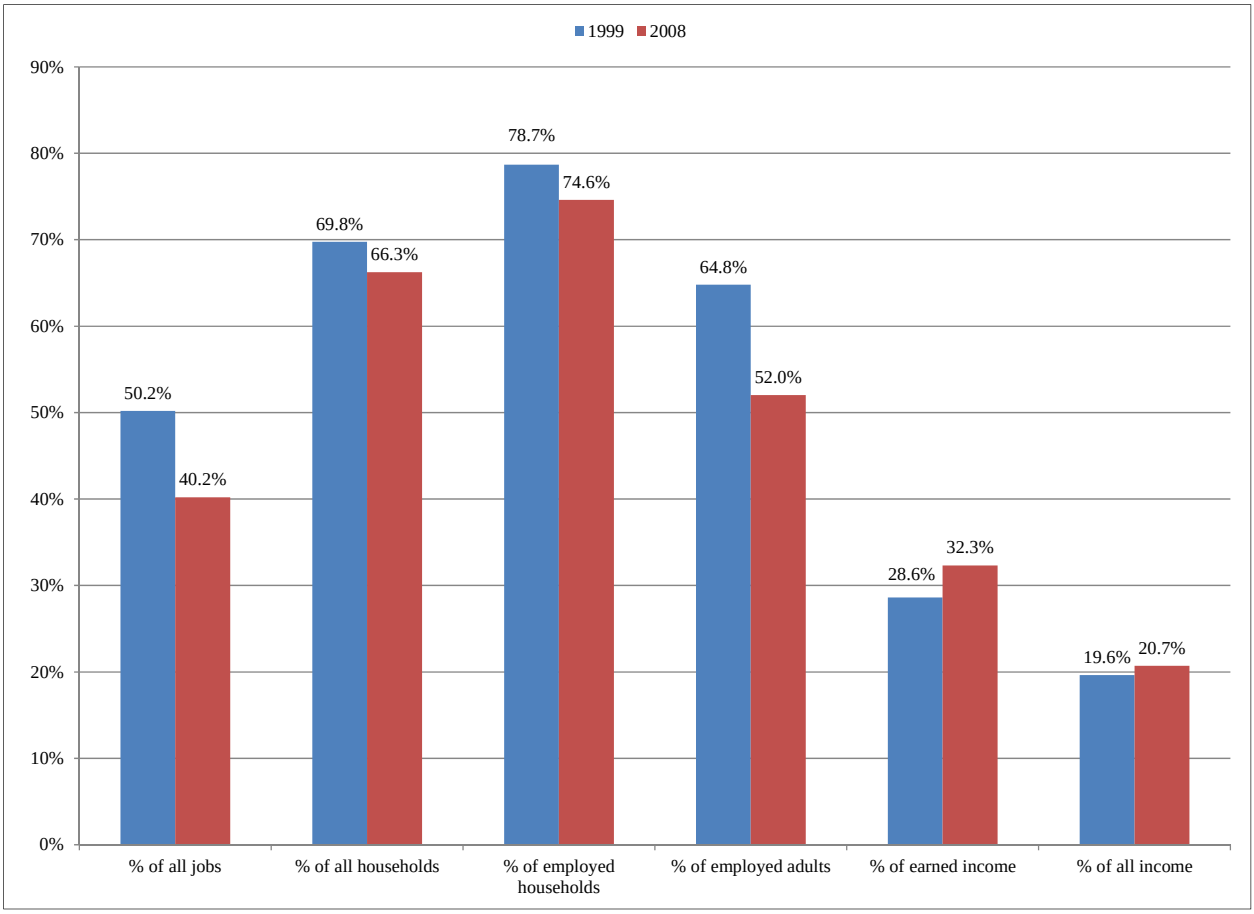

Figure 4-30.–Role of commercial fishing in local economy, Togiak, 1999 and 2008.

Figure 4-31 shows trends in the number of limited entry permits for commercial salmon set gillnet and drift gillnet fishing held by Togiak residents from 1980 through 2010. Overall, the total dropped from an annual average of 134 permits in the 1980s to 122 permits in the 2000s; the 115 permits owned in 2010 was the lowest for the 31 year period. Losses of drift gillnet permits accounted for this entire decline—Togiak residents owned an annual average of 84 Bristol Bay drift gillnet permits in the 1980s and 61 on average in the 2000s, with the 53 owned in 2010 the lowest in the 31 year period. However, Togiak residents owned more set gillnet permits in the 2000s (an annual average of 61) compared to the 1980s (an average of 49 permits).

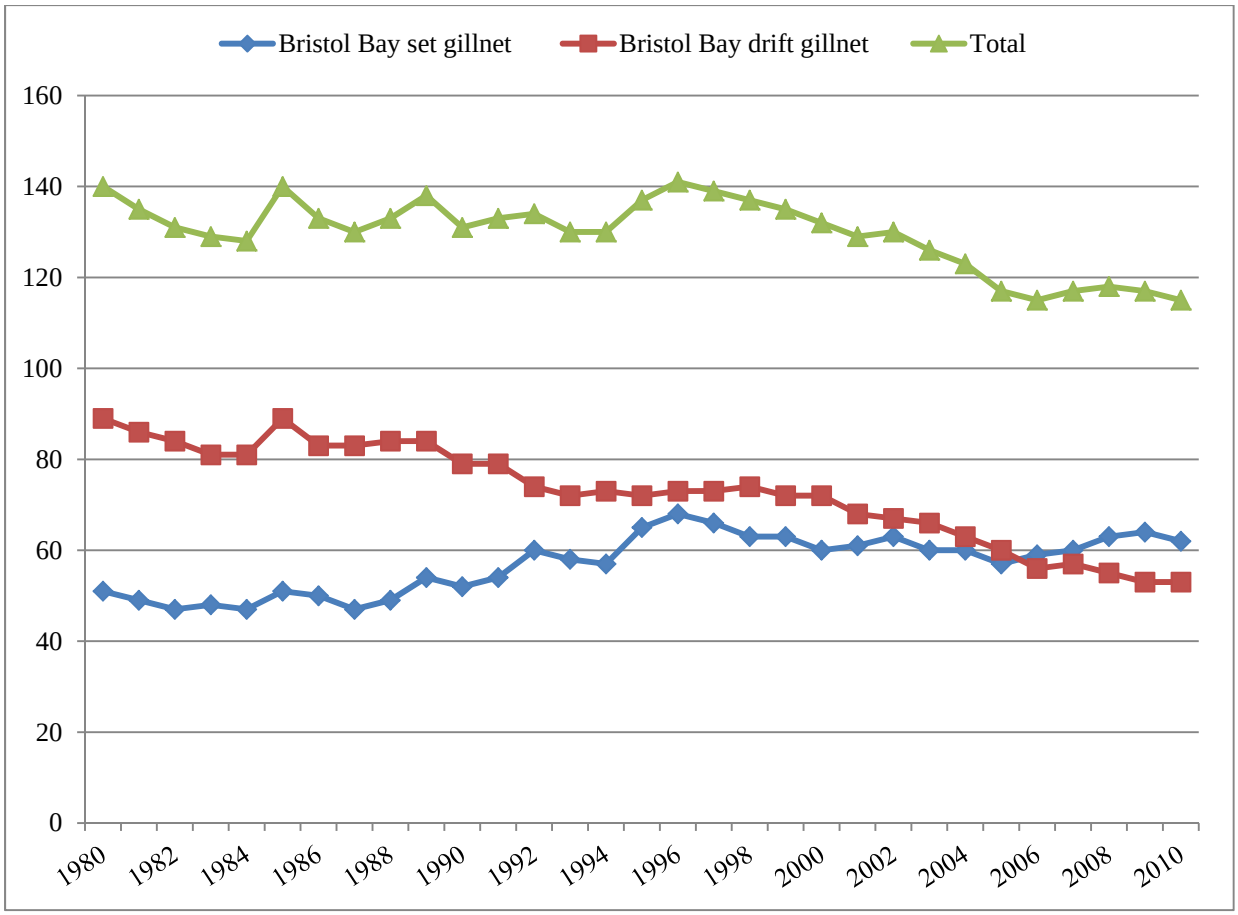

Figure 4-31.–Number of Bristol Bay commercial set gillnet and drift gillnet permits held by Togiak residents, 1980–2010.

Figure 4-32 shows gross earnings by Togiak residents who owned Bristol Bay set gillnet and drift gillnet commercial salmon permits from 1980 to 2010. Overall, gross earnings declined from an annual average of about $4.01 million in the 1980s to about $2.41 million in the 2000s. However, since hitting a nadir of about $700,000 in 2002, gross earnings by Togiak commercial salmon fishers have steadily risen, reaching $4.19 million in 2010, the highest since the mid-1990s.

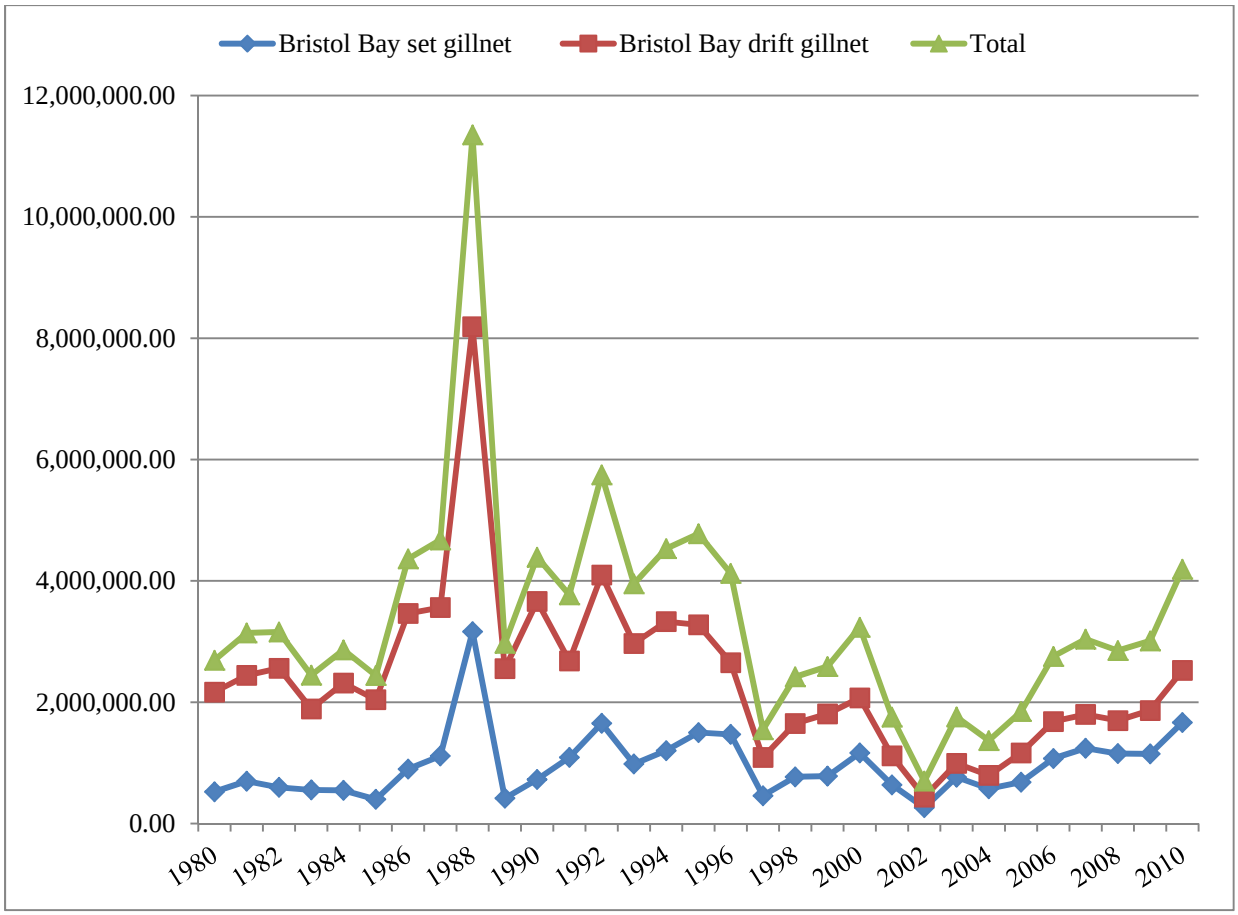

Figure 4-32.–Gross earnings by Togiak set gillnet and drift gillnet permits, 1980–2010.

DISCUSSION AND CONCLUSIONS

The survey findings for 2008 confirmed the results from the previous comprehensive survey administered in Togiak for 1999—that harvests of fish, wildlife, and wild plants remain a key component of the local economy and central to the way of life of community residents, a way of life linked directly to centuries-old traditions of the Yup'ik people of southwest Alaska. In 2008, virtually every household in Togiak used wild foods, and the vast majority was involved in subsistence harvests and sharing. Average harvests were high, at 1,294 lb per household and 303 lb per person, and exceeded the estimates of 1,017 lb per household and 246 lb per person for 1999. In 2008, as in 1999, subsistence harvests and uses were diverse, with the average Togiak household using about 27 different kinds of wild foods. Salmon, with 35% of the harvest as estimated in usable weight, and other fish, at 21%, composed the majority of the harvest in 2008, with land mammals ranking third at 17%. This was a change from 1999, when land mammals ranked first with 32% of the total. However, more Togiak households reported using moose and caribou in 2008 than in 1999, reflecting widespread sharing in the community. Of the 19 resources used by the most Togiak households in 1999, 17 were used by more households in 2008.

Most Togiak households (89%) earned monetary income in 2008 as part of the local mixed subsistence/cash economy of the community. Jobs in commercial fishing were particularly important, providing 21% of all income, ranking third after jobs with local government (25%) and the record-high Alaska Permanent Fund Dividend (24%). The survey estimated the per capita income from all sources at $11,813 in 2008. For the 5-year period 2005–2009, the U.S. Census' American Community Survey found that cash incomes in Togiak were about 35% of the state's average.

For most resource categories, respondents to the survey in Togiak said that their uses were about the same as in other recent years. For subsistence harvests and uses overall, the most respondents (39%) said they were about the same as other recent years, while 33% said they were lower and 28% said they were higher. Personal factors (such as health, time constraints, and interest) were most often cited as reasons for changes, but a range of other factors were cited as well, such as changes in animal populations, economic conditions, and sharing patterns. Over a longer time period of several decades, key respondent interviews identified trends in climate and weather patterns, such as declining sea ice in Togiak Bay, as well as the effects of certain commercial fisheries and other human disturbance, as having long-term effects on Togiak's subsistence patterns.

When asked to provide traditional ecological knowledge about local resource populations, Togiak key respondents also chose to discuss principles of conduct for subsistence activities, which they linked to key Yup'ik values. Central to these values is showing "respect" for the animals that are taken for subsistence use. One man explained:

> My grandparents used to tell me that the things I got from this land and water don't belong to me. It was given to me to use and to respect it all the time.

Associated with showing respect is another central value: "do not waste." Another man said:

> The first rule from my grandpa is take only what you can use, even if there is abundance of whatever, take only what you can use, what you can handle. Never waste and respect the animals, so, like with the fish, they can come back year after year after year.

A corollary to the rule about not wasting is to use all parts of the animal. In the traditional Yup'ik world view as expressed at Togiak, showing respect to animals is also expressed by proper disposal of bones, providing a "drink of water," and using proper butchering techniques.

There are also traditional rules at Togiak that govern how animals are shared, especially by young hunters taking their first game. These rules about sharing may also relate to ideas about "respectful" behavior towards animals.

A principle underlying these rules is that the spirits of animal are aware of how their remains are treated and will withhold themselves from being harvested if offended, causing hunger. Also, animals, such as bears, are aware of how people talk about them and can be offended by disrespectful speech.

Finally, an elder woman remarked that it is important to pass on these principles, through stories for example, to younger generations, even if they do not appear to be listening.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

The results of the household surveys demonstrate the continued importance of wild resource harvests in the study communities of Akutan, Emmonak, and Togiak. Virtually all households used wild foods in the 2008 study year, and large percentages participated in resource harvests and shared these harvests. Harvests were diverse, consisting of a variety of fish, land mammals, marine mammals, marine invertebrates, birds and eggs, and wild plants.

The U.S. Department of Agriculture estimated that on average, Americans consumed 224 lb of meat, fish, and poultry per capita in 2008 (out of a total food consumption of 1,911 lb per person) (U. S. Census Bureau 2011b). Excluding plants, subsistence harvests documented in this study provided food at 125% of this national consumption level in Togiak, 139% in Akutan, and 210% in Emmonak (Figure 5-1). The average consumption of fish and shellfish in the United States in 2008 according to U.S. Department of Agriculture, was 16 lb per person. Subsistence harvests of fish and shellfish in Togiak in 2008 were 1,120% of this national average, Akutan's harvests were 1,630%, and Emmonak's 1,718% (Figure 5-2).

Subsistence harvests of mammals, fish, and birds provided 171% of daily protein requirements (51g/day) (U.S. Department of Agriculture 2011:76) in Togiak, 190% in Akutan, 287% in Emmonak, and 538% in Savoonga. With daily caloric requirements at 2,250 Kcal/day (U.S. Department of Agriculture 2011:14), subsistence harvests (excluding plants) provided 27% of this requirement in Togiak, 30% in Akutan, 46% in Emmonak, and 86% in Savoonga.[30]

30. Savoonga is included because it is a BSIERP study community. Data collection methods were similar to those of ADF&G and Savoonga is included here for comparative purposes.

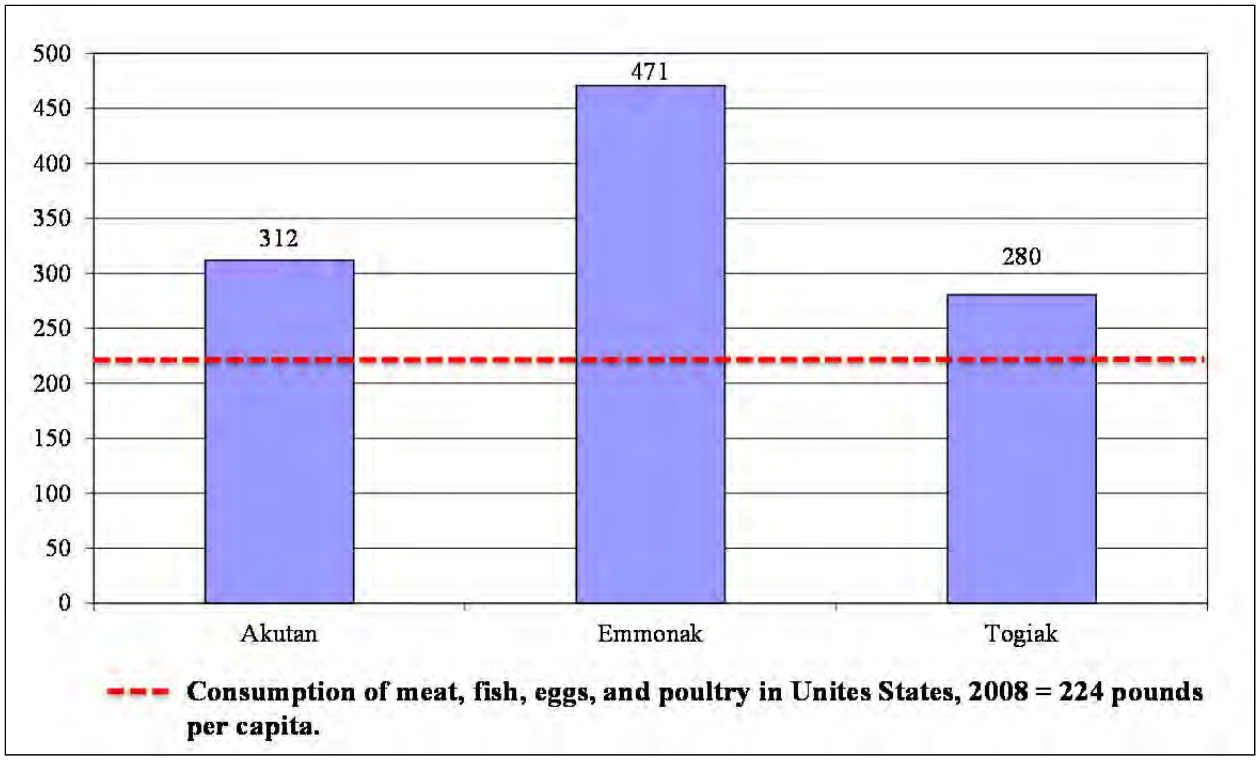

Figure 5-1.–Estimated harvests of fish, shellfish, mammals, and birds, pounds usable weight per capita, study communities, 2008.

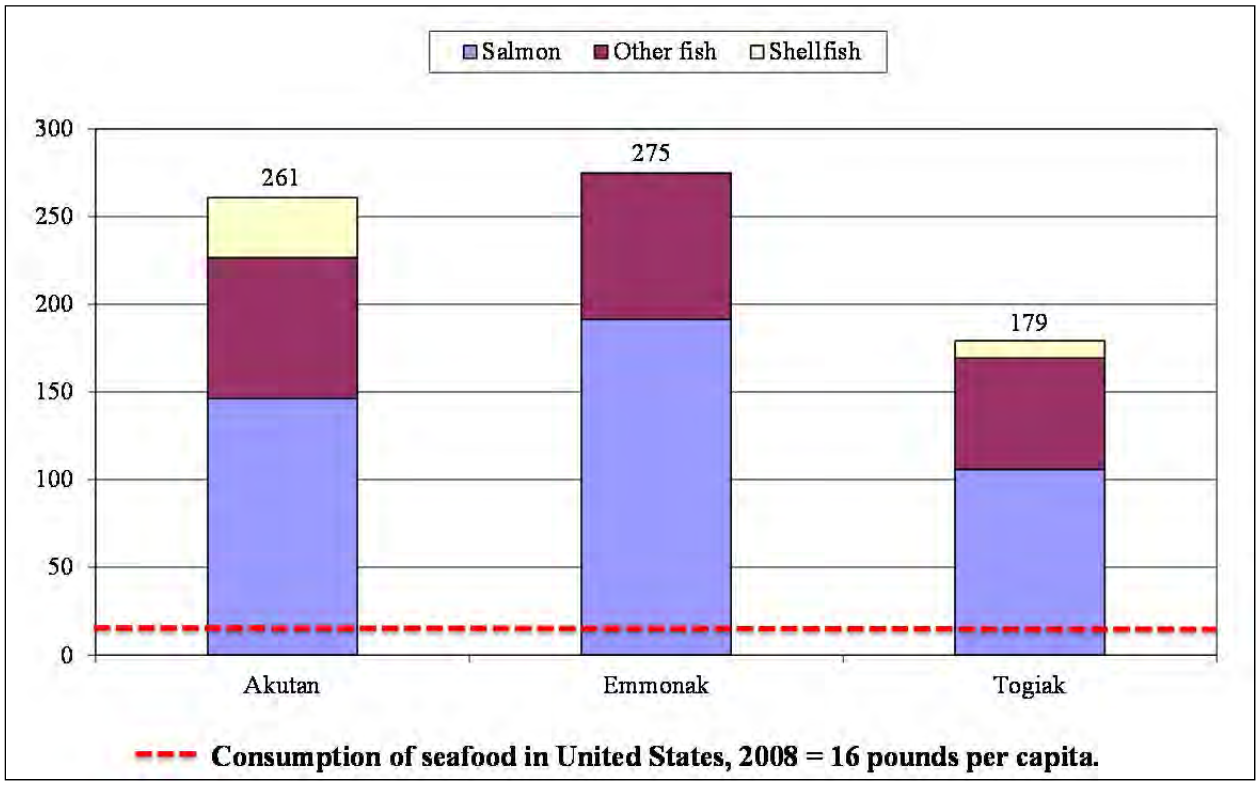

Figure 5-2.–Harvests of fish and shellfish, pounds usable weight per capita, study communities, 2008.

Nevertheless, the study found that subsistence harvest patterns have changed in the study communities over the last several decades (Figure 5-3). These changes were not uniform across communities. Harvest quantities and diversity were lower in Akutan in 2008 than in 1990, the only previous year for which comprehensive survey data are available. In contrast, harvests were higher and diversity of uses greater in Togiak in 2008 than in the previous study year of 1999. Harvests in Emmonak, as estimated in usable pounds per person, were lower in 2008 than in 1980, although it is uncertain if this difference is statistically significant. Shifts in harvest composition also occurred: compared to the previous study year, in 2008, Emmonak harvested more moose and less nonsalmon fish, Togiak harvested less moose and caribou and more salmon, and Akutan's harvests of marine mammals dropped while salmon harvests increased.

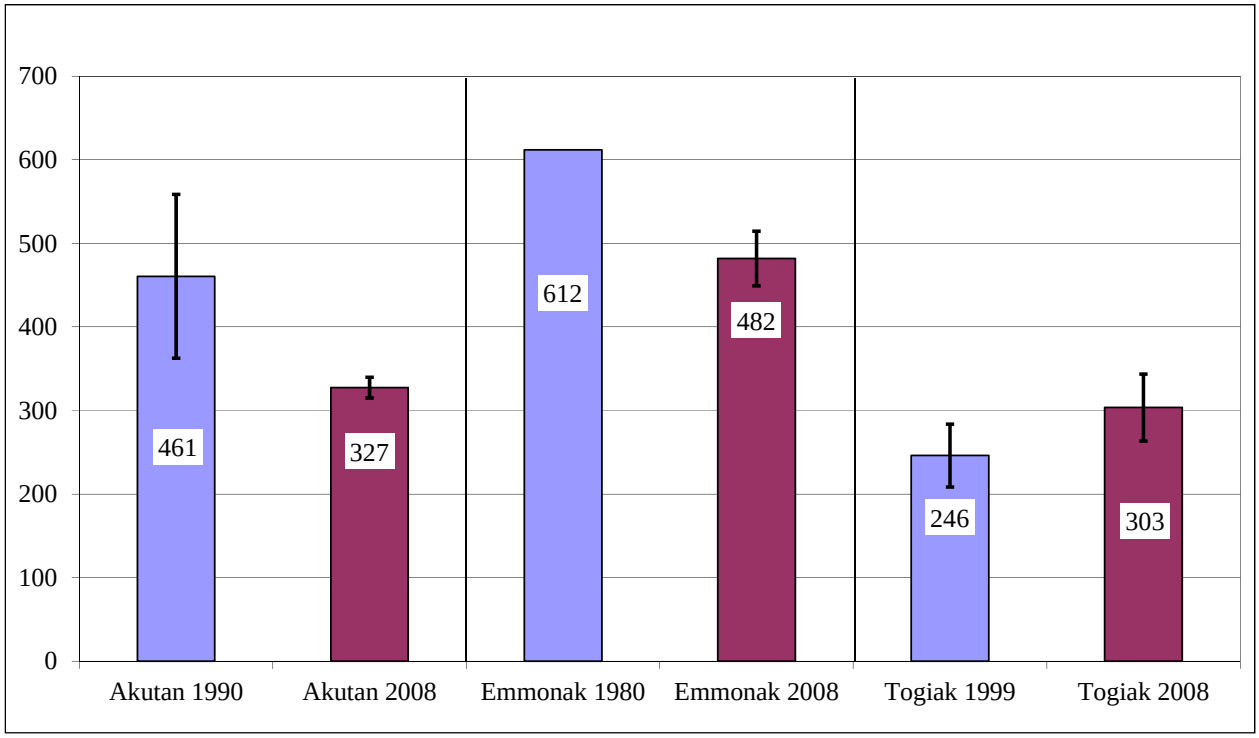

Figure 5-3.–Total subsistence harvests pounds per person, Akutan, Emmonak, and Togiak, 2008 and previous study year.

Survey respondents offered a range of personal, economic, and environmental explanations of these changes. Personal and economic factors dominated their explanations of changes in 2008 compared to other recent years. High fuel costs affected subsistence harvests in all 3 communities. However, interviews with key respondent, perhaps because of the greater time depth and broader experience applied to their observations, identified other factors that are shaping trends. These explanations are complex and multifaceted.

For example, at Akutan, respondents cited the effects of persistent storms and shifting winds that restrict travel and reduce the predictability of the locations of key resources. They also commented on the effects of incidental harvests in Bering Sea commercial fisheries on marine resource abundance and conditions. Emmonak respondents, too, are experiencing shifting winds and persistent storms, as well as unpredictable and unstable sea ice. They cite a combination of environmental and resource management factors, including incidental harvests in Bering Sea commercial fisheries, that negatively affect salmon, still their most important subsistence and commercial resource. Nevertheless, Emmonak residents have taken advantage of growing moose populations, also a valued subsistence food. Togiak respondents as well point to both environmental changes and more immediate human-caused factors for declining

resources. At Togiak too, weather is more unpredictable, compressing the time available for some seasonal activities and shifting the location of resources. As in Emmonak, ice conditions, among other factors, have likely caused a change in Togiak's uses of marine mammals. Similarly, Togiak respondents also voiced concerns about the effects of commercial fisheries on subsistence resources.

As noted in Chapter 1, BSIERP Hypothesis 5.b proposed that with changing abundance and distribution of subsistence resources in the Bering Sea, communities will become more dependent on owners of large boats to travel farther to harvest subsistence resources, and that there will be a shift in the composition of subsistence harvests to reflect changing species availability. The household surveys found evidence of specialization in subsistence harvests, associated in part with involvement in commercial fishing in Togiak and Emmonak. However, the study found no evidence that harvesters are traveling farther to locate scarce resources. Indeed, in Akutan, owners of larger commercial fishing boats reported adapting to rising fuel costs by developing harvest efficiencies that involved fewer and shorter trips. High fuel costs also affected subsistence harvests in Emmonak, Togiak, and Savoonga. The household harvest surveys supported the second part of Hypothesis 5 by documenting shifts in the size and composition of subsistence harvests that can in part be linked to changes in resource abundance and distribution. But these shifts are likely also linked to other causes not directly tied to abundance, such as impediments to access caused by thinning ice or changing and unpredictable weather patterns, or commercial fisheries harvests and bycatches and other human-caused disturbances to natural resource populations.

In conclusion, subsistence hunting, fishing, and gathering remain nutritionally, economically, culturally, and spiritually essential to individual and community well-being in the 3 Bering Sea communities of Akutan, Emmonak, and Togiak. Access remains a key to hunting and fishing success. Access is shaped by environmental factors, such as abundance, distribution, weather, ice, and travel conditions. It is also affected by economic factors such as costs of equipment and fuel. Residents of the study communities have demonstrated considerable flexibility in their subsistence activities on an annual and long-term basis.

Indeed, northern peoples have always faced a great deal variability in their physical, economic, and political environments. Consequently, the capacity to adapt to change is an important part of their cultures (e.g., Berkes and Jolly 2001). In this study, key respondents observed that change itself is not remarkable, but constant.

As keen and systematic observers of their environment, subsistence hunters, fishers, and gatherers tend to see the world "holistically" or "ecologically." As this project has illustrated, through both structured surveys and key respondents interviews, residents of Bering Sea communities seek understanding of the connections between physical and biological components of the world they experience through all the seasons and across years and generations. There appeared to be a consensus that the ecosystem is changing physically and biologically. There also appears to be a consensus that economic, social, and cultural changes are taking place as well. Overall, the residents of these Bering Sea study communities have been able to respond to these changes so far, but the future is less clear if such changes intensify or accelerate. Clearly, the residents of Bering Sea communities will be essential partners in future efforts to understand the complex processes that affect the natural resources of their homeland.

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APPENDIX A: SURVEY INSTRUMENT

COMPREHENSIVE SUBSISTENCE SURVEY

EMMONAK, ALASKA

January to December, 2008

This survey is used to estimate subsistence harvests and to describe community subsistence economies. We will publish a summary report, and send it to all households in your community. We share this information with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service and the National Park Service. We work with the Federal Regional Advisory Councils and with local Fish and Game Advisory Committees to better manage subsistence, and to implement federal and state subsistence priorities.

We will NOT identify your household. We will NOT use this information for enforcement. Participation in this survey is voluntary. Even if you agree to be surveyed, you may stop at any time.

HOUSEHOLD ID:		
COMMUNITY ID:	EMMONAK	128
RESPONDENT ID:		
INTERVIEWER:		
INTERVIEW DATE:		
START TIME:		
STOP TIME:		
DATA CODED BY:		
DATA ENTERED BY:		
SUPERVISOR:		

COOPERATING ORGANIZATIONS

EMMONAK TRIBAL COUNCIL
PO BOX 126
EMMONAK, AK 99581

907-949-1720

DIVISION OF SUBSISTENCE
ALASKA DEPT OF FISH & GAME
PO BOX 1030
DILLINGHAM, AK 99576

907-842-5925

HOUSEHOLD MEMBERS

HOUSEHOLD ID

Between JANUARY and DECEMBER, 2008…
…who lived in your household?

ID#	IS THIS PERSON ANSWERING QUESTIONS *ON THIS SURVEY?* *(circle)*	MALE OR FEMALE? *(circle)*	ALASKA NATIVE? *(circle)*	IN WHAT YEAR WAS THIS PERSON BORN? *(year)*	WHERE WERE PARENTS LIVING WHEN THIS PERSON WAS BORN? *(ak city or state)*	HOW IS THIS PERSON RELATED TO HOUSEHOLD HEAD 1? *(relation)*	HOW MANY YEARS HAS THIS PERSON LIVED IN EMMONAK? *(number)*	IN 2008 DID THIS PERSON HARVEST WILD RESOURCES? *(circle)*	IN 2008 DID THIS PERSON PROCESS WILD RESOURCES? *(circle)*
HEAD 1	Y N	M F	Y N				YRS	Y N	Y N
01									
Enter spouse or partner next. If household has a SINGLE HEAD, leave HEAD 2 blank.									
HEAD 2	Y N	M F	Y N				YRS	Y N	Y N
02									
Enter children (oldest to youngest), grandchildren, grandparents, brothers, sisters, or anyone else living full-time in this household.									
03	Y N	M F	Y N				YRS	Y N	Y N
04	Y N	M F	Y N				YRS	Y N	Y N
05	Y N	M F	Y N				YRS	Y N	Y N
06	Y N	M F	Y N				YRS	Y N	Y N
07	Y N	M F	Y N				YRS	Y N	Y N
08	Y N	M F	Y N				YRS	Y N	Y N
09	Y N	M F	Y N				YRS	Y N	Y N
10	Y N	M F	Y N				YRS	Y N	Y N
11	Y N	M F	Y N				YRS	Y N	Y N
12	Y N	M F	Y N				YRS	Y N	Y N
13	Y N	M F	Y N				YRS	Y N	Y N
14	Y N	M F	Y N				YRS	Y N	Y N
15	Y N	M F	Y N				YRS	Y N	Y N

PERMANENT HH MEMBERS: 01 **EMMONAK: 128**

HARVESTS: COMMERCIAL SALMON FISHING

HOUSEHOLD ID

Do members of your household USUALLY participate in COMMERCIAL SALMON FISHING ?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household participate in commercial salmon fishing?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate the amount of salmon ALL MEMBERS OF YOUR HOUSEHOLD removed from their commercial harvest this year . INCLUDE the fish you gave away, ate fresh, fed to dogs, lost to spoilage, caught as incidental catch while fishing for another species, or got by helping others. If harvested with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…		IN 2008, HOW MANY _____ DID YOUR REMOVE FOR OWN USE?	IN 2008, HOW MANY _____ DID YOU REMOVE FROM THE CATCH AND GAVE AWAY TO CREW OR OTHERS?		ID NUMBER FROM PAGE 2	
	COMMERCIAL FISH FOR _____?	CAUGHT AS INCIDENTAL CATCH _____?		CREW	OTHERS	PERMIT HOLDER	CREW
	(circle)	*(circle)*	*(number)*	*(number)*		*(number)*	*(number)*
CHINOOK SALMON *Kiagtak* 113000000	Y N	Y N	IND	IND	IND		
SOCKEYE SALMON *Cayak* 115000000	Y N	Y N	IND	IND	IND		
COHO SALMON *Uqurliq* 112000000	Y N	Y N	IND	IND	IND		
CHUM SALMON *Uqurliq* 111000000	Y N	Y N	IND	IND	IND		
PINK SALMON *Cuqpeq* 114000000	Y N	Y N	IND	IND	IND		
	Y N	Y N	IND	IND	IND		

COMMERCIAL SALMON FISHING: 03 **EMMONAK: 128**

HARVESTS: COMMERCIAL NON-SALMON FISHING

HOUSEHOLD ID

Do members of your household USUALLY participate in COMMERCIAL NON-SALMON FISHING ?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household participate in commercial non-salmon fishing?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate the amount of fish ALL MEMBERS OF YOUR HOUSEHOLD removed from their commercial harvest this year. INCLUDE the fish you gave away, ate fresh, fed to dogs, lost to spoilage, caught as incidental catch while fishing for another species, or got by helping others. If harvested with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…			IN 2008, HOW MANY _____ DID YOU REMOVE FROM THE CATCH AND GAVE AWAY TO CREW OR OTHERS?		ID NUMBER FROM PAGE 2	
	COMMERCIAL FISH FOR _____?	CAUGHT AS INCIDENTAL CATCH _____?	IN 2008, HOW MANY _____ DID YOUR REMOVE FOR OWN USE?	CREW	OTHERS	PERMIT HOLDER	CREW
	(circle)	*(circle)*	*(number)*	*(number)*		*(number)*	*(number)*
HALIBUT *Natemarpak* 121800000	Y N	Y N	LBS	LBS	LBS		
HERRING *Iqalluarpak* 120200000	Y N	Y N	GAL	GAL	GAL		
HERRING SPAWN ON KELP *Melucuaq* 120306000	Y N	Y N	GAL	GAL	GAL		
SHEEFISH *Ciiq* 125600000	Y N	Y N	IND	IND	IND		
BROAD WHITEFISH *Quartuq* 126404000	Y N	Y N	IND	IND	IND		
LEAST CISCO *Cavirutmaq* 126406060	Y N	Y N	IND	IND	IND		
BERING CISCO *Imarpinraq* 126406040	Y N	Y N	IND	IND	IND		
UNKNOWN WHITEFISH 126499000	Y N	Y N	IND	IND	IND		
PACIFIC COD (GRAY COD) *Ceturmaq* 121004000	Y N	Y N	IND	IND	IND		
ARCTIC LAMPREY 122000000	Y N	Y N	IND	IND	IND		
	Y N	Y N	IND	IND	IND		
	Y N	Y N	IND	IND	IND		
	Y N	Y N					

COMMERCIAL NON-SALMON FISHING: 03 **EMMONAK: 128**

ADD Sheefish
Broad Whitefish
Least-Cisco
Bering Cisco

HARVESTS: COMMERCIAL MARINE INVERTEBRATES

HOUSEHOLD ID

Do members of your household USUALLY participate in COMMERCIAL MARINE INVERTEBRATES ?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household participate in commercial marine invertebrates?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate the amount of fish ALL MEMBERS OF YOUR HOUSEHOLD removed from their commercial harvest this year. INCLUDE the fish you gave away, ate fresh, fed to dogs, lost to spoilage, caught as incidental catch while fishing for another species, or got by helping others. If harvested with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH...		IN 2008, HOW MANY _____ DID YOUR REMOVE FOR OWN USE?	IN 2008, HOW MANY _____ DID YOU REMOVE FROM THE CATCH AND GAVE AWAY TO CREW OR OTHERS?		ID NUMBER FROM PAGE 2	
	L FISH FOR _____?	CAUGHT AS INCIDENTAL CATCH _____?		CREW	OTHERS	PERMIT HOLDER	CREW
	(circle)	*(circle)*	*(number)*	*(number)*		*(number)*	*(number)*
SHRIMP *Cungaralukvak* 503400000	Y N	Y N	LBS	LBS	LBS		
DUNGENESS CRAB 501004000	Y N	Y N	GAL	GAL	GAL		
RED KING CRAB *Pupsulegpak* 501008080	Y N	Y N	GAL	GAL	GAL		
TANNER CRAB *Pupsulek* 501012000	Y N	Y N	IND	IND	IND	DROP	
	Y N	Y N	IND	IND	IND	DROP	
	Y N	Y N	IND	IND	IND		
	Y N	Y N	IND	IND	IND	DROP	
	Y N	Y N	IND	IND	IND	DROP	
	Y N	Y N	IND	IND	IND		

COMMERCIAL MARINE INVERTEBRATE HARVEST: 03 **EMMONAK: 128**

HARVESTS: SALMON

HOUSEHOLD ID

Do members of your household USUALLY harvest SALMON ?.....Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST salmon?.....Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many salmon ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED this year, including with a rod and reel. INCLUDE salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If fishing with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID YOUR HOUSEHOLD…			HOW MANY OF THOSE WERE CAUGHT JUST FOR DOGS?	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	…CATCH WITH GILL NET OR SEINE?	…CATCH WITH ROD AND REEL?	…CATCH WITH OTHER GEAR?			
	(circle)				(number taken by each gear type)			(number)	(ind, lbs)	(circle)
CHINOOK SALMON *Kiagtak* 113000000	Y N	Y N	Y N	Y N					IND	L S M ?
SOCKEYE SALMON *Cayak* 115000000	Y N	Y N	Y N	Y N					IND	L S M ?
COHO SALMON *Uqurliq* 112000000	Y N	Y N	Y N	Y N					IND	L S M ?
CHUM SALMON *Uqurliq* 111000000	Y N	Y N	Y N	Y N					IND	L S M ?
PINK SALMON *Cuqpeq* 114000000	Y N	Y N	Y N	Y N					IND	L S M ?
	Y N	Y N	Y N	Y N						L S M ?

These columns should include all the harvests: salmon HARVESTED by members of this household in 2008.

" ? " means "I don't know"

SALMON

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE salmon as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE, skip the next question.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the salmon that your household harvested, processed, or used for subsistence? X N Y

If Yes, please describe the changes in condition you observed *X = DID NOT USE*

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household HARVEST salmon? *On MAP, mark all harvest locations for salmon.*

SALMON : 04 **EMMONAK: 128**

HARVESTS: OTHER FISH

HOUSEHOLD ID

Do members of your household USUALLY harvest OTHER FISH ?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST other fish?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many other fish ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED use this year, including with a rod and reel. INCLUDE other fish you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If fishing with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID YOUR HOUSEHOLD…			HOW MANY OF THOSE WERE CAUGHT JUST FOR DOGS?	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	…CATCH WITH GILL NET OR SEINE?	…CATCH WITH ROD AND REEL?	…CATCH WITH OTHER GEAR?			
	(circle)				(number taken by each gear type)			(number)	(ind, lbs)	(circle)
HALIBUT *Naternarpak* 121800000	Y N	Y N	Y N	Y N					LBS	L S M ?
HERRING *Iqalluarpak* 120200000	Y N	Y N	Y N	Y N					GAL	L S M ?
HERRING SPAWN ON KELP *Melucuaq* 120306000	Y N	Y N	Y N	Y N					GAL	L S M ?
(If YES to TRY TO HARVEST anwser questions at bottom of page)										
HERRING SAC ROE *Meluk* 120304000	Y N	Y N	Y N	Y N					GAL	L S M ?
CAPELIN (SMELT) *Cikaq* 120402000	Y N	Y N	Y N	Y N					GAL	L S M ?
PACIFIC COD (GRAY COD) *Ceturrnaq* 121004000	Y N	Y N	Y N	Y N					IND	L S M ?
PACIFIC TOM COD *Igalluaq* 121008000	Y N	Y N	Y N	Y N					IND	L S M ?
SCULPIN (UNKNOWN) *Kayutak* 123099000	Y N	Y N	Y N	Y N					IND	L S M ?
STARRY FLOUNDER *Naternaq* 121406000	Y N	Y N	Y N	Y N					IND	L S M ?
SMELT *Iqalluaq* 120400000	Y N	Y N	Y N	Y N					GAL	L S M ?
RAINBOW TROUT *Talaariq* 126204000	Y N	Y N	Y N	Y N					IND	L S M ?
TROUT (UNKNOWN) 126200000	Y N	Y N	Y N	Y N					IND	L S M ?

Continue on next page.

These columns should include all the other fish HARVESTED by members of this household in 2008.

" ? " means "I don't know"

HERRING SPAWN ON KELP (*Melucuaq*)

Have you observed changes in the quality and/or amount of HERRING SPAWN ON KELP in your traditional harvest area? X N Y

X = DID NOT ATTEMPT TO HARVEST

If so, what changes have you observed?

Map past and present use areas

OTHER FISH: 06 **EMMONAK: 128**

HARVESTS: OTHER FISH

HOUSEHOLD ID

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID YOUR HOUSEHOLD…			HOW MANY OF THOSE WERE CAUGHT JUST FOR DOGS?	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	…CATCH WITH GILL NET OR SEINE?	…CATCH WITH ROD AND REEL?	…CATCH WITH OTHER GEAR?			
	(circle)				(number taken by each gear type)			(number)	(ind, lbs)	(circle)
DOLLY VARDEN *Yugyaq* 125006000	Y N	Y N	Y N	Y N					IND	L S M ?
GRAYLING *Nakrullugpak* 125200000	Y N	Y N	Y N	Y N					IND	L S M ?
PIKE *Cuukvak/Keggsuli* 125400000	Y N	Y N	Y N	Y N					IND	L S M ?
BURBOT (LING COD) *Manignaq* 124800000	Y N	Y N	Y N	Y N					IND	L S M ?
ROUND WHITEFISH *Cingikegglig* 126412000	Y N	Y N	Y N	Y N					IND	L S M ?
HUMPBACK WHITEFISH *Uraruq* 126408000	Y N	Y N	Y N	Y N					IND	L S M ?
BROAD WHITEFISH *Quartuq* 126404000	Y N	Y N	Y N	Y N					IND	L S M ?
LEAST CISCO *Cavirutmnaq* 126406060	Y N	Y N	Y N	Y N					IND	L S M ?
BERING CISCO *Imarpinraq* 126406040	Y N	Y N	Y N	Y N						L S M ?
BLACKFISH *Imangaq* 124600000	Y N	Y N	Y N	Y N					IND	L S M ?
	Y N	Y N	Y N	Y N						L S M ?
	Y N	Y N	Y N	Y N					IND	L S M ?

OTHER FISH

Between JANUARY and DECEMBER, 2008…

…Did your household use LESS, SAME, or MORE other fish as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE skip the next question.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the other fish that your household harvested, processed, or used for subsistence? X N Y

If Yes, please describe the changes in condition you observed *X = DID NOT USE*

Between JANUARY and DECEMBER, 2008…

…WHERE did members of your household HARVEST other fish? *On MAP, mark all harvest locations for other fish.*

OTHER FISH: 06 **EMMONAK: 128**

MARINE INVERTEBRATES/SHELLFISH

HOUSEHOLD ID

Do members of your household USUALLY fish for MARINE INVERTEBRATES/SHELLFISH ?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST marine invertebrates/shellfish ?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many marine invertebrates/shellfish ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED for subsistence use this year. INCLUDE marine invertebrates/shellfish you gave away, ate fresh, lost to spoilage, or got by helping others. If fishing with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH… USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	IN 2008, HOW MANY _____ DID YOUR HOUSEHOLD HARVEST?	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	(circle)				(number)	(each, gallons, tubs, etc.)	(circle)
RAZOR CLAMS *Aliruaq* 500612000	Y N	Y N	Y N	Y N		GAL	L S M ?
OTHER CLAMS 500693000	Y N	Y N	Y N	Y N		GAL	L S M ?
COCKLES (UNKNOWN) *Tavtaaq* 500693000	Y N	Y N	Y N	Y N		GAL	L S M ?
BLUE MUSSELS *Amyak* 502002000	Y N	Y N	Y N	Y N		GAL	L S M ?
SHRIMP *Cungarahkvak* 503400000	Y N	Y N	Y N	Y N		GAL	L S M ?
DUNGENESS CRAB 501004000	Y N	Y N	Y N	Y N		GAL	L S M ?
RED KING CRAB *Pupsulegpak* 501008080	Y N	Y N	Y N	Y N		IND	L S M ?
TANNER CRAB *Pupsulek* 501012000	Y N	Y N	Y N	Y N		IND	L S M ?
BUTTER CLAMS 500602000	Y N	Y N	Y N	Y N		IND	L S M ?
	Y N	Y N	Y N	Y N			L S M ?
							" ? " means "I don't know"

MARINE INVERTEBRATES/SHELLFISH

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE marine invertebrates/shellfish as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE, skip the next question.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the marine invertebrates/shellfish that your household harvested, processed, or used for subsistence?

If Yes, please describe the changes in condition you observed X N Y

X = DID NOT USE

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household GATHER marine invertebrates/shellfish? *Mark all harvest locations on MAP*

MARINE INVERTEBRATES/SHELLFISH: 08 **EMMONAK: 128**

HARVESTS: LARGE LAND MAMMALS

HOUSEHOLD ID

Do members of your household USUALLY hunt for LARGE LAND MAMMALS for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST large land mammals?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many large land mammals ALL MEMBERS OF YOUR HOUSEHOLD HARVEST for subsistence use this year. INCLUDE large land mammals you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If hunting with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…					IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?														
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	SEX	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	(circle)					(enter number by sex and month of take)													(ind)	(circle)
CARIBOU *Tuntuq* 211000000	Y N	Y N	Y N	Y N	M														IND	L S M ?
					F															
					?															
					M															
					F															
					?															
MOOSE *Tuntuvak* 211800000	Y N	Y N	Y N	Y N	M														IND	L S M ?
					F															
					?															
					M															
					F															
					?															
BROWN BEAR *Tagukaq* 210800000	Y N	Y N	Y N	Y N															IND	L S M ?
BLACK BEAR *Carayak* 210600000	Y N	Y N	Y N	Y N															IND	L S M ?
	Y N	Y N	Y N	Y N															IND	L S M ?
																				" ? " means "I don't know"

LARGE LAND MAMMALS

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE large land mammals as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE, skip the next question.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the large land mammals that your household harvested, processed, or used for subsistence?

If Yes, please describe the changes in condition you observed X N Y

X = DID NOT USE

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household HUNT FOR large land mammals? *On MAP, mark all harvest locations for large land mammals.*
…WHERE did members of your household HARVEST large land mammals? *Circle all search areas on MAP*

LARGE LAND MAMMALS: 10 **EMMONAK: 128**

HARVESTS: MARINE MAMMALS

HOUSEHOLD ID

Do members of your household USUALLY hunt for MARINE MAMMALS for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST marine mammals?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many marine mammals ALL MEMBERS OF YOUR HOUSEHOLD HARVEST for subsistence use this year. INCLUDE marine mammals you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If hunting with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…					IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?													WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	SEX	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	UNITS	
	(circle)					(enter number by sex and month of take)													(ind)	(circle)
SPOTTED SEAL *Issuriq* 300812000	Y N	Y N	Y N	Y N	M														IND	L S M ?
					F															
					?															
300812001					M															
300812002					F															
300812009					?															
SEA LION *Ugjnaq* 301200000	Y N	Y N	Y N	Y N	M														IND	L S M ?
					F															
					?															
301200001					M															
301200002					F															
301200009					?															
RINGED SEAL *Nayiq / Qasrule* 300810000	Y N	Y N	Y N	Y N															IND	L S M ?
BEARDED SEAL *Maklak* 300802000	Y N	Y N	Y N	Y N															IND	L S M ?
SEAL 300800000	Y N	Y N	Y N	Y N															IND	L S M ?
WALRUS *Asveq* 301400000	Y N	Y N	Y N	Y N															IND	L S M ?
HARBOR PORPOISE *Mangayaaq* 300604000	Y N	Y N	Y N	Y N															IND	L S M ?
RINGED SEAL *Nayiq / Qasrule* 300810000	Y N	Y N	Y N	Y N															IND	L S M ?
BELUGA WHALE *Centuaq* 301602000	Y N	Y N	Y N	Y N															IND	L S M ?
																				" ? " means "I don't know"

MARINE MAMMALS

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE marine mammals as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE, skip the next question.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the marine mammals that your household harvested, processed, or used for subsistence? X N Y

If Yes, please describe the changes in condition you observed

X = DID NOT USE

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household HUNT FOR marine mammals? *On MAP, mark all harvest locations for marine mammals.*
…WHERE did members of your household HARVEST marine mammals? *Circle all search areas on MAP*

MARINE MAMMALS: 12 **EMMONAK: 128**

HARVESTS: SMALL LAND MAMMALS

HOUSEHOLD ID

Do members of your household USUALLY hunt or trap SMALL LAND MAMMALS for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST small land mammals?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many small land mammals ALL MEMBERS OF YOUR HOUSEHOLD HARVEST for subsistence use this year. INCLUDE small land mammals you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If hunting or trapping with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?													WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	UNITS
	(circle)				(enter number by sex and month of take)													(ind)	(circle)
BEAVER *Paluqtaq* 220200000	Y N	Y N	Y N	Y N														ind	L S M ?
PORCUPINE *Iisaluuq* 222600000	Y N	Y N	Y N	Y N														ind	L S M ?
MINK *Imarmiutaq* 222200000	Y N	Y N	Y N	Y N														ind	L S M ?
RED FOX *Kaviaq* 220804000	Y N	Y N	Y N	Y N														ind	L S M ?
CROSS FOX *Tunguliayaaq* 220804020	Y N	Y N	Y N	Y N														ind	L S M ?
ARCTIC FOX *Uliiq* 220802000	Y N	Y N	Y N	Y N														ind	L S M ?
WOLF *Kegglunеq* 223200000	Y N	Y N	Y N	Y N														ind	L S M ?
WOLVERINE *Qavciq* 223400000	Y N	Y N	Y N	Y N														ind	L S M ?
LAND OTTER *Cenkaq* 221200000	Y N	Y N	Y N	Y N														ind	L S M ?
MUSKRAT *Kanaqllak* 222400000	Y N	Y N	Y N	Y N														ind	L S M ?
WEASEL *Amitatuk* 223000000	Y N	Y N	Y N	Y N														ind	L S M ?

Continue on next page.

" ? " means "I don't know"

SMALL LAND MAMMALS: 14 **EMMONAK: 128**

HARVESTS: SMALL LAND MAMMALS

HOUSEHOLD ID

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?														WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	UNITS	
	(circle)				(enter number by sex and month of take)													(ind)	(circle)
LYNX *Tertuli* 221000000	Y N	Y N	Y N	Y N														ind	L S M ?
MARTEN *Qavcicuar* 222000000	Y N	Y N	Y N	Y N														ind	L S M ?
COYOTE *Kayu* 220400000	Y N	Y N	Y N	Y N														ind	L S M ?
ARCTIC HARE *Tundra* 221002000	Y N	Y N	Y N	Y N														ind	L S M ?
SNOWSHOE HARE *Ciriiq/Nullutuuyak* 221004000	Y N	Y N	Y N	Y N														ind	L S M ?
JACKRABBIT *Qayugerrliq* 221006000	Y N	Y N	Y N	Y N														ind	L S M ?
UNKNOWN HARE 221099000	Y N	Y N	Y N	Y N														ind	L S M ?
	Y N	Y N	Y N	Y N														ind	L S M ?
	Y N	Y N	Y N	Y N														ind	L S M ?

" ? " means "I don't know"

SMALL LAND MAMMALS

Between JANUARY and DECEMBER, 2008…

…Did your household use LESS, SAME, or MORE small land mammals as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE go on to next page.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the small land mammals that your household harvested, processed, or used for subsistence?

X N Y

X = DID NOT USE

If Yes, please describe the changes in condition you observed

Between JANUARY and DECEMBER, 2008…

…WHERE did members of your household HUNT OR TRAP small land mammals? *On MAP, mark all harvest locations for small land mammals.*

…WHERE did members of your household HARVEST small land mammals? *Circle all search areas on MAP*

SMALL LAND MAMMALS: 14 **EMMONAK: 128**

HARVESTS: MIGRATORY WATERFOWL

HOUSEHOLD ID

Do members of your household USUALLY hunt for MIGRATORY WATERFOWL for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO CATCH migratory waterfowl?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many migratory waterfowl ALL MEMBERS OF YOUR HOUSEHOLD CAUGHT for subsistence use this year. INCLUDE migratory waterfowl you gave away, ate fresh, lost to spoilage, or got by helping others. If hunting with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD CATCH?											WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	
	(circle)				winter				spring		summer			fall				(circle)
CANADA GEESE (CACKLERS) *Tutangayak* 410404040	Y N	Y N	Y N	Y N														L S M ?
CANADA GEESE (BIG LESSER) *Dinmakbik* 410404080	Y N	Y N	Y N	Y N														L S M ?
CANADA GEESE (UNKNOWN) 410404000	Y N	Y N	Y N	Y N														L S M ?
WHITE-FRONTED GEESE (SPECKLEBELLY) *Neqlernaq* 410410000	Y N	Y N	Y N	Y N														L S M ?
BRANT (SEA GEESE) *Neqlernaq* 410402000	Y N	Y N	Y N	Y N														L S M ?
EMPEROR GEESE *Nacaullek* 410406000	Y N	Y N	Y N	Y N														L S M ?
SNOW GEESE *Kanguq* 410408000	Y N	Y N	Y N	Y N														L S M ?
GEESE 930300000	Y N	Y N	Y N	Y N														L S M ?
TUNDRA SWAN *Ougyuk* 410604000	Y N	Y N	Y N	Y N														L S M ?
TRUMPETER SWAN 410602000	Y N	Y N	Y N	Y N														L S M ?
SWAN (UNKNOWN) *Ougyuk* 410600000	Y N	Y N	Y N	Y N														L S M ?
SANDHILL CRANE *Outeraq* 410802000	Y N	Y N	Y N	Y N														L S M ?
MALLARD *Uqulkataqpak* 410214000	Y N	Y N	Y N	Y N														L S M ?
NORTHERN PINTAIL *Uqulkataq* 410220000	Y N	Y N	Y N	Y N														L S M ?
GOLDENEYE (UNKNOWN) *Anarnissakaq* 410210990	Y N	Y N	Y N	Y N														L S M ?
NORTHERN SHOVELER *Sugg'Erpak* 410230000	Y N	Y N	Y N	Y N														L S M ?
GADWALL 410208000	Y N	Y N	Y N	Y N														L S M ?

Continue on next page.

" ? " means "I don't know"

HARVESTS: MIGRATORY WATERFOWL

HOUSEHOLD ID

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?											WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	
	(circle)				winter				spring		summer			fall				(circle)
GREEN-WINGED TEAL	Y N	Y N	Y N	Y N														L S M ?
BUFFLEHEAD 410202000	Y N	Y N	Y N	Y N														L S M ?
HARLEQUIN DUCK *Cetusqaar* 410212000	Y N	Y N	Y N	Y N														L S M ?
SCAUP (UNKNOWN) *Kip'Alek* 410226000	Y N	Y N	Y N	Y N														L S M ?
WIGEON (UNKNOWN) *Qatkegaliq* 410236000	Y N	Y N	Y N	Y N														L S M ?
OLDSQUAW *Aarraangiiq* 410218000	Y N	Y N	Y N	Y N														L S M ?
CANVASBACK 410204000	Y N	Y N	Y N	Y N														L S M ?
COMMON MERGANSER 410216020	Y N	Y N	Y N	Y N														L S M ?
RED-BREAST MERGANSER 410216040	Y N	Y N	Y N	Y N														L S M ?
MERGANSER (UNKNOWN) 410216000	Y N	Y N	Y N	Y N														L S M ?
BLACK SCOTER (BLACK DUCK) *Kukumyar* 410228020	Y N	Y N	Y N	Y N														L S M ?
COMMON EIDER *Metrag* 410206020	Y N	Y N	Y N	Y N														L S M ?
KING EIDER *Qenallek* 410206040	Y N	Y N	Y N	Y N														L S M ?
DUCKS (UNKNOWN) 410200000	Y N	Y N	Y N	Y N														L S M ?
COMMON SNIPE *Kukukuaq* 411002000	Y N	Y N	Y N	Y N														L S M ?

" ? " means "I don't know"

MIGRATORY WATERFOWL

Between JANUARY and DECEMBER, 2008…

…Did your household use LESS, SAME, or MORE migratory waterfowl as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE go on to next page.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the migratory waterfowl that your household harvested, processed, or used for subsistence?

X N Y

X = DID NOT USE

If Yes, please describe the changes in condition you observed

Between JANUARY and DECEMBER, 2008…

…WHERE did members of your household HUNT FOR migratory waterfowl?

…WHERE did members of your household HARVEST migratory waterfowl?

On MAP, mark all harvest locations for migratory waterfowl.

Circle all search areas on MAP

MIGRATORY WATERFOWL: 15 **EMMONAK: 128**

HARVESTS: OTHER BIRDS

HOUSEHOLD ID

Do members of your household USUALLY hunt for OTHER BIRDS for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO HARVEST other birds?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many other birds ALL MEMBERS OF YOUR HOUSEHOLD HARVEST for subsistence use this year. INCLUDE other birds you gave away, ate fresh, lost to spoilage, or got by helping others. If hunting with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD HARVEST?											WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	
	(circle)				winter				spring		summer			fall				(circle)
PTARMIGAN *Aqesgiq* 421804000	Y N	Y N	Y N	Y N														L S M ?
SPRUCE GROUSE *Egtuk* 421802020	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
																		" ? " means "I don't know"

OTHER BIRDS

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE other birds as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE go on to next page.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the other birds that your household harvested, processed, or used for subsistence? X N Y

If Yes, please describe the changes in condition you observed

X = DID NOT USE

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household HUNT FOR other birds? *On MAP, mark all harvest locations for other birds.*
…WHERE did members of your household HARVEST other birds? *Circle all search areas on MAP*

OTHER BIRDS: 15 **EMMONAK: 128**

HARVESTS: BIRD EGGS

HOUSEHOLD ID

Do members of your household USUALLY look for BIRD EGGS for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO GATHER bird eggs?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many bird eggs ALL MEMBERS OF YOUR HOUSEHOLD GATHERED for subsistence use this year. INCLUDE bird eggs you gave away, ate fresh, lost to spoilage, or got by helping others. If looking with others, report ONLY YOUR SHARE of the catch.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY (_____) DID MEMBERS OF YOUR HOUSEHOLD GATHER?												WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	
	(circle)				winter				spring		summer			fall				(circle)
GULL EGGS *Naru'Yaq* 431212000	Y N	Y N	Y N	Y N														L S M ?
CRANE EGGS 430800000	Y N	Y N	Y N	Y N														L S M ?
GOOSE EGGS *Neqleq* 430400000	Y N	Y N	Y N	Y N														L S M ?
DUCK EGGS *Yaqulek* 430200000	Y N	Y N	Y N	Y N														L S M ?
SWAN EGGS *Ougyuk* 430600000	Y N	Y N	Y N	Y N														L S M ?
TERN EGGS *Tekiyaar* 431226000	Y N	Y N	Y N	Y N														L S M ?
COMMON SNIPE EGGS *Kukukuaq* 431002000	Y N	Y N	Y N	Y N														L S M ?
CORMORANT EGGS *Uyalek* 431204000	Y N	Y N	Y N	Y N														L S M ?
UNKNOWN EGGS *Kayanguq* 439900000	Y N	Y N	Y N	Y N														L S M ?
	Y N	Y N	Y N	Y N														L S M ?
																		" ? " means "I don't know"

EGGS

Between JANUARY and DECEMBER, 2008…
…Did your household use LESS, SAME, or MORE eggs as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE go on to next page.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the eggs that your household harvested, processed, or used for subsistence? X N

If Yes, please describe the changes in condition you observed

X = DID NOT USE

Between JANUARY and DECEMBER, 2008…
…WHERE did members of your household LOOK FOR bird eggs?
…WHERE did members of your household GATHER bird eggs?

On MAP, mark all harvest locations for bird eggs.
Circle all search areas on MAP

BIRD EGGS: 15 **EMMONAK: 128**

HARVESTS: PLANTS AND BERRIES

HOUSEHOLD ID

Do members of your household USUALLY pick PLANTS AND BERRIES for subsistence?..... Y N

Between JANUARY and DECEMBER, 2008…
…Did members of your household USE or TRY TO PICK plants and berries?..... Y N

IF NO, go to the next harvest page.
If YES, continue on this page…

Please estimate how many plants and berries ALL MEMBERS OF YOUR HOUSEHOLD PICKED for subsistence use this year. INCLUDE plants and berries you gave away, ate fresh, lost to spoilage, or got by helping others. If picking with others, report ONLY YOUR SHARE of the harvest.

	IN 2008 DID MEMBERS OF YOUR HH…				IN 2008, HOW MANY _____ DID MEMBERS OF YOUR HOUSEHOLD PICK?	UNITS	WERE LESS, SAME, OR MORE (_____) AVAILABLE IN 2008, THAN IN RECENT YEARS?
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?			
	(circle)				(number)	(each, gallons, tubs, etc.)	(circle)
BLUEBERRIES *Suraq* 601002000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
LOW-BUSH CRANBERRIES *Tumagliq* 601004000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
HIGH-BUSH CRANBERRIES *Kitngpak* 601006000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
CROWBERRIES *Tan'Gerpak* 601007000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
HUCKLEBERRIES *Surav'Ak* 601014000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
CLOUDBERRIES *Atsalugpiaq* 601022000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
GOOSEBERRIES 601010000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
STRAWBERRIES 601026000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
RASPBERRIES 601020000	Y N	Y N	Y N	Y N		GALLONS	L S M ?
BERRIES 601000000	Y N	Y N	Y N	Y N		GALLONS	L S M ?

" ? " means "I don't know"

Continue on next page.

HARVESTS: PLANTS AND BERRIES

HOUSEHOLD ID

	IN 2008 DID MEMBERS OF YOUR HH… USE? (circle)	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	IN 2008, HOW MANY _____ DID MEMBERS OF YOUR HOUSEHOLD PICK? (number)	UNITS (each, gallons, tubs, etc.)	WERE LESS, SAME, OR MORE (____) AVAILABLE IN 2008, THAN IN RECENT YEARS? (circle)
FIDDLEHEAD FERNS *Ceturkaaq* 602014000	Y N	Y N	Y N	Y N		GAL	L S M ?
SOURDOCK *Ouagciq* 602028000	Y N	Y N	Y N	Y N		GAL	L S M ?
HUDSON BAY TEA *Ayuk* 602018000	Y N	Y N	Y N	Y N		GAL	L S M ?
STINKWEED *Naunerrluk* 602044000	Y N	Y N	Y N	Y N		GAL	L S M ?
SEA CHICKWEED *It'Garralek* 602070000	Y N	Y N	Y N	Y N		GAL	L S M ?
WILD CELERY *Tarnaq* 602032000	Y N	Y N	Y N	Y N		GAL	L S M ?
WILD RHUBARB 602006000	Y N	Y N	Y N	Y N		GAL	L S M ?
SEAWEED 603099000	Y N	Y N	Y N	Y N		GAL	L S M ?
OTHER VEGETATION 609000000	Y N	Y N	Y N	Y N		GAL	L S M ?
FIREWOOD 604000000	Y N	Y N	Y N	Y N		CORD	L S M ?
	Y N	Y N	Y N	Y N			L S M ?
							" ? " means "I don't know"

PLANTS AND BERRIES

Between JANUARY and DECEMBER, 2008…

…Did your household use LESS, SAME, or MORE plants and berries as in recent years?..... X L S M

X = NEVER USE

If the SAME or NEVER USE go on to next page.

If different (LESS or MORE), how and why was your use different?

In 2008, did you notice any changes in the condition of the plants and berries that your household harvested, processed, or used for subsistence?

X N Y

X = DID NOT USE

If Yes, please describe the changes in condition you observed

Between JANUARY and DECEMBER, 2008…

…WHERE did members of your household PICK plants and berries? *On MAP, mark all harvest areas for plants and berries.*

PLANTS AND BERRIES: 17 **EMMONAK: 128**

HARVEST: OVERALL ASSESSMENTS

HOUSEHOLD ID

Considering all your uses of wild resources total between January and December 2008 …
Did your household use LESS, SAME or MORE wild resources as in recent years?

L S M X

X = NEVER USE WILD RESOURCES

If the SAME or NEVER USE WILD RESOURCES, skip the next question

IF your househod use of wild resources was LESS or MORE than recent years, how and why was your use different?

In 2008, did fuel costs affect your household's subsistence hunting and fishing?

Y N X

X = DO NOT HARVEST

If yes, how?

OVERALL ASSESSMENTS OF HARVEST AND USE: 109 **EMMONAK: 128**

JOBS **FOR EACH PERSON IN THE HOUSEHOLD, 16 YEARS OLD AND OLDER** **HOUSEHOLD ID**

Between JANUARY and DECEMBER, 2008…
…Did any members of your household earn money from a JOB or from SELF EMPLOYMENT?..... Y N

For each member of this household born before 1993, please list EACH JOB held between JANUARY and DECEMBER, 2008.
For household members who did not have a job, write: "RETIRED," "UNEMPLOYED," "STUDENT," "HOMEMAKER," etc.
There should be at least ONE ROW for each member of this household born BEFORE 1993.

We ask about jobs and income because we are trying to understand all parts of the community economy. Many people use wages from jobs to support subsistence activities. If one person has more than one job, list each job on a separate line. (One person may have several lines.)

REMEMBER COMMERCIAL FISHING AND TRAPPING IF APPLICABLE.

	WHO HAD THIS JOB?	WHAT KIND OF WORK DID HE/SHE DO IN THIS JOB?	FOR WHOM DID HE/SHE WORK IN THIS JOB?	JOB LOCATION?	IN 2008, WHAT MONTHS DID HE OR SHE WORK IN THIS JOB?	WORK SCHEDULE… FULL TIME / PART TIME / SHIFT - FULL TIME / ON-CALL, VARIES / SHIFT - PART TIME	IN 2008, HOW MUCH DID HE/SHE EARN IN THIS JOB?
	person	*job title*	*employer, SIC*	*(community)*	*circle each month worked*	*circle one*	*gross income*
1ST JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
1 6 910100000		SOC				SCHEDULE	
2ND JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
2 6 910100000		SOC				SCHEDULE	
3RD JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
3 6 910100000		SOC				SCHEDULE	
4TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
4 6 910100000		SOC				SCHEDULE	
5TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
5 6 910100000		SOC				SCHEDULE	
6TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
6 6 910100000		SOC				SCHEDULE	
7TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
7 6 910100000		SOC				SCHEDULE	
8TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
8 6 910100000		SOC				SCHEDULE	
9TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
9 6 910100000		SOC				SCHEDULE	
10TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
10 6 910100000		SOC				SCHEDULE	
11TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
11 6 910100000		SOC				SCHEDULE	
12TH JOB					J F M A M J J A S O N D	FT PT SF OC SP	$ / YR
12 6 910100000		SOC				SCHEDULE	

If a person is SELF-EMPLOYED (selling carvings, crafts, bread, etc), list that as a separate job. Enter "sewer," "carver," "baker," etc. as JOB TITLE. Work schedule usually will be "ON CALL." For gross income from self employment ("profit"), enter revenue MINUS expenses.

If a person is UNEMPLOYED, specify retired, unemployed, disabled, student, or homemaker as the JOB TITLE.

TRAPPING for barter or sale IS a job.

WORK SCHEDULE
1 - Fulltime (35+ hours/week)
2 - Parttime (<35 hours/week)
3 - Shift (2 wks on/2 off, etc.)
4 - Irregular, on call
5 - Shift - part time

GROSS INCOME is the same as TAXABLE INCOME on a W-2 form.

EMPLOYMENT: 23 **EMMONAK: 128**

OTHER INCOME

THIS PAGE IS ONLY FOR INCOME THAT IS NOT EARNED FROM WORKING **HOUSEHOLD ID**

Between JANUARY and DECEMBER, 2008…

…Did any members of your household receive a dividend from the Permanent Fund or a Native Corporation?..... Y N

IF NO, go to the next section on this page.

If YES, continue below…

		DID ANYONE IN YOUR HH RECEIVE INCOME FROM ____ IN 2008? (circle one)	TOTAL AMOUNT ALL MEMBERS OF YOUR HH RECEIVED IN 2008? (dollars)
DIVIDENDS	ALASKA PERMANENT FUND DIVIDEND	Y N	$ /YR
	32		
	NATIVE CORPORATION DIVIDENDS	Y N	$ /YR
	13		

ALASKA PFD IN 2008
1 PFD = $3,267
2 PFDs = $6,534
3 PFDs = $9,801
4 PFDs = $13,068
5 PFDs = $16,335
6 PFDs = $19,602
7 PFDs = $22,869
8 PFDs = $26,136
9 PFDs = $29,403
10 PFDs = $32,670
11 PFDs = $35,937

BBNC DIVIDENDS IN 2008	
Class A	
1 shrs= $11.75	
100 shrs= $1,175	

Between JANUARY and DECEMBER, 2008…

…Did any members of your household receive OTHER income such as SENIOR BENEFITS or UNEMPLOYMENT?..... Y N

IF NO, go to the next page.

If YES, continue below…

		RECEIVED IN 2008? (circle one)	TOTAL AMOUNT IN 2008? (dollars)	*scratch paper for calculations*
JOB BENEFITS	UNEMPLOYMENT	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	12			
	WORKERS' COMPENSATION	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	8			
ASSISTANCE	FOOD STAMPS (QUEST CARD)	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	11			
	ADULT PUBLIC ASSISTANCE	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	3			
ELDER BENEFITS	ALASKA SENIOR BENEFITS (LONGEVITY)	Y N	$ /YR	Depends on Income: $125 per month for 12 months = $1,500 per elder $175 per month for 12 months = $2,100 per elder $250 per month for 12 months = $3,000 per elder
	6			
	PENSION & RETIREMENT	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	5			
	SOCIAL SECURITY	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	7			
CHILD BENEFITS	SUPPLEMENTAL SECURITY	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	10			
	FOSTER CARE	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	41			
	CHILD SUPPORT	Y N	$ /YR	$_____ per week for _____ weeks = $_____ per month for _____ months =
	15			
OTHER	ENERGY ASSISTANCE	Y N	$ /YR	
	9			
	OTHER *(describe)*	Y N	$ /YR	

OTHER INCOME: 24 **EMMONAK: 128**

COMMENTS

HOUSEHOLD ID

DO YOU HAVE ANY QUESTIONS, COMMENTS, OR CONCERNS?

INTERVIEW SUMMARY:

BE SURE TO FILL IN THE STOP TIME ON THE FIRST PAGE!!!!

COMMENTS: 30 **EMMONAK: 128**

DISCARD THIS PAGE
PRINT DUPLEX
BIND ON LEFT (LONG) EDGE

APPENDIX B: CONVERSION FACTORS, 2008

Appendix B-1.–Conversion of reported amounts to edible pounds, Akutan, 2008.

Resource	Units	Conversion to pounds
Chum salmon	Individual	5.34
Coho salmon	Individual	5.27
Chinook salmon	Individual	4.09
Pink salmon	Individual	2.5
Sockeye salmon	Individual	3.98
Herring	Gallons	6
Herring roe	Gallons	7
Smelt	Individual	0.25
Pacific cod (gray)	Individual	3.2
Pacific tomcod	Individual	0.5
Walleye pollock (whiting)	Individual	1.4
Flounder	Individual	3
Greenling	Individual	1
Atka mackerel	Individual	1
Unknown greenling	Individual	1
Greenling roe	Gallons	7
Pacific halibut	Lb	1
Black rockfish	Individual	1.5
Red rockfish	Individual	4
Sablefish (blackcod)	Individual	3.1
Bullhead sculpin	Individual	0.5
Irish lord	Individual	0.5
Yellow sculpin	Individual	0.5
Unknown sculpin	Individual	0.5
Yellowfin sole	Individual	1
Dolly Varden	Individual	1.4
Lake trout	Individual	1.4
Arctic grayling	Individual	0.7
Deer	Individual	43.2
Cattle– feral	Individual	350
Fur seal	Individual	15
Harbor seal	Individual	56
Steller sea lion	Individual	200
Whale	Individual	995
Bufflehead	Individual	0.4
Canvasback	Individual	1.1
Steller eider	Individual	0.78
Gadwall	Individual	0.8
Common goldeneye	Individual	0.82
Harlequin	Individual	0.5
Mallard	Individual	1
Common merganser	Individual	0.9
Red-breasted merganser	Individual	0.9
Long-tailed duck (oldsquaw)	Individual	0.8
Northern pintail	Individual	0.8
Redhead duck	Individual	0.92
Greater scaup	Individual	0.9
Scoter	Individual	0.9
Surf scoter	Individual	0.9

-continued-

Resource	Units	Conversion to pounds
White-winged scoter	Individual	1.22
European teal	Individual	0.3
Green-winged teal	Individual	0.3
Unknown ducks	Individual	0.7
Canada geese	Individual	1.94
Aleutian Canada geese	Individual	1.94
Emperor geese	Individual	2.5
Black oystercatcher	Individual	0.57
Auklet	Individual	0.3
Cormorants	Individual	2.5
Loons	Individual	3
Common murre	Individual	0.5
Unknown murre	Individual	0.5
Puffins	Individual	0.5
Rock ptarmigan	Individual	0.7
Willow ptarmigan	Individual	0.7
Black oystercatcher eggs	Individual	0.4
Glaucous gull eggs	Individual	0.3
Unknown gull eggs	Individual	0.3
Red (large) chitons	Individual	0.5
Black (small) chitons	Gallons	4
Butter clams	Gallons	3
Horse clams (gaper)	Gallons	3
Pacific littleneck clams (steamers)	Gallons	3
Razor clams	Gallons	3
Cockles	Gallons	3
Dungeness crab	Individual	0.7
Hair crab	Individual	0.7
King crab	Individual	2.3
Tanner crab, bairdi	Individual	1.6
Tanner crab, opillio	Individual	1.6
Tanner crab, opilio (commercial fisheries retention)	Individual	1.6
Rock jingles	Gallons	3
Limpets	Gallons	1.5
Blue mussels	Lb	1
Brown mussels	Individual	1.5
Octopus	Individual	4
Scallops	Individual	0.063
Sea anemone	Gallons	2
Sea cucumber	Gallons	2
Sea urchin	Gallons	0.5
Shrimp	Gallons	2
Snails	Gallons	1.5
Squid	Individual	2
Berries	Gallons	4
Blueberry	Gallons	4
Lowbush cranberry	Gallons	4
Salmonberry	Gallons	4
Strawberry	Gallons	4
Other wild berry	Gallons	4
Plants/greens/mushrooms	Gallons	1

-continued-

Resource	Units	Conversion to pounds
Wild rhubarb	Gallons	4
Cow parsnip (wild celery)	Gallons	4
Wild parsley	Gallons	1
Yarrow	Gallons	1
Fireweed	Gallons	1
Unknown greens from land	Gallons	1
Unknown greens from sea	Gallons	1
Bull kelp	Gallons	1
Unknown seaweed	Gallons	1
Roots	Gallons	4

Appendix B-2.–Conversion of reported amounts to edible pounds, Emmonak, 2008.

Resource	Unit	Conversion to pounds
Chum salmon	Individual	5.15
Coho salmon	Individual	5.12
Chinook salmon	Individual	10.17
Pink salmon	Individual	2.4
Sockeye salmon	Individual	5.15
Herring	Gallons	6
Herring sac roe	Gallons	6
Herring spawn on kelp	Gallons	7
Smelt	Gallons	6
Capelin (grunion)	Gallons	5
Rainbow smelt	Gallons	6
Pacific cod (gray)	Individual	9
Pacific tomcod	Individual	0.75
Saffron cod	Individual	0.21
Starry flounder	Individual	3
Pacific halibut	Pounds	1
Arctic lamprey	Individual	0.6
Sculpin	Individual	1.5
Alaska blackfish	Individual	0.25
Burbot	Individual	4.5
Dolly Varden	Individual	1.5
Arctic grayling	Individual	1.5
Northern pike	Individual	2.25
Sheefish	Individual	8
Trout	Individual	2
Rainbow trout	Individual	1.4
Broad whitefish	Individual	2
Bering cisco	Individual	1.4
Least cisco	Individual	1
Humpback whitefish	Individual	2
Round whitefish	Individual	1.5
Unknown whitefish	Individual	1.75
Black bear	Individual	100
Brown bear	Individual	141
Caribou	Individual	130
Moose	Individual	715
Beaver	Individual	15
Arctic hare	Individual	5
Snowshoe hare	Individual	2.5
Jackrabbit	Individual	2
Unknown hare	Individual	3
River (land) otter	Individual	3
Lynx	Individual	4
Muskrat	Individual	0.75
Porcupine	Individual	4
Harbor porpoise	Individual	45
Bearded seal	Individual	140
Ribbon seal	Individual	56
Ringed seal	Individual	56
Spotted seal	Individual	56
Steller sea lion	Individual	200

-continued-

Resource	Unit	Conversion to pounds
Walrus	Individual	1,100
Beluga	Individual	700
Bowhead	Individual	1,000
Bufflehead	Individual	0.4
Canvasback	Individual	1.1
Common eider	Individual	1.6
King eider	Individual	2.67
Gadwall	Individual	0.8
Goldeneye	Individual	0.8
Harlequin	Individual	0.5
Mallard	Individual	1
Merganser	Individual	0.6
Common merganser	Individual	1.27
Red-breasted merganser	Individual	0.62
Long-tailed duck (oldsquaw)	Individual	0.8
Northern pintail	Individual	0.8
Scaup	Individual	0.9
Black scoter	Individual	0.9
Northern shoveler	Individual	0.6
Green-winged teal	Individual	0.3
Wigeon	Individual	0.7
Brant	Individual	1.2
Cacklers	Individual	1.2
Lesser Canada geese (taverner/parvipes)	Individual	2.1
Unknown Canada geese	Individual	1.75
Emperor geese	Individual	2.5
Snow geese	Individual	2.3
White-fronted geese	Individual	2.4
Trumpeter swan	Individual	10.1
Tundra swan (whistling)	Individual	10
Sandhill crane	Individual	8.4
Common snipe	Individual	0.1
Spruce grouse	Individual	1
Ptarmigan	Individual	1
Snowy owl	Individual	2.8
Duck eggs	Individual	0.15
Geese eggs	Individual	0.15
Swan eggs	Individual	0.3
Crane eggs	Individual	0.33
Common snipe eggs	Individual	0.05
Cormorant eggs	Individual	0.15
Gull eggs	Individual	0.16
Loon eggs	Individual	0.18
Tern eggs	Individual	0.05
Unknown eggs	Individual	0.15
Clams	Gallons	3
Razor clams	Gallons	3
Cockles	Gallons	3
Dungeness crab	Individual	0.7
Red king crab	Individual	1
Tanner crab	Individual	1

-continued-

Resource	Unit	Conversion to pounds
Blue mussels	Gallons	1.5
Shrimp	Gallons	4
Snails	Gallons	1.5
Berries	Gallons	4
Blueberry	Gallons	4
Lowbush cranberry	Gallons	4
Highbush cranberry	Gallons	4
Crowberry	Gallons	4
Gooseberry	Gallons	4
Huckleberry	Gallons	4
Cloudberry	Gallons	4
Raspberry	Gallons	4
Strawberry	Gallons	4
Wild rhubarb	Gallons	4
Fiddlehead ferns	Gallons	1
Hudson’s Bay tea	Gallons	1
Sourdock	Gallons	1
Willow leaves	Gallons	1
Cow parsnip (wild celery)	Gallons	1
Vegetation	Gallons	4
Stinkweed	Gallons	1
Mousefoods	Gallons	1
Sea chickweed	Gallons	1
Seaweed/kelp	Gallons	4

Appendix B-3.–Conversion of reported amounts to edible pounds, Togiak, 2008.

Resource	Unit	Conversion to pounds
Chum salmon	Individual	4.60
Coho salmon	Individual	4.83
Chinook salmon	Individual	11.04
Pink salmon	Individual	2.59
Sockeye salmon	Individual	4.28
Spawning sockeye	Individual	2.00
Herring	Gallons	6
Herring sac roe	Gallons	7
Herring spawn on kelp	Gallons	7
Smelt	Gallons	6
Capelin (grunion)	Individual	3.25
Rainbow smelt	Gallons	7
Pacific cod (gray)	Individual	3.20
Pacific tomcod	Individual	3.20
Starry flounder	Individual	3.00
Pacific halibut	Pounds	1
Sculpin	Individual	0.50
Yellowfin sole	Individual	1
Blackfish	Individual	0.07
Burbot	Individual	1
Dolly Varden	Individual	1.40
Dolly Varden–freshwater	Individual	1.40
Dolly Varden–saltwater	Individual	1.40
Lake trout	Individual	1.40
Arctic grayling	Individual	0.70
Northern pike	Individual	2.80
Longnose sucker	Individual	1.50
Trout	Individual	1.40
Rainbow trout	Individual	1.40
Broad whitefish	Individual	4.00
Least cisco	Individual	0.40
Humpback whitefish	Individual	1.75
Round whitefish	Individual	1
Black bear	Individual	58
Brown bear	Individual	340
Caribou	Individual	150
Moose	Individual	540
Beaver	Individual	8.75
Arctic hare	Individual	5.60
Snowshoe hare	Individual	2
Jackrabbit	Individual	2
Unknown hare	Individual	3
Lynx	Individual	4
Muskrat	Individual	0.75
Porcupine	Individual	8
Parka squirrel (ground)	Individual	0.50
Red (tree) squirrel	Individual	0.50
Harbor porpoise	Individual	45
Seal	Individual	56
Bearded seal	Individual	176

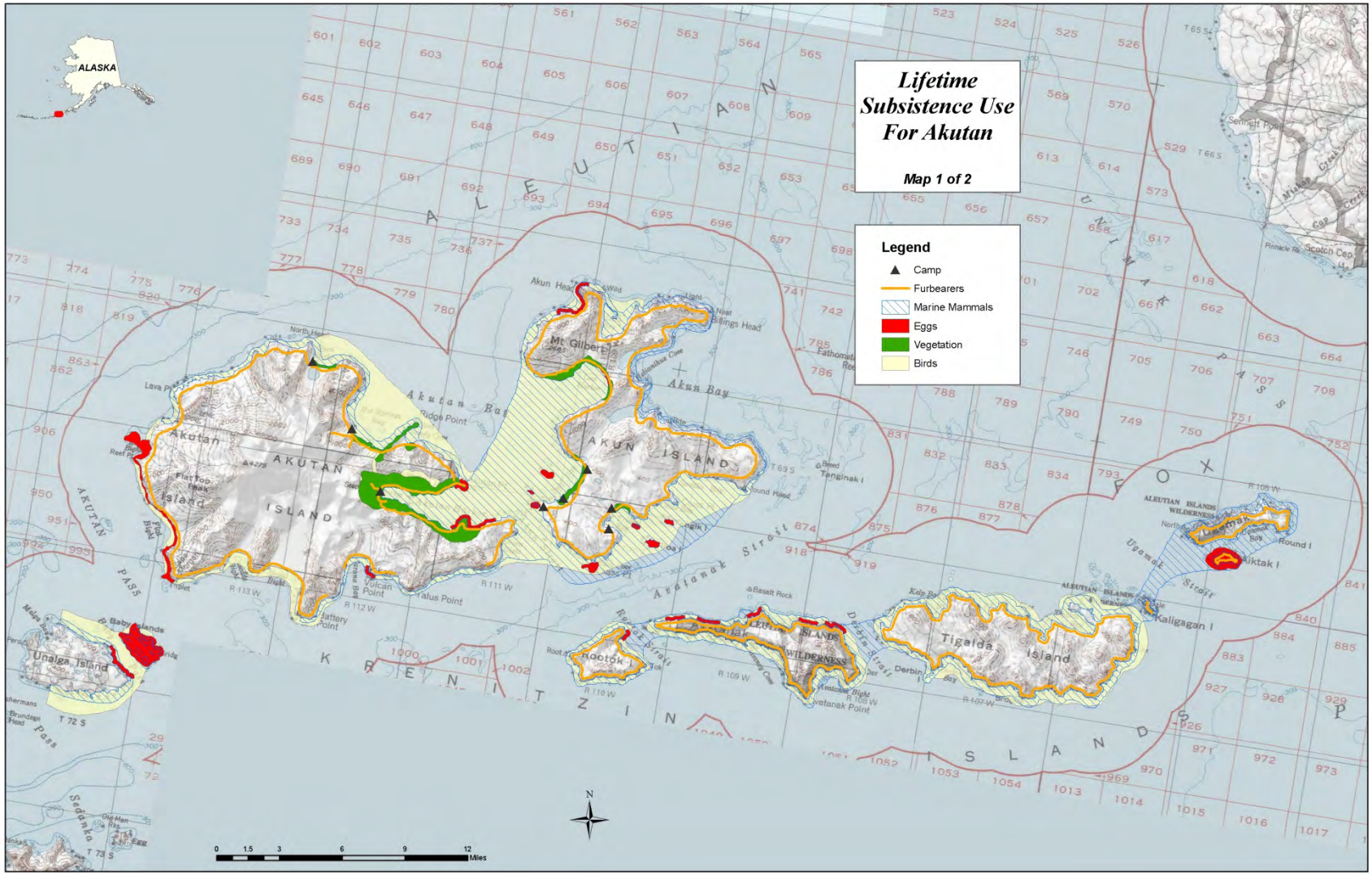
-continued-

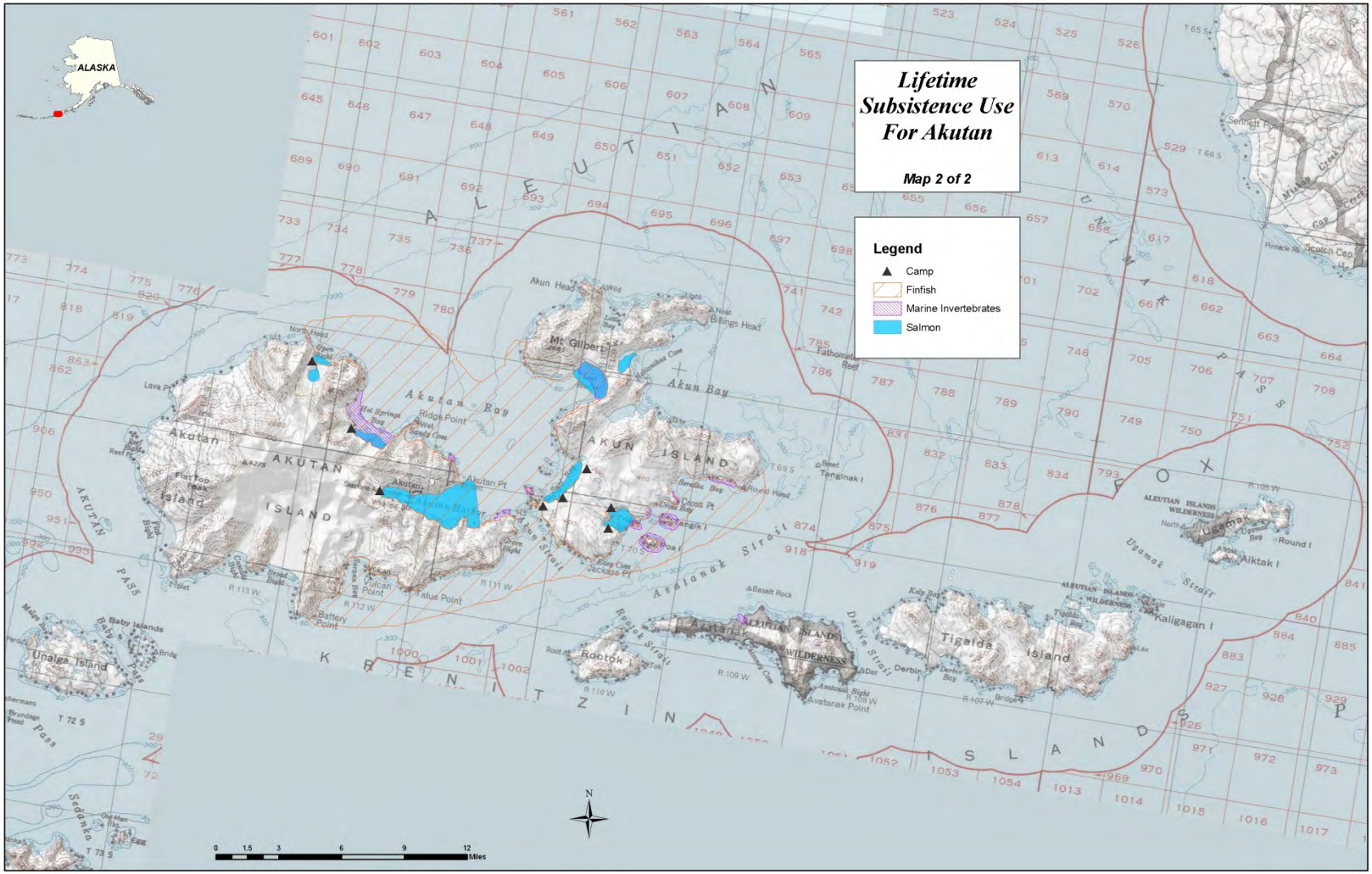
Resource	Unit	Conversion to pounds
Harbor seal	Individual	56
Ribbon seal	Individual	92
Ringed seal	Individual	56
Steller sea lion	Individual	200
Walrus	Individual	560
Bufflehead	Individual	0.40
Canvasback	Individual	1.10
Common eider	Individual	1.60
King eider	Individual	2.67
Gadwall	Individual	0.80
Goldeneye	Individual	0.80
Harlequin	Individual	0.50
Mallard	Individual	1
Merganser	Individual	0.60
Common merganser	Individual	0.60
Red-breasted merganser	Individual	0.90
Long-tailed duck (oldsquaw)	Individual	0.80
Northern pintail	Individual	0.80
Scaup	Individual	0.90
Black scoter	Individual	0.90
Northern shoveler	Individual	0.60
Green-winged teal	Individual	0.30
Wigeon	Individual	0.70
Brant	Individual	1.20
Cacklers	Individual	1.20
Lesser Canada geese (taverner/parvipes)	Individual	1.20
Canada geese	Individual	1.20
Emperor geese	Individual	2.50
Snow geese	Individual	2.30
White-fronted geese	Individual	2.40
Trumpeter swan	Individual	11.21
Tundra swan (whistling)	Individual	6
Sandhill crane	Individual	8.40
Common snipe	Individual	0.10
Kittiwakes	Individual	2.00
Spruce grouse	Individual	0.70
Ptarmigan	Individual	0.70
Duck eggs	Individual	0.15
Geese eggs	Individual	0.30
Swan eggs	Individual	0.30
Common snipe eggs	Individual	0.05
Cormorant eggs	Individual	0.15
Gull eggs	Individual	0.30
Murre eggs	Individual	0.17
Tern eggs	Individual	0.05
Clams	Gallons	3
Razor clams	Gallons	3
Softshell clams	Gallons	3
Cockles	Gallons	3
Dungeness crab	Individual	0.70

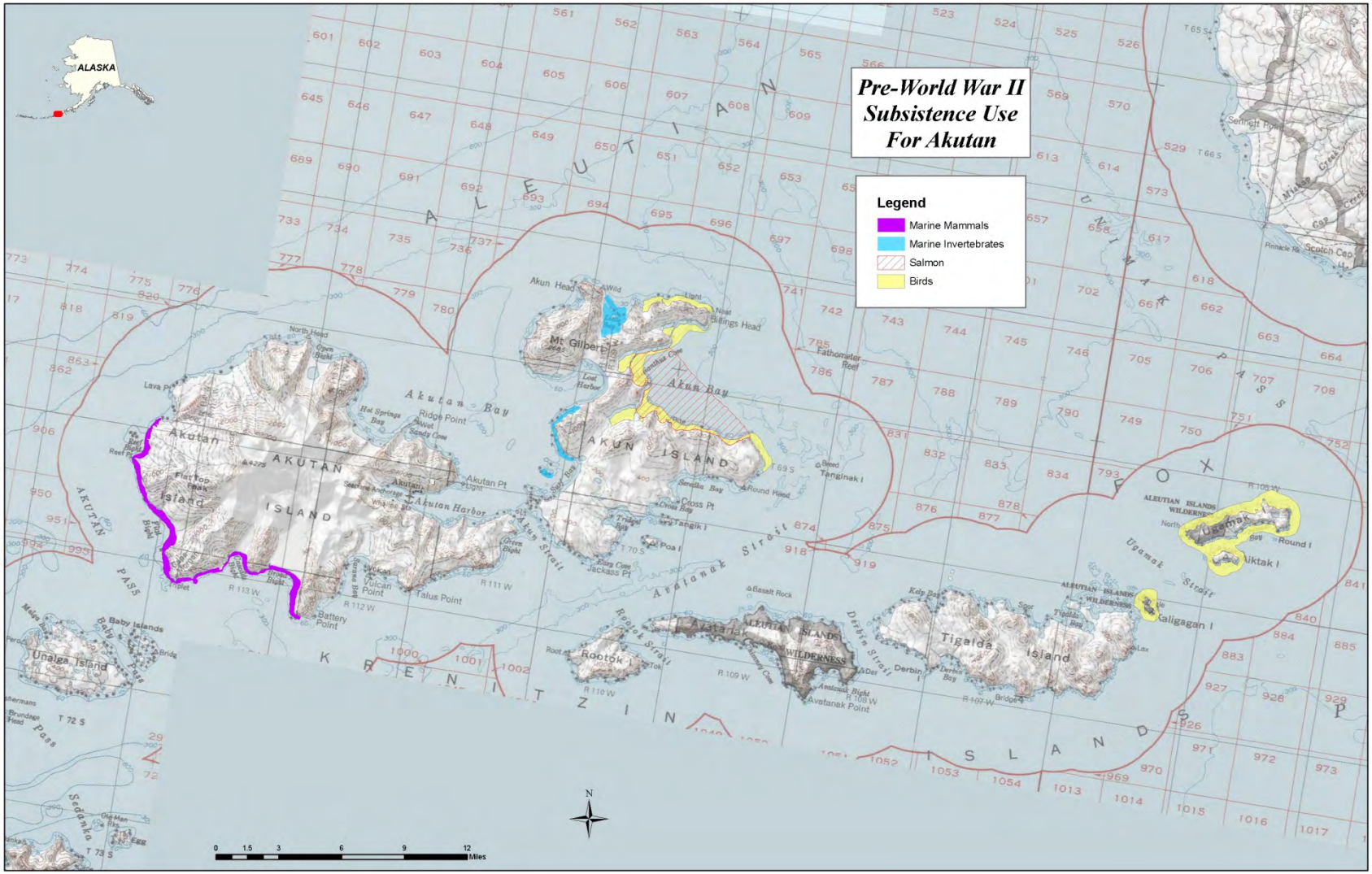
-continued-

Resource	Unit	Conversion to pounds
Red king crab	Individual	1
Tanner crab	Individual	1.60
Blue mussels	Gallons	1.50
Shrimp	Gallons	4
Berries	Gallons	4
Blueberry	Gallons	4
Lowbush cranberry	Gallons	4
Highbush cranberry	Gallons	4
Crowberry	Gallons	4
Huckleberry	Gallons	4
Raspberry	Gallons	4
Salmonberry	Gallons	4
Blackberry	Gallons	4
Other wild berries	Gallons	4
Other beach greens	Gallons	1
Fiddlehead ferns	Gallons	1
Hudson’s Bay tea	Gallons	1
Sourdock	Gallons	1
Cow parsnip (wild celery)	Gallons	1
Other wild greens	Gallons	1
Stinkweed	Gallons	1
Unknown greens from land	Gallons	1
Sea chickweed	Gallons	1
Unknown vegetation	Gallons	1

APPENDIX C: LIFETIME SUBSISTENCE USE MAPS, AKUTAN, 1990


Lifetime Subsistence Use For Akutan
Map 1 of 2
Legend
Camp
Furbearers
Marine Mammals
Eggs
Vegetation
Birds
ALASKA
ALEUTIAN
ISLANDS
Akutan Island
AKUTAN ISLAND
Akun Bay
AKUN ISLAND
Mt Gilbert
Unalga Island
Rootok I
Tigalda Island
Derbin I
Kaligagan I
Aiktak I
Round I
Tanginak I
Akun Head
Akutan Pass
Avatanak Strait
Derbin Strait
Uyamak Strait
Scotch Cap
Sedanka
N
0 1.5 3 6 9 12 Miles


Lifetime Subsistence Use For Akutan
Map 2 of 2
Legend
Camp
Finfish
Marine Invertebrates
Salmon
ALASKA
ALEUTIAN
UNIMAK PASS
FOX
ISLANDS
KRENITZIN
AKUTAN ISLAND
AKUN ISLAND
Akutan Bay
Akun Bay
Akun Strait
Avatanak Strait
Rootok Strait
Derbin Strait
Ugamak Strait
Mt Gilbert
Akutan Pt
Ridge Point
Hot Springs Bay
Vulcan Point
Talus Point
Battery Point
Jackass Pt
Cross Pt
Akun Head
Billings Head
Tanginak I
Avatanak
Rootok
Tigalda Island
Kaligagan I
Ugamak
Aiktak I
Round I
Unalga Island
Baby Islands
Sedanka
Scotch Cap
Semisopochnoi
ALEUTIAN ISLANDS WILDERNESS
N
0 1.5 3 6 9 12 Miles


Pre-World War II Subsistence Use For Akutan
Legend
Marine Mammals
Marine Invertebrates
Salmon
Birds
ALASKA
ALEUTIAN
ISLANDS
Akutan Island
AKUTAN ISLAND
Akutan Bay
Akutan Harbor
AKUN ISLAND
Akun Bay
Akun Strait
Avatanak Strait
Rootok Strait
Derbin Strait
Tigalda Island
Ugamak Strait
Ugamak
Kaligagan I
Unalga Island
Rootok
Avatanak
ALEUTIAN ISLANDS WILDERNESS
Mt. Gilbert
Akun Head
Billings Head
Fathometer Reef
Tanginak I
Round I
Aiktak I
Tanginak I
Poa I
Tanglik I
Cross Pt
Jackass Pt
Akutan Pt
Ridge Point
Hot Springs Bay
Flat Top Mtn
Vulcan Point
Talus Point
Battery Point
Avatanak Point
Derbin I
Bridget
Lava Pt
North Head
Open Bight
Sernett Point
Scotch Cap
Rinnacle Rk
Baby Islands
Sedanka
Egg
Old Man Rks
Brundage Head
Pass
AKUTAN PASS
KRENITZIN ISLANDS
UNIMAK PASS
N
0 1.5 3 6 9 12 Miles