

**Special Publication No. BOG 2013-02**

---

---

**Customary and Traditional Use Worksheet and  
Options for Amounts Reasonably Necessary for  
Subsistence Uses of Grouses in Game Management  
Unit 18**

**Prepared by**

**Hiroko Ikuta and Jeff Park**

**for the January 2014 Kotzebue Board of Game meeting**

---

---

December 2013

Alaska Department of Fish and Game

Division of Subsistence



## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the reports by the Division of Subsistence. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

### 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 <sup>3</sup> /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

*all commonly-accepted abbreviations*  
e.g., Mr., Mrs., AM, PM, etc.

*all commonly-accepted professional titles* e.g., Dr., Ph.D., R.N., etc.

Alaska Administrative Code AAC  
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 use two-letter abbreviations (e.g., AK, WA)

### Measures (fisheries)

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

### Mathematics, statistics

*all standard mathematical signs, symbols and abbreviations*

alternate hypothesis	H <sub>A</sub>
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics (F, t, χ <sup>2</sup> , 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 <sub>2</sub> , etc.
minute (angular)	'
not significant	NS
null hypothesis	H <sub>0</sub>
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

***SPECIAL PUBLICATION NO. BOG 2013-02***

**Customary and Traditional Use Worksheet and Options for Amounts  
Reasonably Necessary for Subsistence Uses of Grouses in Game Management  
Unit 18**

Prepared by

Hiroko Ikuta and Jeff Park  
Alaska Department of Fish and Game, Division of Subsistence, Fairbanks

Alaska Department of Fish and Game  
Division of Subsistence  
1300 College Road, Fairbanks, Alaska 99701-1599

December 2013

The Division of Subsistence Special Publications series was established for the publication of techniques and procedure manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and other documents that do not fit in another publications series of the Division of Subsistence. Most Special Publications are intended for readers generally interested in fisheries, wildlife, and the social sciences; for natural resource technical professionals and managers; and for readers generally interested the subsistence uses of fish and wildlife resources in Alaska.

Special Publications are available through the Alaska Resources Library and Information Services, the Alaska State Library and on the Internet: <http://www.adfg.alaska.gov/sf/publications/>. This publication has undergone editorial and professional review.

*Hiroko Ikuta and Jeff Park  
Alaska Department of Fish and Game, Division of Subsistence,  
1300 College Road, Fairbanks, Alaska, 99701-1551 USA*

*This document should be cited as:*

*Ikuta, H., and J. Park. 2013. Customary and traditional use worksheet and options for amounts reasonably necessary for subsistence uses of grouses in Game Management Unit 18. Alaska Department of Fish and Game Division of Subsistence, Special Publication No .BOG 2013-02, Fairbanks.*

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

**If you believe you have been discriminated against in any program, activity, or facility please write:**

ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK, 99811-5526

U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, MS 2042, Arlington, VA, 22203

Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW, MS 5230, Washington DC 20240

**The department's ADA Coordinator can be reached via phone at the following numbers:**

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648, (Juneau TDD)

907-465-3646, or (FAX) 907-465-6078

**For information on alternative formats and questions on this publication, please contact:**

ADF&G Division of Subsistence at <http://www.adfg.alaska.gov/index.cfm?adfg=contacts.anchorage>.

# TABLE OF CONTENTS

	<b>Page</b>
LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
LIST OF APPENDICES.....	ii
ABSTRACT.....	1
INTRODUCTION.....	1
THE EIGHT CRITERIA.....	1
Criterion 1: Length and Consistency of Use.....	1
Criterion 2: Seasonality.....	2
Criterion 3: Means and Methods of Harvest.....	2
Criterion 4: Geographic Areas.....	2
Criterion 5: Means of Handling, Preparing, Preserving, and Storing.....	2
Criterion 6: Intergenerational Transmission of Knowledge, Skills, Values, and Lore.....	2
Criterion 7: Distribution and Exchange.....	3
Criterion 8: Diversity of Resources in an Area; Economic, Cultural, Social, and Nutritional Elements.....	3
ANS OPTIONS.....	4
REFERENCES CITED.....	7

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1.–Subsistence harvests and uses of grouses in 13 communities in GMU 18, 1998–2012.....	6
2.–Subsistence harvests in GMU 18 communities, by subregion, 2004–2011.....	6

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1.–Map of Game Management Unit 18.....	5

## LIST OF APPENDICES

<b>Appendix</b>	<b>Page</b>
A.–Grouse regulatory history, 1925–2013, in GMU 18.....	8

## ABSTRACT

This report provides a description of the customary and traditional uses of grouses in Game Management Unit (GMU) 18. It also provides options for amounts reasonably necessary for subsistence (ANS) for consideration by the Alaska Board of Game (BOG) should it make a positive customary and traditional use finding for grouses.

Key words: Subsistence, amount necessary for subsistence, customary and traditional uses, Yukon-Kuskokwim Delta, grouse, Board of Game.

## INTRODUCTION

This report has been prepared for the Alaska Board of Game (BOG) for reference when considering Proposal 12, which has implications for subsistence hunting for grouses in Game Management Unit (GMU) 18, during its January 2014 meeting (Figure 1). Under AS 16.05.258(a), the BOG is charged with identifying game populations, or portions of populations, that “are customarily taken or used for subsistence” (a “C&T finding”). If a portion of these populations can be harvested consistent with sustained yield principles, the BOG “shall determine the amount of the harvestable portion that is reasonably necessary for subsistence uses” (AS 16.05.258(b)). This is called the amount reasonably necessary for subsistence, or an “ANS finding.” The proposal provides an opportunity for the BOG and public to determine C&T and ANS findings for grouses in GMU 18.

## THE EIGHT CRITERIA

### CRITERION 1: LENGTH AND CONSISTENCY OF USE

**A long-term consistent pattern of noncommercial taking, use, and reliance on the fish stock or game population that has been established over a reasonable period of time of not less than one generation, excluding interruption by circumstances beyond the user’s control, such as unavailability of the fish or game caused by migratory patterns.**

Grouses have a long history in the diets of Western Alaska residents. According to Division of Subsistence comprehensive surveys, ruffed grouse *Bonasa umbellus*, sharp-tailed grouse *Tympanuchus phasianellus*, and spruce grouse *Falci pennis canadensis* have been harvested for many generations (Brown et al. 2012; Brown et al. 2013; Brown et al. In prep<sup>1</sup>; Fall et al. 2012; Ikuta, Brown, and Koster In prep<sup>2</sup>; Ikuta, Runfola, Koster In prep<sup>3</sup>).

In the Central Yup’ik language, ruffed grouse are called *egelruciyuli* or *elciayuli*, while spruce grouse are *egtuk*. Grouses are easier birds to catch than waterfowl. Today, they remain an important food source in spring and fall. Information about subsistence harvests and uses of grouses in GMU 18 from 1998–2012 is presented in Table 1. In addition, a regulatory history and present hunting regulations for grouses in GMU 18 are presented in Appendix A.

- 
1. Brown, Caroline L., David S. Koster, Alida Trainor, Lisa J. Slayton, Brittany Retherford, Elizabeth Mikow, Hiroko Ikuta, Andrew R. Brenner, and James S. Magdanz. In prep. “Subsistence Harvests in 5 Yukon River Communities, 2010: An Index Approach”. Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. NNN. Hereinafter cited as “Brown et al. In prep.”
  2. Ikuta, Hiroko, Caroline L. Brown, and David S. Koster. In prep. “Subsistence Harvests in 8 Communities in the Kuskokwim and Yukon River Drainages, 2011”. Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. NNN. Hereinafter cited as “Ikuta, Brown, and Koster In prep.”
  3. Ikuta, Hiroko, David M. Runfola, and David S. Koster. In prep. “Bethel Subsistence, 2012: Wild Resource Harvests and Uses, Land Use Patterns, and Subsistence Economy in the Hub Community of the Yukon–Kuskokwim Delta”. Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. NNN. Hereinafter cited as “Ikuta, Runfola, and Koster In prep.”

## **CRITERION 2: SEASONALITY**

**A pattern of taking or use recurring in specific seasons of each year.**

Grouses are available year-round, yet people harvest them primarily in spring and fall. A man who has been living in Bethel since 1996 said, “We’ll shoot a lot of spruce grouse. We’ll shoot them during moose hunting season” (Key respondent, personal communication with Jeff Park, ADF&G Subsistence Resource Specialist, April 8, 2013).

## **CRITERION 3: MEANS AND METHODS OF HARVEST**

**A pattern of taking or use consisting of methods and means of harvest that are characterized by efficiency and economy of effort and cost.**

Historically, people in Western Alaska harvested grouses by using snares, nets, and decoys. Today, instead of using snares and nets, many hunters harvest grouses with shotguns and .22 caliber rifles.

## **CRITERION 4: GEOGRAPHIC AREAS**

**The area in which the noncommercial, long-term, and consistent pattern of taking, use, and reliance upon the fish stock and game population has been established.**

Areas closest to communities are most heavily used, but grouses are harvested opportunistically by hunters or trappers traveling throughout community harvest areas in upland areas.

Ruffed grouse occur naturally throughout most of Interior Alaska in aspen forests in the Yukon, Tanana, and Kuskokwim river valleys. They are most abundant where dense stands of young aspen or birch have become established after a fire or timber harvest. Sharp-tailed grouse can often be found perched high in a spruce tree, or emerging from dense brush along a back road. Spruce grouse inhabit white spruce and paper birch woodlands, and black spruce bogs,<sup>4</sup>

## **CRITERION 5: MEANS OF HANDLING, PREPARING, PRESERVING, AND STORING**

**A means of handling, preparing, preserving, and storing fish or game that has been traditionally used by past generations, but not excluding recent technological advances where appropriate.**

Grouses and their eggs are primarily used as food for human consumption. Now as in the past, most grouses are eaten fresh or frozen for later use. Freezing has been a common preservation technique. Occasionally, a grouse is dried whole. Often grouses are boiled or roasted without being eviscerated. Currently, some people store frozen grouses in electric freezers, but it is not uncommon to store grouses in storm sheds for a few days or weeks at a time prior to consumption.

## **CRITERION 6: INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES, AND LORE**

**A pattern of taking or use that includes the handing down of knowledge of fishing or hunting skills, values, and lore from generation to generation.**

Traditionally, young boys in Western Alaska learned how to hunt by living with other men of the community in the ceremonial men’s house (*qargiq*). Today, the institution of *qargiq* is no longer part of Central Yup’ik daily life. Yet, hunting knowledge is still passed on from grandfather, father, or uncle to

---

4. Alaska Department of Fish and Game. 2013. Small Game Hunting in Alaska: Small Game Species. <http://www.adfg.alaska.gov/index.cfm?adfg=smallgamehunting.species> (Accessed November 25, 2013).

children. A middle-aged man in Bethel said, “They’ve [children] all shot spruce grouse. Even my 7-year-old [daughter], she’ll take a .22 and go knock one down ... Making sure you’ll get some food when you get older” (Key respondent, personal communication with Jeff Park, ADF&G Subsistence Resource Specialist, April 8, 2013).

Yup’ik children are expected to learn by observing experienced hunters—such as fathers, uncles, and grandfathers—who know the hunting equipment and techniques, animal behaviors, anatomy, geography, and weather, and then by participating in the actual tasks with them.

## **CRITERION 7: DISTRIBUTION AND EXCHANGE**

**A pattern of taking, use, and reliance where the harvest effort or products of that harvest are distributed or shared, including customary trade, barter, and gift-giving.**

In every community in Western Alaska where Division of Subsistence has conducted studies, researchers have found extensive sharing and distribution of wild resources (Brown et al. 2012; Brown et al. 2013; Brown et al. In prep; Fall et al. 2012; Ikuta, Brown, and Koster In prep; Ikuta, Runfola, and Koster In prep). Sharing typically involves almost every household in the study samples. Certain resources, such as seal oil, are more commonly shared than others, which is as true in the present as it was in the past. Certain communities are recognized as particularly good sources for certain resources; for example, Lower Yukon River villages are recognized for their higher moose harvests in more recent times.

Some sharing occurs ceremonially: in feasts at Thanksgiving, Christmas, Easter, funerals, or on the occasion of a child’s first kill. Table 1 lists the percentage of households in selected GMU 18 communities using, harvesting, giving, and receiving grouse, and serves to document the extent of sharing of this particular resource from 1998–2012. Every community that reported harvesting grouse also reported giving and receiving this resource. In most communities, households use wild foods harvested by others through sharing networks, so the percentages of households harvesting usually are lower than the percentage of households using wild foods.

In addition, the extra subsistence foods local people produce are usually shared with elderly residents, single mothers with young, dependent children, and young single persons or couples who are just getting started. Sharing subsistence-caught wildlife is a fundamental characteristic of communities that follow a subsistence way of life in the region resources (Brown et al. 2012; Brown et al. 2013; Brown et al. In prep; Fall et al. 2012; Ikuta, Brown, and Koster In prep; Ikuta, Runfola, and Koster In prep).

## **CRITERION 8: DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS**

**A pattern that includes taking, use, and reliance for subsistence purposes upon a wide variety of fish and game resources and that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.**

A number of recent studies have demonstrated that Western Alaskan communities take, use, and rely upon a wide diversity of fish and game resources (Brown et al. 2012; Brown et al. 2013; Brown et al. In prep; Fall et al. 2012; Ikuta, Brown, and Koster In prep; Ikuta, Runfola, and Koster In prep). Documented harvests ranged from 434 lb per capita in Lower Kuskokwim communities to 269 lb per capita in Central Kuskokwim communities in 2009–2013. The typical community harvests approximately 50 different species of plants, fish, and wildlife each year. The mix of species depends upon species availability. For some coastal communities, as much as 80% of the total harvest by weight may come from marine mammals. For other communities, terrestrial mammals, fish, and marine mammals compose approximately equal portions of the total community harvests.

Many people in these communities cannot afford to buy meat or fish, and wild foods are essential to the quality of their diet. The people of GMU 18 use and rely upon virtually all the edible wild game species

available in their region. These households use cash income to purchase fuel oil, electricity, and family goods, including clothing and shelter. They also use cash to purchase equipment used in subsistence activities. However, the amount of cash available in most Western communities is relatively small compared to urban parts of Alaska. According to the U.S. Census Bureau<sup>5</sup>, the median household income is \$52,063 in the Bethel census area and \$39,583 in the Wade Hampton census area, while the median in the state of Alaska is \$69,014. At the same time, imported food costs are very high.

The harvesting of wild foods continues a long cultural tradition for many people—a tradition which continues to evolve in many ways as social, economic, and environmental conditions change.

## ANS OPTIONS

Followings are 4 options for the BOG to consider in making an ANS finding during its January 2014 meeting. The options presented below were developed using harvest data from the survey program of the Alaska Migratory Bird Co-Management Council (AMBCC) (Naves 2010a; Naves 2010b; Naves 2011; Naves 2012). While the data from comprehensive surveys present harvest estimates at the community level (Table 1), the AMBCC program reports harvest estimates at the subregional and regional levels (Table 2).

The AMBCC program is an annual survey program that develops area estimates based on a sample of communities. In the AMBCC program, villages and regions are surveyed on a rotating schedule, which is adjusted yearly according to monitoring priorities and funding availability. Communities in GMU 18 were surveyed in 2004–2007 and 2009–2011.

### **OPTION A: 100–5,100 grouses (all species combined, rounded)**

Option A is based on the low and high range (84–5,094 birds) of the annual estimated harvests in GMU 18, 2004–2007 and 2009–2011.

### **OPTION B: 100–2,900 grouses (all species combined, rounded)**

Option B is plus and minus ( $\pm$ ) one standard deviation around the average annual estimated harvests in GMU 18, 2004–2007 and 2009–2011 (84–2,856 birds). Standard deviation is a measure of variability in the data. Based upon the estimates, repeated sampling should give a result between  $-1$  and  $+1$  standard deviation from the mean 68% of the time. Because the  $(-)$  standard deviation would be less than zero, the lower bound is equal to the lowest harvest year instead.

### **OPTION C: 100–3,900 grouses (all species combined, rounded)**

Option C is based on the high 95% confidence interval value (CI) for the lowest estimated harvest year, to the low 95% CI value for the highest estimated harvest year, GMU 18, 2004–2007 and 2009–2011 (127–3,888 birds).

### **OPTION D: 50–6,300 grouses (all species combined, rounded)**

Option D is based on the low 95% CI value for the lowest estimated harvest year, to the high 95% CI value for the highest estimated harvest year in GMU 18, 2004–2007 and 2009–2011 (42–6,300 birds).

---

5. State & County QuickFacts, U.S. Department of Commerce, U.S. Census Bureau. <http://quickfacts.census.gov/qfd/states/02000.html> (Accessed November 25, 2013).



Figure 1.–Map of Game Management Unit 18.

Table 1.–Subsistence harvests and uses of grouses in 13 communities in GMU 18, 1998–2012.

Community	Study year	Percentage of households					Estimated harvest			95% CI (±)
		Use	Attempting harvest	Harvesting	Receiving	Giving	Per household (lb)	Per capita (lb)	Community (individual)	
Akiachak	1998	30%	30%	30%	5%	11%	1	0.0	146	31%
Akiak	2010	22%	21%	21%	2%	10%	0.7	0.2	94.7	37%
Bethel	2012	4%	3%	3%	1%	1%	0.5	0.1	745	85%
Emmonak	2008	2%	2%	2%	1%	1%	0.2	0.0	36	78%
Kwethluk	1986	unknown	14%	14%	3%	3%	1	0.0	144	unknown
Kwethluk	2010	4%	2%	2%	2%	2%	0	0.0	33.4	126%
Lower Kalskag	2009	44%	41%	38%	10%	14%	2.7	0.7	293	9.9%
Marshall	2009	13%	9%	9%	7%	4%	0.2	0.0	24	71%
Mountain Village	2009	5%	4%	4%	3%	2%	0	0.0	25	62%
Napakiak	2011	0%	0%	0%	0%	0%	0	0.0	0	0%
Napaskiak	2011	4%	4%	4%	0%	0%	0	0.0	3	91%
Oscarville	2010	0%	0%	0%	0%	0%	0	0.0	0	0%
Russian Mission	2011	52%	52%	52%	9%	11%	8.2	1.6	653	32%
Tuluksak	2010	31%	29%	28%	7%	12%	1.4	0.3	170.7	21%
Upper Kalskag	2009	60%	50%	48%	17%	23%	3.8	1.1	325	8.9%

Sources Brown et al. 2012; Brown et al. 2013; Coffing 1991; Coffing et al. 2001; Fall et al. 2012; Ikuta, Brown, and Koster In prep; Ikuta, Runfola, and Koster In prep.

Table 2.–Subsistence harvests in GMU 18 communities, by subregion, 2004–2011.

Subregion	2004	CI (±)	2005	CI (±)	2006	CI (±)	2007	CI (±)	2008	CI (±)	2009	CI (±)	2010	CI (±)	2011	CI (±)
Mid coast	0		0		0		0		0		0		0		0	
North coast	0		0		0		0		0		0		0		0	
Lower Yukon	65	22–108	16	2–30	307	158–456					30	18–43	164	164–164	2,265	1,551–2,979
Lower Kuskokwim	112	29–1,095	200	142–257	624	493–754	116	3–229			54	24–84	391	261–520	2,829	2,337–3,321
Bethel	0		163	0–358	4	1–7	0				0		0		0	
<b>Total</b>	<b>177</b>	<b>51–1,203</b>	<b>379</b>	<b>144–645</b>	<b>935</b>	<b>652–1,217</b>	<b>116</b>	<b>3–229</b>			<b>84</b>	<b>42–127</b>	<b>555</b>	<b>425–684</b>	<b>5,094</b>	<b>3,888–6,300</b>

Sources (Naves 2010a; Naves 2010b; Naves 2011; Naves 2012)

Note The Central Kuskokwim subregion falls outside GMU 18 and was therefore omitted from these calculations.

## REFERENCES CITED

- Brown, Caroline L., James S. Magdanz, David S. Koster, and Nicole S. Braem. 2012. "Subsistence Harvests in 8 Communities in the Central Kuskokwim River Drainage, 2009." Fairbanks: Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 365.
- . 2013. "Subsistence Harvests in 6 Communities in the Kuskokwim River Drainage, 2010." Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 379.
- Coffing, Michael W. 1991. "Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use and the Subsistence Economy of a Lower Kuskokwim River Area Community." Technical paper 157. Juneau: Alaska Department of Fish and Game, Division of Subsistence. <http://www.adfg.alaska.gov/techpap/tp157.pdf>.
- Coffing, Michael W., Louis Brown, Gretchen Jennings, and Charles J. Utermohle. 2001. "The Subsistence Harvest and Use of Wild Resources in Akiachak, Alaska, 1998." Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 258.
- Fall, James A., Caroline L. Brown, Nicole M. Braem, Lisa Hutchinson-Scarborough, David S. Koster, Theodore M. Krieg, and Andrew R. Brenner. 2012. "Subsistence Harvests and Use in Three Bering Sea Communities, 2008: Akutan, Emmonak, and Togiak." Anchorage: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 371.
- Ikuta, Hiroko, Caroline L. Brown, and David S. Koster. In prep. "Subsistence Harvests in 8 Communities in the Kuskokwim and Yukon River Drainages, 2011." Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. NNN.
- Ikuta, Hiroko, David M. Runfola, and David S. Koster. In prep. "Bethel Subsistence, 2012: Wild Resource Harvests and Uses, Land Use Patterns, and Subsistence Economy in the Hub Community of the Yukon–Kuskokwim Delta." Fairbanks: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. NNN.
- Naves, Liliana C. 2010a. "Alaska Migratory Bird Subsistence Harvest Estimates, 2004–2007, Alaska Migratory Bird Co-Management Council." Anchorage: Alaska Department of Fish and Game Division of Subsistence, Technicap Paper No. 349.
- . 2010b. "Alaska Migratory Bird Subsistence Harvest Estimates, 2008, Alaska Migratory Bird Co-Management Council." Anchorage: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 353.
- . 2011. "Alaska Migratory Bird Subsistence Harvest Estimates, 2009, Alaska Migratory Bird Co-Management." Anchorage: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 364.
- . 2012. "Alaska Migratory Bird Subsistence Harvest Estimates, 2010, Alaska Migratory Bird Co-Management Council." Anchorage: Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 376.

## **Appendix A: Grouse Regulatory History, 1925–2013 in GMU 18**

<b>Regulatory year</b>	<b>Season</b>	<b>Total days</b>	<b>Bag limits, areas, and conditions</b>
1925–1932	Sept. 1 – Feb. 28	181	In any one day during the open season 15 grouse in the aggregate of all kinds; but not to exceed 25 in the aggregate of all kinds of grouse and ptarmigan.
1933–1939	Sept. 1 – Feb. 28	181	15 grouse, 25 ptarmigan, a day but not more than 25 in aggregate a day.
1940	Aug. 20 – Jan. 31	165	Grouse 10; ptarmigan 15, but not to exceed 15 in the aggregate of all kind of grouse and ptarmigan a day.
1941–1942	Aug. 20 – Jan.31	165	Grouse 10; ptarmigan 10, but not to exceed 10 in the aggregate of all kind of grouse and ptarmigan a day.
1943	Sept. 1 – Jan. 31	153	Grouse 10; ptarmigan 10, but not to exceed 10 in the aggregate of all kind of grouse and ptarmigan a day.
1944	Fur District 5 Sept. 15 – Feb. 28	167	Grouse 10; ptarmigan 10, but not to exceed 10 in the aggregate of all kind of grouse and ptarmigan a day.
1945–1946	Fur District 5 Sept. 1 – Feb. 28	181	Grouse 10; ptarmigan 10, but not to exceed 10 in the aggregate of all kind of grouse and ptarmigan a day.
1947–1948	Fur District 5 Aug. 20 – Feb. 28	193	Grouse 10; ptarmigan 10, but not to exceed 10 in the aggregate of all kind of grouse and ptarmigan a day.
1949–1951	In the Territory Sept. 1 – Feb. 28	181	10 singly or in the aggregate of all kinds of grouse or ptarmigan in a day.
1952	In the Territory Aug. 20 – Feb. 28	193	10 singly or in the aggregate of all kinds of grouse or ptarmigan in a day.
1953	In the Territory Aug. 20 – April 15	239	10 singly or in the aggregate of all kinds of grouse or ptarmigan in a day.
1954	North of the Alaska Range Aug. 20 – April 15	239	15 a day in the aggregate of all kinds of grouse and ptarmigan, of which not more than 10 shall be grouse.
1955	North of the Alaska Range Aug. 20 – April 15	239	10 grouse a day.
1956–1959	GMU 18 Aug. 20 – April 15	239	10 grouse a day.
1960–1961	GMU 18 Aug. 20 – March 15	208	15 grouse a day.
1962–1964	GMU 18 Aug. 10 – March 15	218	15 grouse a day.
1965–1967	GMU 18 Aug. 20 – March 15	208	15 grouse a day. 30 in possession.
1968–2013	GMU 18 Aug. 10 – April 30	218	15 grouse a day. 30 in possession.