

# Alaska Migratory Bird Subsistence Harvest Estimates, 2009, Alaska Migratory Bird Co-Management Council

Liliana C. Naves



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September 2011

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Alaska Department of Fish and Game  
Division of Subsistence



Alaska Migratory Bird  
Co-Management Council



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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 <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

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

<i>all standard mathematical signs, symbols and abbreviations</i>	
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, $\chi^2$ , 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 <sub>2</sub> , etc.
minute (angular)	'
not significant	NS
null hypothesis	H <sub>O</sub>
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

***TECHNICAL PAPER NO. 364***

**ALASKA MIGRATORY BIRD SUBSISTENCE HARVEST ESTIMATES,  
2009,  
ALASKA MIGRATORY BIRD CO-MANAGEMENT COUNCIL**

by

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*“Subsistence Way of Life is Our Way of Life.*

*Life to us is about living, learning, surviving together in this wild beautiful country we call home. Let us pass our love, knowledge, and understanding of our way of life—from one generation to the next.” Valerie Engebretsen, Nondalton, Alaska.*

Front cover photo: Valerie Engebretsen, her children and nephew prepare mallards and speckled-belly (white-fronted) geese by their fish camp near the village of Nondalton, Alaska, June 2008. Counter clock-wise: Valerie Engebretsen, Geronimo Trefon, nephew Devonte Trefon, Jerome Trefon, and Harley Trefon. Photograph by husband Clyde Trefon used by permission.

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## ABSTRACT

This report presents subsistence harvest estimates of migratory birds and their eggs in Alaska for the data year 2009. Data were gathered through the harvest assessment program of the Alaska Migratory Bird Co-Management Council. This program relies on collaboration among the U.S. Fish and Wildlife Service, the Alaska Department of Fish and Game, and a number of regional Alaska Native organizations. Information obtained by this program is used to evaluate federal subsistence harvest regulations, to document customary and traditional uses of migratory birds in Alaska, and to plan for the continued harvest and conservation of birds. Participation of villages and individual households in the harvest survey is voluntary. The survey covers spring, summer, and fall harvests in most regions. Some regions also have a winter survey. Harvest estimates are based on a stratified multistage clustered sample of villages and households. The sample frame encompasses all households in regions eligible for the subsistence harvest of migratory birds and their eggs in Alaska. Households are the basic sampling unit. Data at the household level are confidential and data at the village level are considered sensitive. Villages with similar harvest patterns are grouped in subregions. Harvests reported by surveyed villages are expanded to nonsurveyed villages in the same subregion. Subregions are grouped into regions, which approximately correspond to the designated migratory bird management regions. Within villages, households are stratified by harvest level. Villages and regions are surveyed on a rotating schedule, which is adjusted yearly according to monitoring priorities and constraints to survey funding. In 2009, the AMBCC harvest survey was conducted in the Yukon-Kuskokwim Delta region, the North Slope region, and the St. Lawrence-Diomedes Islands subregion of the Bering Strait-Norton Sound region.

Key words: Alaska Migratory Bird Co-Management Council, AMBCC, migratory birds, migratory bird eggs, subsistence harvest, subsistence hunting, subsistence harvest estimates, ducks, geese, swans, cranes, ptarmigan, grouse, seabirds, shorebirds, grebes, loons.

## INTRODUCTION

### AMBCC SUBSISTENCE HARVEST ASSESSMENT PROGRAM

In 1918, Canada and the United States ratified the Migratory Bird Treaty Act (the treaty) to protect wild bird populations. The treaty later included agreements with Mexico, Japan, and Russia. The treaty set provisions to protect migratory bird populations, including a yearly hunting season closure from March 10 to September 1. However, this provision failed to provide for the harvest of migratory birds by northern peoples in spring and summer; these harvests have been historically necessary to their subsistence way of life. Despite the closure, customary and traditional hunting of migratory birds in spring and summer continued.

In 1997, the U.S. Congress ratified an amendment to the treaty that legally recognized the traditional spring and summer subsistence harvests of migratory birds by northern peoples. The goal of the amendment was to promote conservation of migratory birds by including subsistence hunting in the regulatory process. This amendment authorized the U.S. Fish and Wildlife Service (USFWS) to open regulated spring and summer subsistence hunts of migratory birds in Alaska. The treaty amendment also mandated that Alaska's indigenous inhabitants play a meaningful role in migratory bird conservation by participating in relevant management bodies. As a result of this direction, the Alaska Migratory Bird Co-Management Council (AMBCC) was formed in 2000. The AMBCC is composed of representatives from the USFWS, Alaska Department of Fish and Game (ADF&G), and regional Alaska Native entities (CFR vol. 65, No. 60, pp. 16405–16409, March 28, 2000). The AMBCC first met in October 2000, at which time they discussed the assessment of spring and summer subsistence harvests, which are important for describing traditional uses of migratory birds and levels of harvest. Harvest monitoring is also necessary to meet the intentions of the amended treaty: 1) subsistence harvests should remain at traditional levels relative to bird population sizes; 2) subsistence harvest data should be integrated with flyway and national harvest management programs; and 3) regulatory processes for all migratory bird hunting should be inclusive to users and responsive to conservation needs. The AMBCC found the available harvest data insufficient to properly address management issues, and formed the Subsistence Harvest Survey Committee (AMBCC-HSC). This group of Alaska agency staff, regional partners, and consultants was charged with designing a statewide migratory bird subsistence harvest survey to assess the amount and composition of subsistence harvests.

A statewide harvest survey protocol (AMBCC 2003) was designed based on the surveys conducted in the context of the goose management plan (Pamplin 1986; Zavaleta 1999) for the Yukon-Kuskokwim Delta (Copp and Roy 1986; Wentworth and Seim 1996; Wentworth 1998, 2004, 2007b), Bristol Bay (Seim and Wentworth 1996; Wentworth 2007a), and Bering Strait (Kawerak Inc. 2004), as well as on elements of the USFWS Migratory Bird Harvest Information Program (HIP), which assesses sport harvests of selected migratory bird species (Bales et al. 2002; Padding et al. 2006; Moore et al. 2007; Raftovich et al. 2010). The AMBCC harvest assessment program relies on collaboration between USFWS, ADF&G, and Alaska Native partners; the program is funded by the USFWS. The AMBCC statewide subsistence harvest survey was to begin with the first open spring–summer subsistence season in 2003, but delays in survey approval and other procedural problems prevented harvest data collection that year, and the survey was first implemented in 2004. However, funding of the survey program has been 40–50% short every year and it is not adjusted for inflation. Consequently, cost-cutting measures have resulted in reduced sampling efforts, village outreach, and training of survey staff, further compounding intrinsic difficulties of doing the survey in the remote areas of Alaska. In 2005, the AMBCC-HSC adopted a regional rotation, and since then only the Yukon-Kuskokwim Delta region has been surveyed yearly. Other regions are surveyed approximately every other year, depending on monitoring priorities and funding constraints. The necessity of reduced, rotating survey coverage has extended the time necessary to detect changes in harvest levels.

The AMBCC and its Harvest Survey Committee recognize the need to conduct an effective survey that provides accurate and timely harvest information in order to meet treaty obligations, to protect subsistence harvest traditions, and to sustain migratory bird populations. In 2007, the AMBCC-HSC asked the ADF&G Division of Subsistence to assess the performance of the original survey design as well as implementation challenges. Based on the survey assessment report (Naves et al. 2008), the AMBCC-HSC evaluated problems, considered technical improvements to the survey methods, and collaboratively reformulated an operational plan. The revised survey methods were first implemented to collect 2010 harvest information. The 2009 harvest information to which this report refers was collected following the original survey methods (AMBCC 2003; Wentworth 2006).

This report is the third in a series of yearly reports presenting regional and subregional harvest estimates for birds and bird eggs based on data collected by the AMBCC harvest assessment program. Harvest estimates for 2004 to 2007 were reported by Naves (2010a) and harvest estimates for 2008 were reported by Naves (2010b). In 2009, the AMBCC harvest survey was conducted in the Yukon-Kuskokwim Delta region, the North Slope region, and the St. Lawrence-Diomedes Islands subregion of the Bering Strait-Norton Sound region.

## **AMBCC MEMBER ORGANIZATIONS**

The Alaska Migratory Bird Co-Management Council is composed of representatives from:

- U.S. Fish and Wildlife Service;
- Alaska Department of Fish and Game;
- Chugach Regional Resources Commission;
- Sun'aq Tribe of Kodiak;
- Aleutian-Pribilof Islands Association;
- Bristol Bay Native Association;
- Association of Village Council Presidents;
- Kawerak Inc.;
- Maniilaq Association;
- North Slope Borough;
- Tanana Chiefs Conference;
- Copper River Native Association; and
- Southeast Inter-Tribal Fish and Wildlife Commission.

## **USES OF THE INFORMATION OF THE SUBSISTENCE HARVEST SURVEY**

Harvest estimates from the subsistence harvest survey are available to Alaska rural communities (hereinafter referred to as “villages”), Alaska Native organizations, state and federal resource management and conservation agencies, the Pacific Flyway Council, and the general public. Data at the household level are confidential and data at the village level are considered sensitive. Preliminary harvest estimates based on survey data are submitted to Alaska Native regional partners for review before being adopted by the AMBCC in its yearly spring meeting. Information from the survey is not to be used for punitive enforcement purposes, nor has this been reported to have happened. Survey data are used to:

- Document the importance of customary and traditional uses of migratory birds by Alaska rural villages so that subsistence uses will be protected and conducted in a sustainable manner;
- Document subsistence harvest trends and track changes in harvests;
- Assist the USFWS in the evaluation of spring–summer migratory bird harvest regulations; and
- Assist in the development of management plans by state and federal agencies.

# METHODS

## DATA COLLECTION

### Overall Survey Design

#### *Sampling Strategy*

The subsistence harvest survey covers 193 rural villages (Appendix A) within the regions eligible to participate in the subsistence harvest of migratory birds in Alaska (50 CFR, Part 92, Subpart 92.5). According to the Alaska Department of Labor and Workforce Development's 2009 population estimates, these villages have a total population of 88,587 people living in 25,390 households (ADLWD 2009). A census survey to evaluate the subsistence harvests of migratory birds within eligible regions would be impractical and cost-prohibitive. Thus, sampling of regions, villages, and households is the basis for the calculation of harvest estimates.

The subsistence harvest survey employs a stratified multistage clustered sampling method where each sampling stage refers to specific sampling units (Cochran 1977:274; Bernard et al. 1998). There are 4 sampling stages in the subsistence harvest survey: 1) the subregions sampled in a region, 2) the villages sampled in a subregion, 3) the harvest level strata sampled in a village, and 4) the households sampled in each harvest level stratum. The number of villages and households varies among subregions. Each step in the calculation of harvest estimates and variances is weighted by the number of households in the respective sampling stage:

- First stage: total number of households in the sampled subregions;
- Second stage: total number of households in the sampled villages;
- Third stage: total number of households in the sampled harvest level strata;
- Fourth stage: number of households sampled in each stratum.

#### *Sampling Frame*

The household is the basic sampling unit. The sampling frame encompasses all yearlong resident households in regions eligible for the subsistence harvest of migratory birds and their eggs in Alaska. In the surveyed villages, data collection relies on a village household list that includes all resident households. A household is considered resident if its members live in the village year-round and have lived in the village for the 12 previous months. The list of resident households also does not include unoccupied dwellings, commercial buildings, and public buildings. In the nonsurveyed villages, the number of households is calculated based on yearly population estimates from the Alaska Department of Labor and Workforce Development and the number of people per household reported in the 2000 census (U.S. Census Bureau 2001).

#### *Precision Goal*

The precision goal of the subsistence harvest survey is based on the precision goal of the HIP sport hunting monitoring program—95% confidence intervals within 10–20% of the estimated harvest (Bales et al. 2002:70). However, there are difficulties in comparing confidence intervals from these 2 surveys: 1) HIP currently does not report confidence intervals for harvest estimates of individual species, 2) some species harvested for subsistence uses are not included in the HIP survey, 3) different sport and subsistence hunting patterns may have different effects on the precision of harvest estimates, and 4) subsistence harvest estimates are currently available at the regional and subregional levels whereas sport hunting estimates are available at the state level.

The subsistence harvest survey covers a large geographic area and a large number of species. Some species are abundant and harvested in large numbers. Other species are harvested only occasionally

because they have small populations or restricted distribution, or are not widely used for subsistence purposes. Wide-coverage harvest assessment programs cannot address both commonly- and rarely-harvested species with the same level of precision (Copp and Roy 1986:11, H-15). Few data points for species rarely harvested may result in less accurate harvest estimates and wider confidence intervals as compared to species commonly harvested. After the publication of the first spring–summer subsistence harvest regulations in 2003, the public, biologists, and resource managers expressed strong interest in subsistence harvests of nongame bird species, which are sometimes harvested, although in relatively low numbers. Dedicated harvest surveys are required to determine the harvests of species that have small populations, low densities, or limited distributions, and that are less likely to be precisely documented in the statewide subsistence harvest survey.

## **Regions, Subregions, and Villages**

Villages with similar harvest patterns are grouped into subregions. The reported harvests from surveyed villages are expanded to nonsurveyed villages in the same subregion. The subregions are grouped into regions, which approximately correspond to the 12 designated migratory bird management regions (CFR vol. 68, No. 139, pp. 43010–43030, July 21, 2003). The survey covers 10 of these 12 regions—the Gulf of Alaska and Cook Inlet regions were combined because of their small numbers of eligible villages (Figure 2), and the Southeast Alaska region has not been surveyed because of a lack of regional partnerships for data collection and because only a few villages are eligible for the harvest of eggs (Figure 11, Appendix A). Regional hub villages (Kodiak, Unalaska, Dillingham, Bethel, Nome, Kotzebue, Barrow, and Tok) are considered as subregions composed of only 1 village because these larger villages likely have harvest patterns that differ from those of smaller villages (e.g., fewer harvesters and lower harvests per household). The original survey protocol listed 32 subregions within 10 regions (Wentworth 2006). Subregions in the Bristol Bay and Interior Alaska regions were revised by the AMBCC Harvest Survey Committee in 2009, which resulted in a total of 29 subregions (figures 2–11, Appendix A). Data analysis for 2004–2009 was based on the revised configuration of subregions (present report; Naves 2010a, 2010b).

### ***Rotation of Regions and Villages***

Rotation of regions based on monitoring priorities has been implemented as a cost reduction measure (Table 1). The rotation of villages calls for surveying two-thirds of the villages in each surveyed region each year (Reynolds 2007). Regional hub villages (Kodiak, Unalaska, Dillingham, Bethel, Nome, Kotzebue, Barrow, and Tok) are to be surveyed each year that their region is surveyed because hubs usually account for a significant proportion of households in a region. The standard rotation schedule is adjusted on a yearly basis to respond to:

- monitoring priorities;
- funding constrains;
- village consent to conduct the survey; and
- fieldwork logistics in remote areas of Alaska (e.g., weather, communication, costs, local partnerships in place for data collection, etc.)

In 2009, the AMBCC harvest survey was conducted in the Yukon-Kuskokwim Delta region, the North Slope region, and the St. Lawrence-Diomedes Islands subregion of the Bering Strait-Norton Sound region. The following organizations participated in the 2009 data collection:

- Yukon-Kuskokwim Delta region: Yukon Delta National Wildlife Refuge and Togiak National Wildlife Refuge;
- North Slope region: North Slope Borough, Department of Wildlife Management;



- Bering Strait-Norton Sound region: Kawerak Inc.

Table 1.–Regions surveyed in 2004–2009.

Regions	2004	2005	2006	2007	2008	2009
Gulf of Alaska-Cook Inlet	•	•	•			
Kodiak Archipelago			•			
Aleutian-Pribilof Islands		•		•	•	
Bristol Bay	•	•	•	•	•	
Yukon-Kuskokwim Delta	•	•	•	•	•	•
Bering Strait-Norton Sound	•	•		•		•
Northwest Arctic			•			
North Slope		•		•	•	•
Interior Alaska	•	•	•	•	•	
Upper Copper River	•			•		
Southeast Alaska						

Source Survey results for 2004–2007 were reported in Naves 2010a and for 2008 in Naves 2010b.

## Confidentiality Standards

From a harvester’s perspective, subsistence harvest surveys collect information that commonly is confidential and sensitive. Households usually consider their subsistence harvests a private matter. The subsistence bird harvest is a particularly sensitive topic because it was illegal until very recently (the MBTA was amended in 1997 and the first legal harvest season was in 2003). In addition, users of subsistence resources fear that information provided in harvest surveys may be used to control and limit subsistence harvest practices that are essential for their diet, culture, and society. To meet the survey objectives, it has been absolutely necessary to develop and maintain trust and collaboration among the local residents and organizations and the resource management agencies. As part of these efforts, the following standards for data collection, management, and release have been defined by the AMBCC and its Harvest Survey Committee:

- Participation in the AMBCC survey is voluntary at the village and the household level.
- Data are reported at the regional and subregional levels. Data at the village level are considered sensitive and data at the household level are confidential. Hub villages are an exception because they are a subregion composed of a single village.
- Although village household lists are necessary to correctly conduct surveys, household names are not used in harvest report forms and are not entered in the database (a numeric household ID is used). Before archiving of survey forms, names on household lists are covered, the lists (not showing names) are photocopied, and the original lists are destroyed.
- The raw data stored in the database and the scanned original survey forms are archived by the ADF&G Division of Subsistence following its confidentiality standards. Formal requests of access to raw data are considered on a case-by-case basis by the AMBCC executive director and are subject to confidentiality standards of the ADF&G Division of Subsistence.

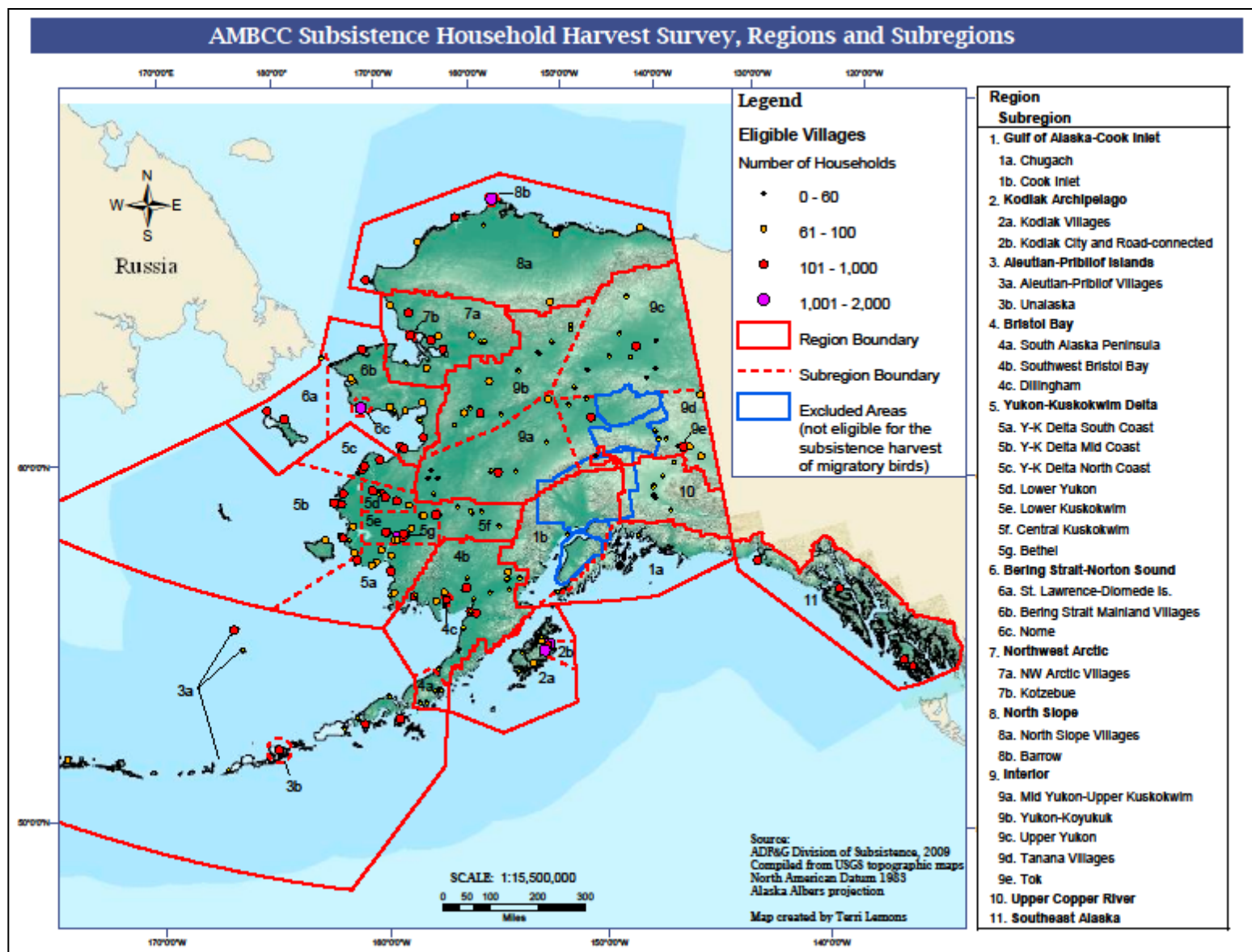


Figure 1.—Regions and subregions of the AMBCC migratory bird subsistence harvest survey.

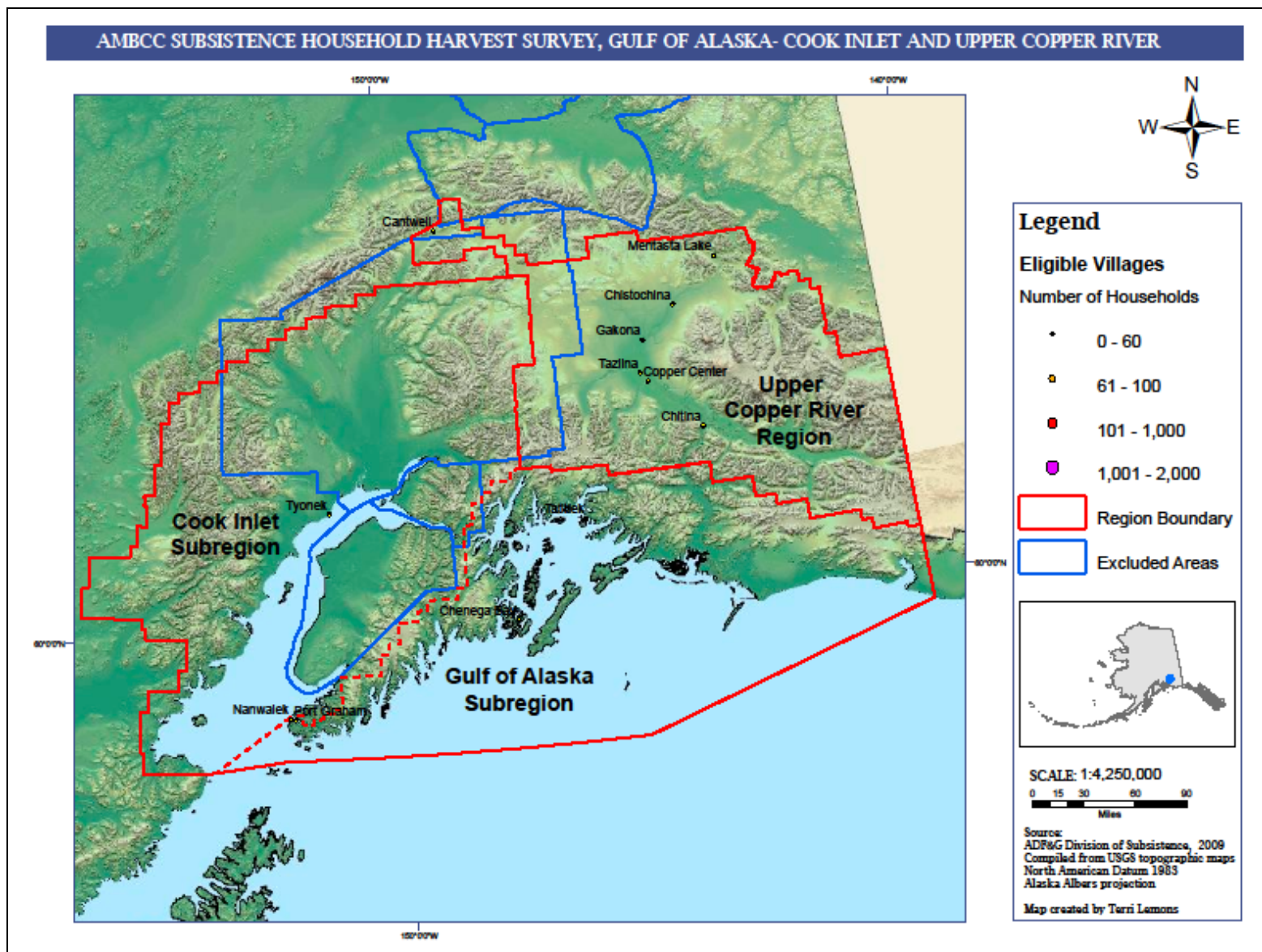
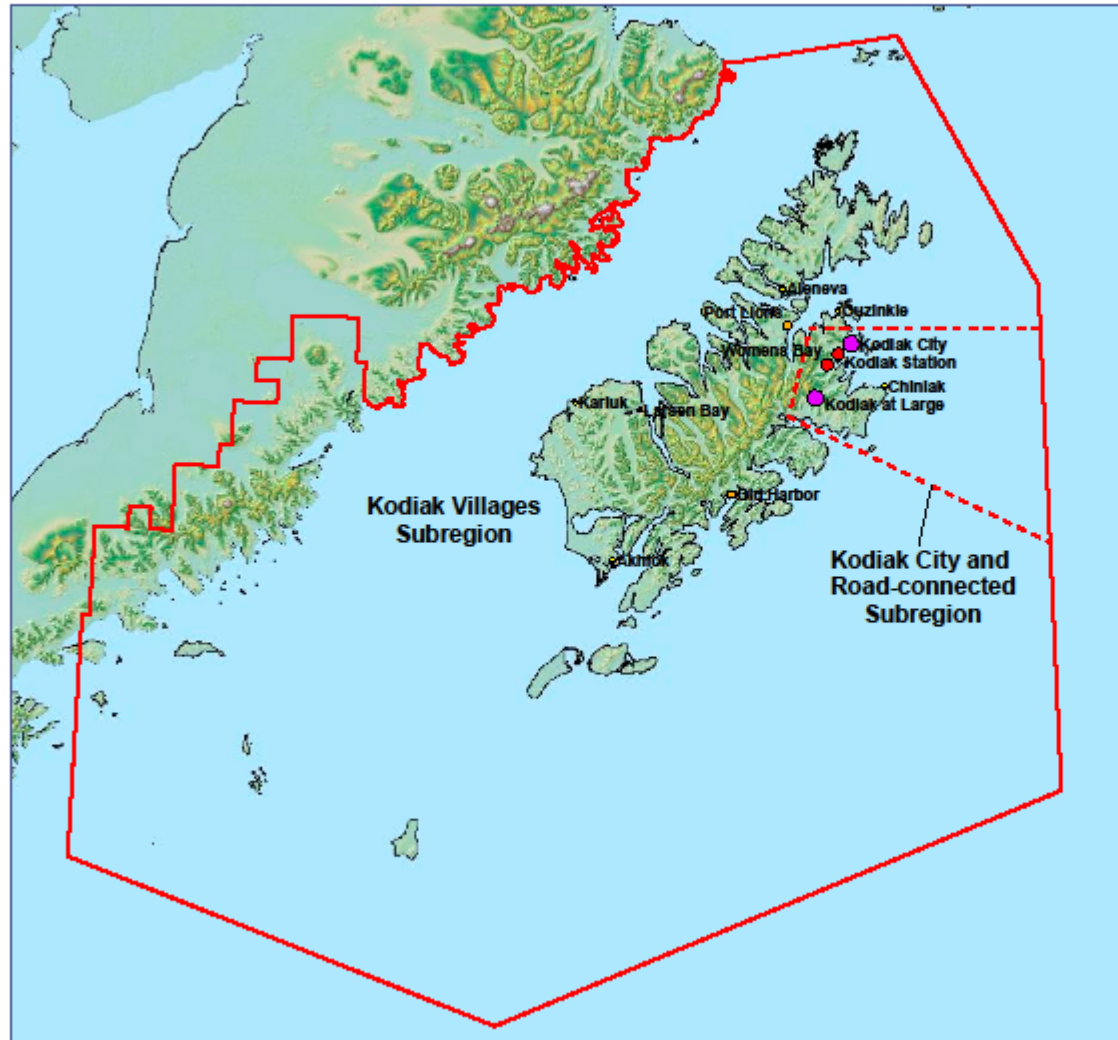


Figure 2.—Gulf of Alaska-Cook Inlet and Upper Copper River regions.

AMBCC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, KODIAK ARCHIPELAGO



**Legend**

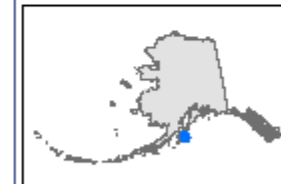
**Eligible Villages**

Number of Households

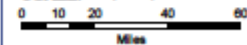
- 0 - 60
- 61 - 100
- 101 - 1,000
- 1,001 - 2,000

Region Boundary

Subregion Boundary



SCALE: 1:2,500,000



Source:  
ADP&G Division of Subsistence, 2009  
Compiled from USGS topographic maps  
North American Datum 1983  
Alaska Albers projection

Map created by Terri Lemons

Figure 3.—Kodiak Archipelago region.

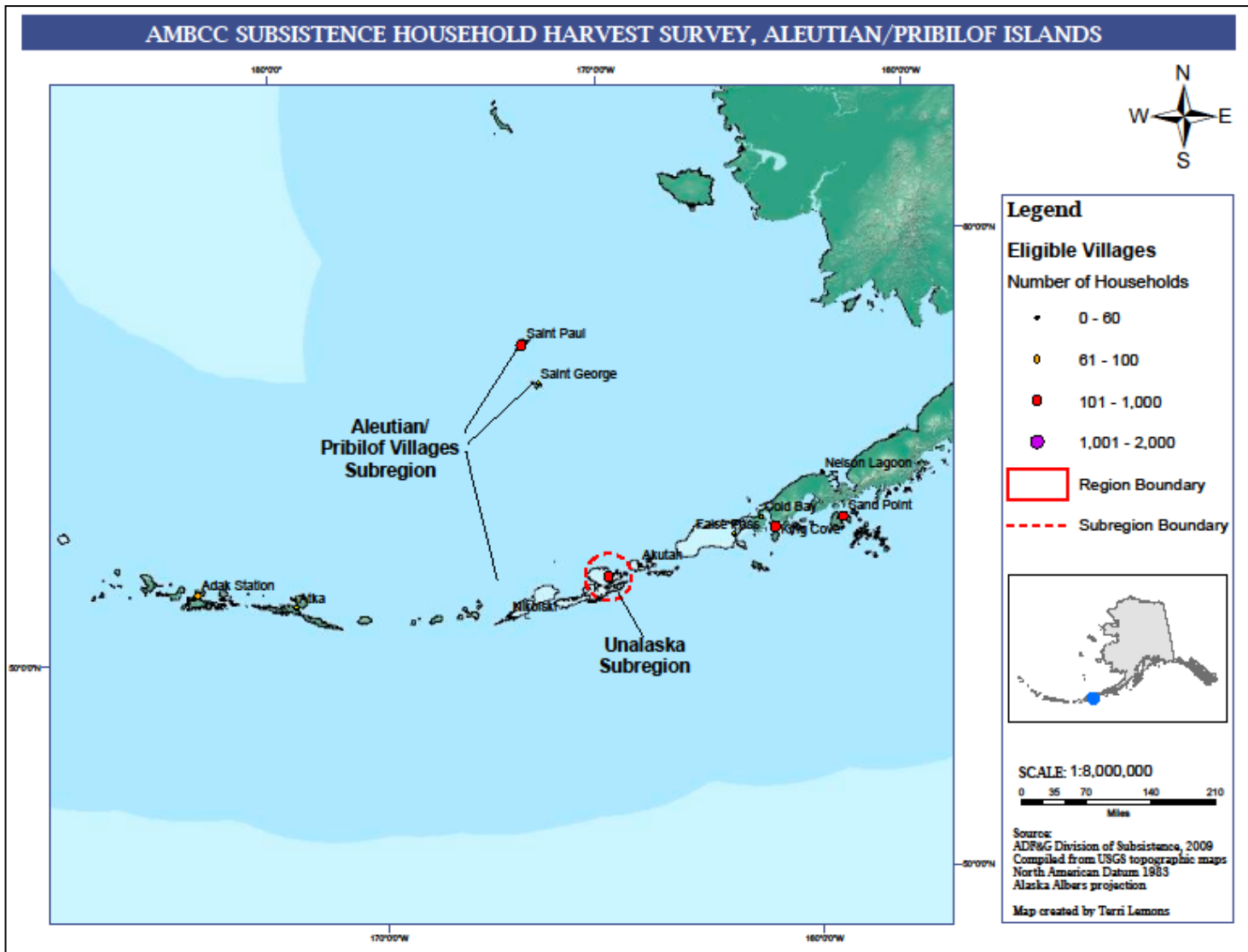


Figure 4.—Aleutian-Pribilof Islands region.

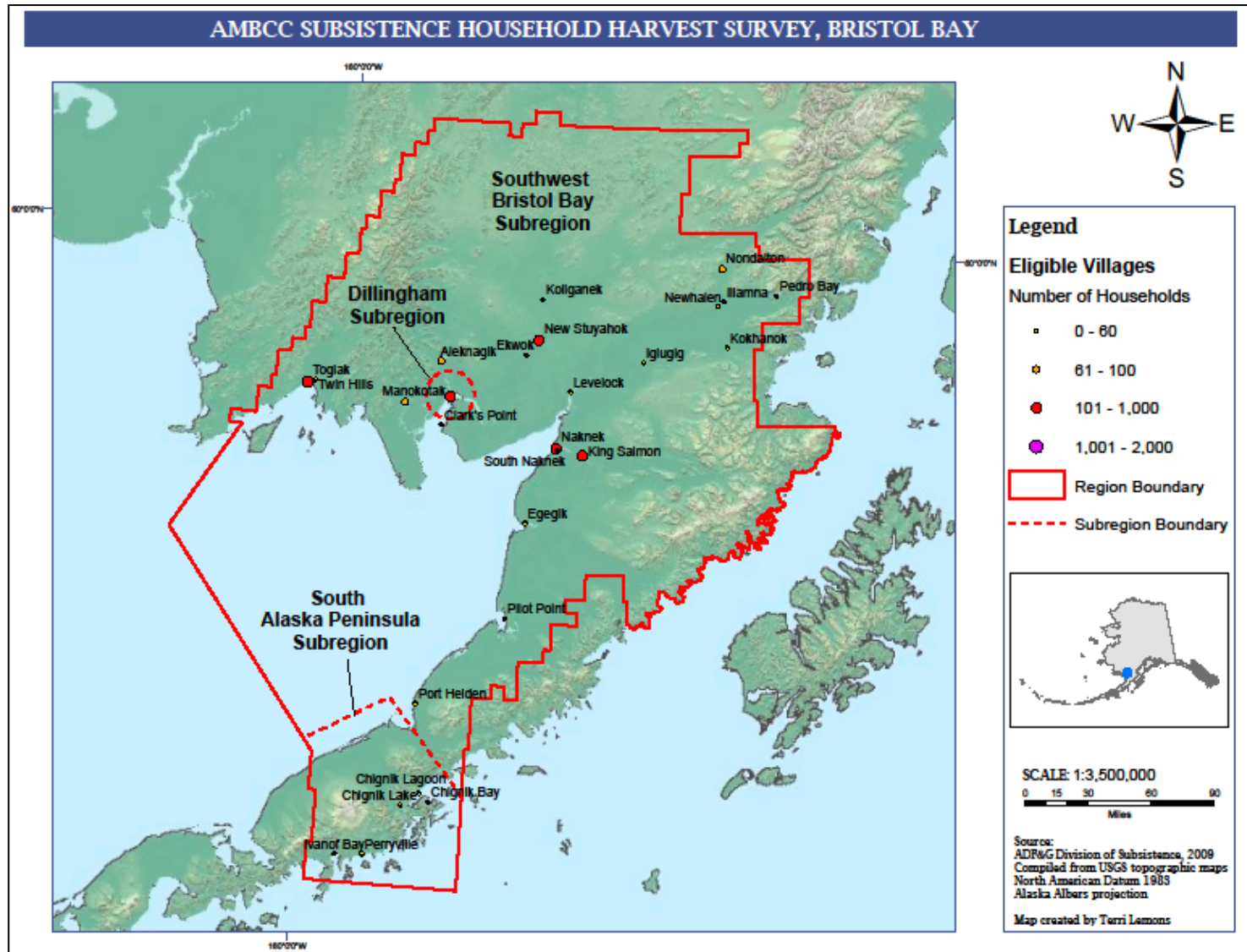


Figure 5.—Bristol Bay region.

AMBCC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, YUKON- KUSKOKWIM DELTA

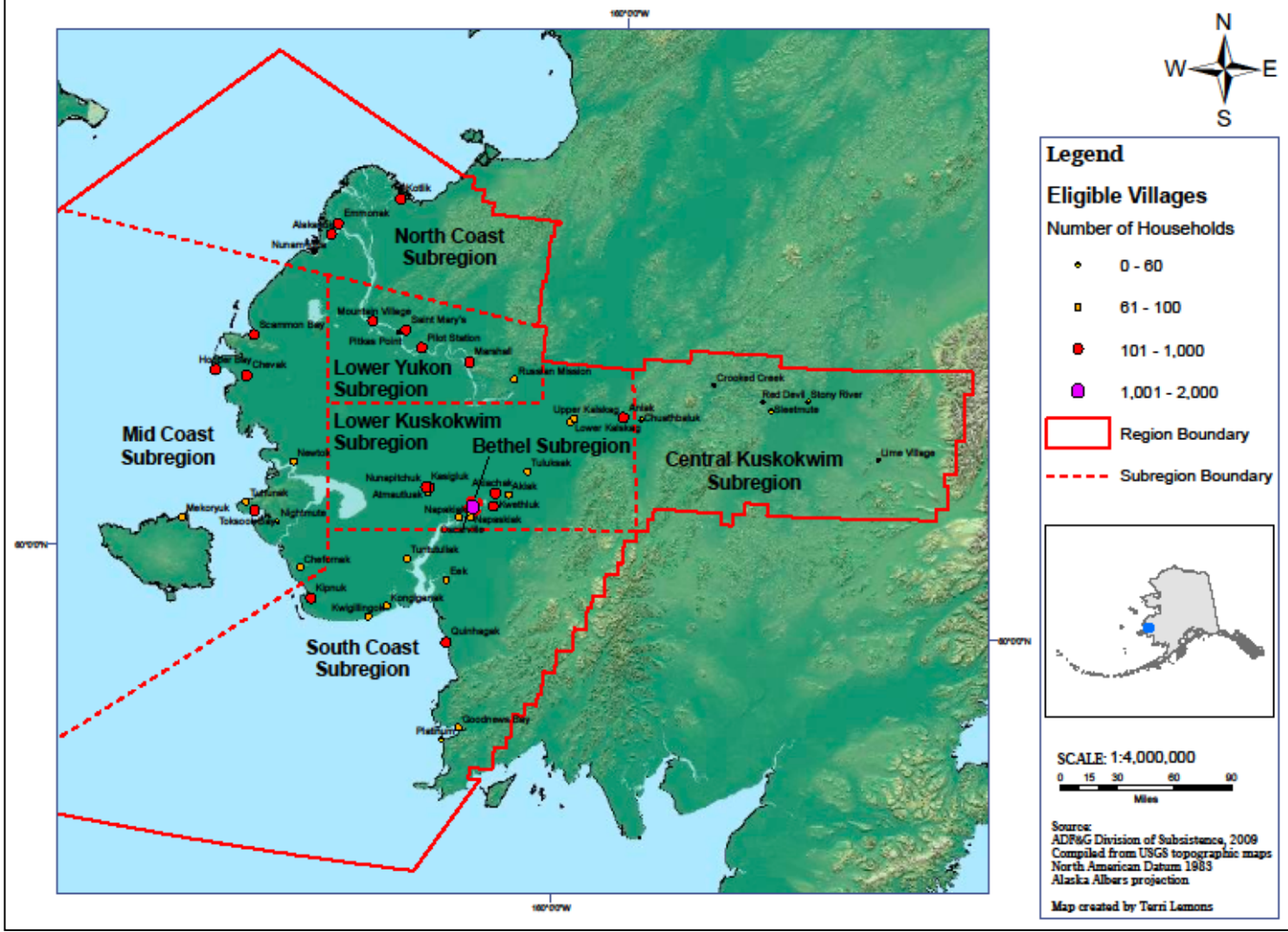


Figure 6.—Yukon-Kuskokwim Delta region.

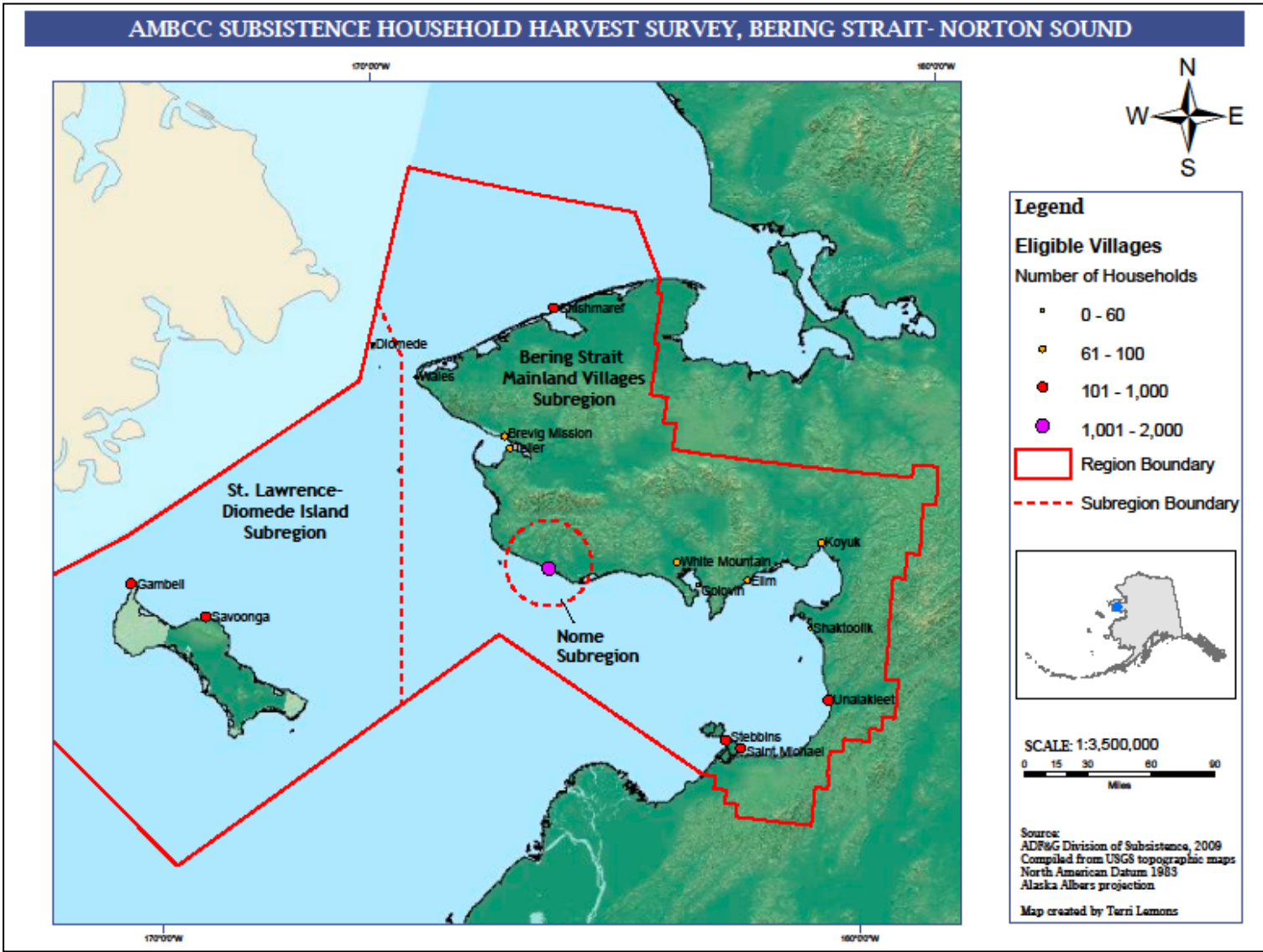
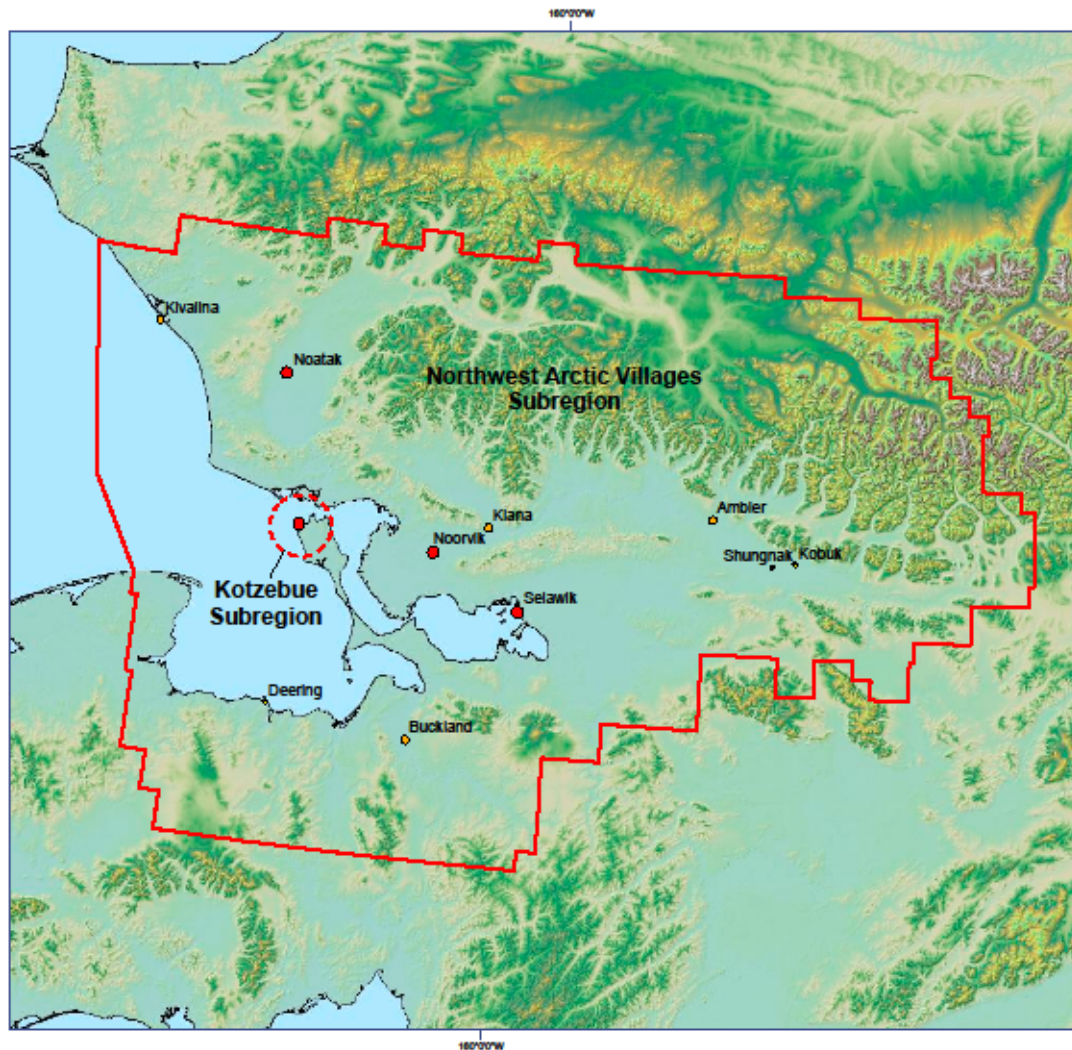


Figure 7.—Bering Strait-Norton Sound region.



AMBCC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, NORTHWEST ARCTIC



**Legend**

**Eligible Villages**

**Number of Households**

- 0 - 60
- 61 - 100
- 101 - 1,000
- 1,001 - 2,000

Region Boundary

Subregion Boundary



SCALE: 1:2,750,000



Source:  
ADFG Division of Subsistence, 2009  
Compiled from USGS topographic maps  
North American Datum 1983  
Alaska Albers projection

Map created by Terri Lemons

Figure 8.—Northwest Arctic region.

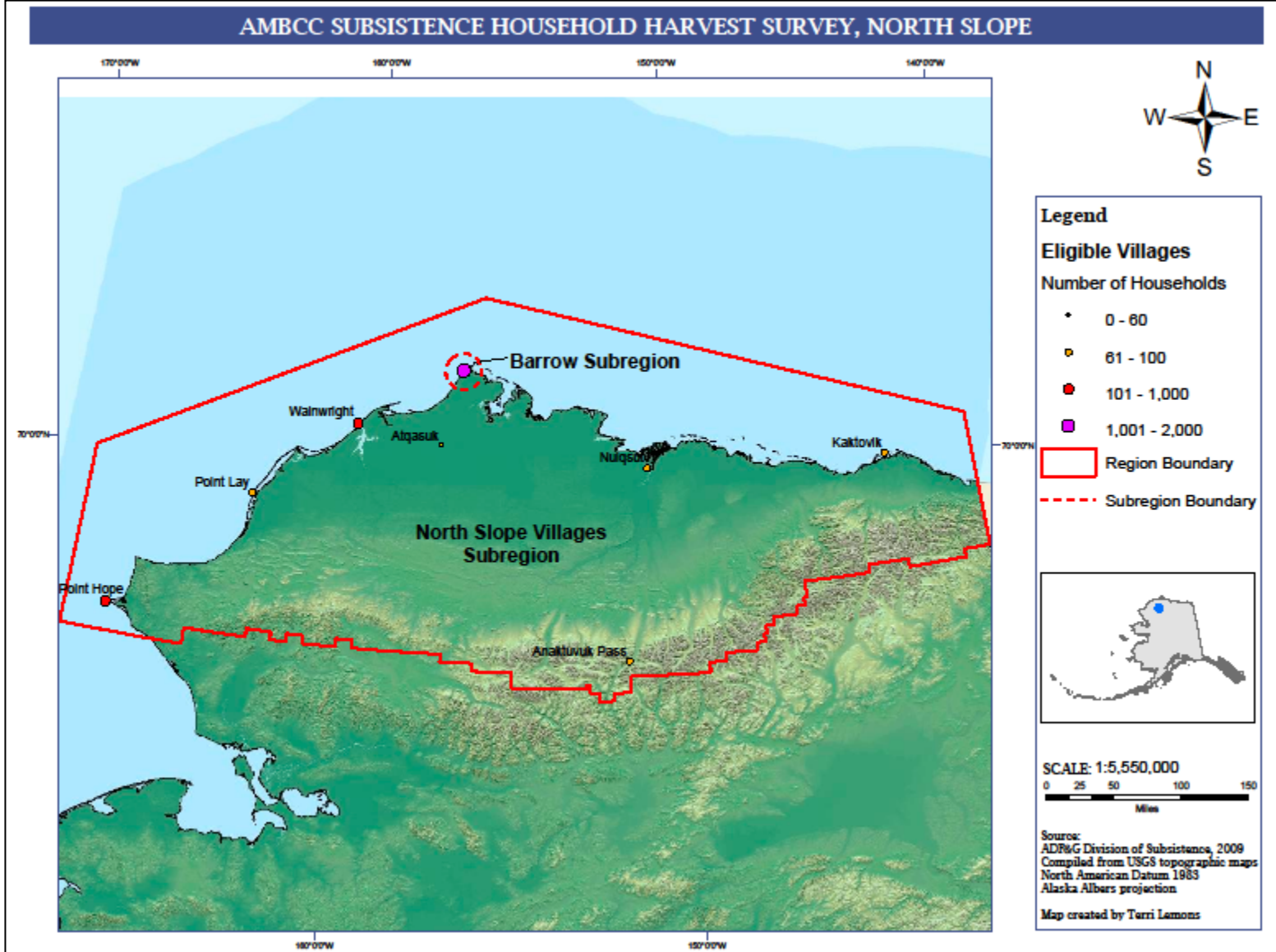


Figure 9.—North Slope region.

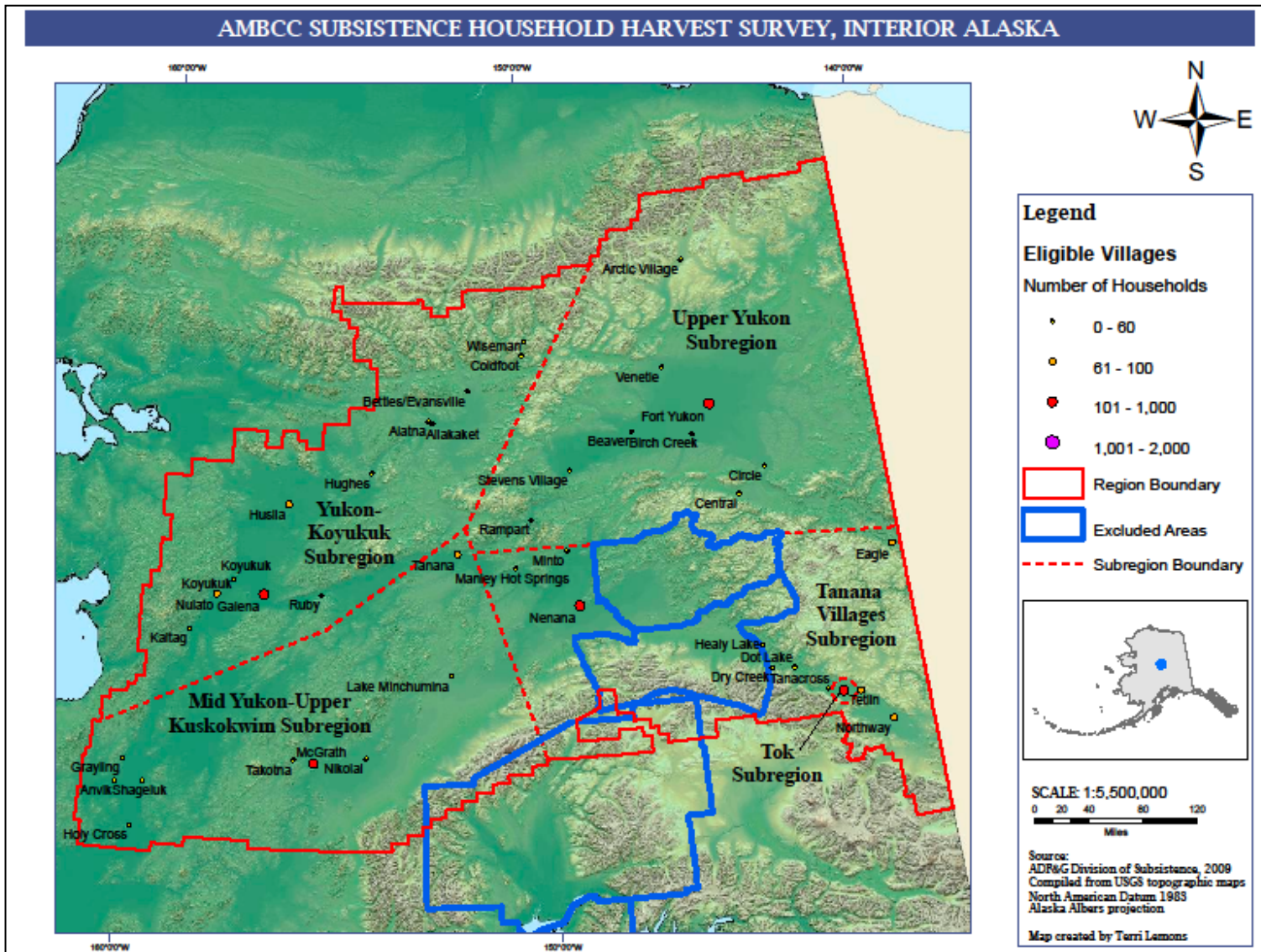


Figure 10.—Interior Alaska region.

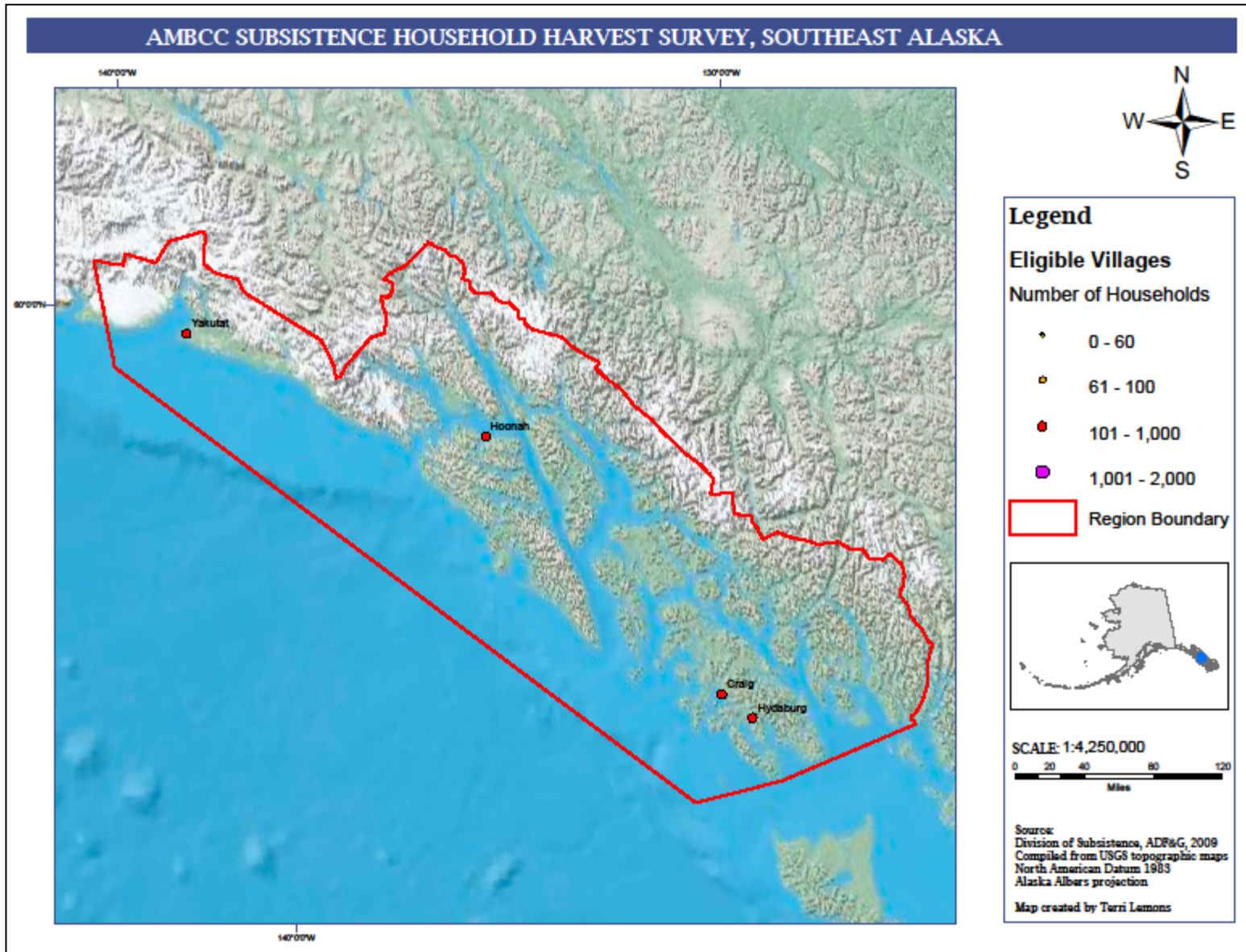


Figure 11.–Southeast Alaska region.

## **Sampling Methods**

The original survey design called for a 3-harvest-level stratification (“none, low, high”) of households within a village and the evaluation of this sampling method once sufficient statewide data were accumulated (AMBCC 2003; Wentworth 2006). Villages surveyed across the state vary in size from a few households to about 2,000 households. This variation in village size led to the application of other sampling methods (Naves et al. 2008). Data collection in the 2004–2009 survey sometimes deviated from the original sampling design by varying degrees, largely as a result of budget constraints and operational difficulties (Naves et al. 2008; Naves 2010a, 2010b).

### ***“None, Low, High” Stratification***

At the beginning of each survey, the surveyor lists all resident households in the village and classifies them, according to their general harvest patterns of previous years, into 1 of 3 harvest level strata: “none” (0 birds), “low” (1–10 birds), and “high” (10+ birds). The surveyor then draws a random sample from each harvest level so that 10% of “none,” 15% of “low,” and 40% of “high” households are sampled. Stratification based on each household’s harvest pattern of previous years naturally results in a degree of misclassification of households into incorrect strata (Naves et al. 2008).

### ***Census: 100% Sampling***

In small villages (up to about 40 households), sampling by census (100% sampling) is usually attempted because implementing the 3-level stratification and its stratum-specific sampling proportions with a small total number of households usually results in sample sizes that are too small and may lead to a biased sample (e.g., if only harvesters or only nonharvesters are represented in the sample).

### ***Simple Random Sampling***

Random selection without harvest level stratification is occasionally used. Also, sampling is treated as a simple random sampling if a census is attempted but some households cannot be contacted or decline to participate.

### ***“Harvester, Other” Stratification***

In some cases, expansion of reported harvests is based on a 2-level (“harvester, other”) stratification where “harvester” includes all harvester households (“low” and “high” strata in 3-level stratification) and “other” includes nonharvester households (“none” stratum) as well as nonlisted households or households with unknown harvest patterns. Three-level stratification of “none, low, high” is difficult to implement in large villages because 1) surveyors frequently do not know the general harvest patterns of all households, 2) large rural villages frequently have large population turnover, and 3) household lists for large villages often do not include all resident households. It is difficult and costly to keep updated household lists of large villages. In the case of an incomplete household list, it would be inappropriate to assume that sampling of large villages approached a simple random sampling. Most likely, the households included in the household list were harvesters as opposed to nonharvesters, because field coordinator and surveyor training emphasized the importance of surveying a higher proportion of high harvesters (Wentworth 2006) and local field staff considers it important to survey harvesters. Also, locally hired surveyors are more likely to be familiar with Alaska Native households, which may include higher proportions of harvesters when compared to households of other ethnicities. Because of these difficulties, at the AMBCC 2008 spring meeting, field coordinators adopted the “harvester, other” stratification to sample large villages. Starting in 2009, field coordinator training focused on the need to survey both harvesters and other households as defined in the sampling design. Survey training emphasizes that both harvester and other households are to be sampled and that the sample includes a higher proportion of harvester households.

## **Survey Year and Seasons**

Although dates for the open hunting seasons may vary among regions and between years according to the yearly harvest regulations, for purposes of this survey, the survey year is April 1 through October 31 in most regions, except in Southern Coastal Alaska (Gulf of Alaska-Cook Inlet, Kodiak Archipelago, Aleutian-Pribilof Islands, and the South Alaska Peninsula of Bristol Bay), where the survey year ends on March 9. The survey year is divided into 3 seasons: spring, summer, and fall or fall–winter (Table 2). In the North Slope, the survey records harvests in spring and summer only because birds migrate out of this region in late summer or early fall. In regions with an important winter harvest, fall and winter harvests are recorded together. Harvest estimates are calculated for each season and the yearly estimate is calculated as the sum of seasonal harvests.

The primary goal of the survey is to document spring–summer subsistence harvests under subsistence regulations. However, the subsistence survey has covered most of the calendar year to provide a complete description of the harvests important for subsistence. The fall migratory bird hunts (after September 1) are managed under early season frameworks in federal regulations selected and adopted as state regulations. Harvests from fall hunts should be captured by the HIP survey; however, the HIP survey is likely ineffective in documenting fall subsistence harvests in some Alaska rural areas because of low hunter participation in the HIP program. For this reason, the AMBCC subsistence harvest survey also covers the fall or fall–winter season.

The harvest report form has 3 sheets, 1 for each season. In regions that have a winter survey, harvests are noted on the fall–winter page and cannot be identified for each individual season (i.e., fall–winter is identified as one season). As in the original survey methods, surveyors make 4 visits to each participating household during a survey year (Wentworth 2006). In March–April, surveyors obtain household consent and distribute survey forms to participating households. After the end of each survey season, surveyors visit the participating households to collect the corresponding sheet of the survey form (Table 2). The intent of using 3 seasonal recall periods is to minimize the length of period over which respondents need to recall the number and species of birds and eggs they harvested, which is important given the large number of species included on the survey. Long recall periods may lead to increased recall bias (Westat Inc. 1989). Difficulties with survey funding and field operations sometimes prevent seasonal collection of harvest data as scheduled, however, and thus a large proportion of surveys have been done with a single household visit at the end of the survey year (Naves et al. 2008).

## **Village and Household Consent**

Village consent must be granted in writing and is often given as a tribal or village council resolution. To request village consent, the field coordinator presents the survey background and goals and the importance of collecting information on the subsistence harvest of birds. If a village does not respond or does not agree to participate in the survey, an alternate village is selected, preferably in the same subregion.

Household participation in the survey is also voluntary. After village consent is granted by the tribal council, the surveyor contacts each household selected to participate in the survey to obtain their consent. Individual household consent is documented with a permission slip, which also allows calculation of household participation rates. During the first visit to each selected household, the surveyor explains the purpose of the survey to an adult household member, explains how the survey works, and invites the household to participate. An alternate household is selected to replace households that decline to participate and households that cannot be contacted after 3 reasonable attempts. If harvest level stratification is used, alternate households must be from the same stratum as the no-contact or no-consent households.

Table 2.—Seasonal survey coverage and household visits.

Regions	Spring			Summer		Fall		Winter				
	1 Apr–30 Jun			1 Jul–31 Aug		1 Sep–31 Oct		1 Nov–9 Mar				
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Gulf of Alaska-Cook Inlet	•	•	•	•	•	•	•	•	•	•	•	•
				2nd		3rd						1st, 4th
Kodiak Archipelago	•	•	•	•	•	•	•	•	•	•	•	•
				2nd		3rd						1st, 4th
Aleutian-Pribilof Islands	•	•	•	•	•	•	•	•	•	•	•	•
				2nd		3rd						1st, 4th
South Alaska Peninsula (Bristol Bay region)	•	•	•	•	•	•	•	•	•	•	•	•
				2nd		3rd						1st, 4th
Bristol Bay (except South Alaska Peninsula)	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
Yukon-Kuskokwim Delta	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
Bering Strait-Norton Sound	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
Northwest Arctic	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
North Slope	•	•	•	•	•	◦	◦	◦	◦	◦	◦	◦
				2nd		3rd						1st
Interior Alaska	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
Upper Copper River	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st
Southeast Alaska	•	•	•	•	•	•	•	◦	◦	◦	◦	◦
				2nd		3rd		4th				1st

- Months covered by the survey in each region.
- Months not covered by the survey in each region.
- 1st First household visit, to invite households to participate in the survey.
- 2nd Second household visit, to collect spring harvest data.
- 3rd Third household visit, to collect summer harvest data.
- 4th Fourth household visit, to collect fall or fall–winter harvest data.

## Reporting Harvests

The harvest report form is used to record the harvest of migratory birds and their eggs (Appendix B). The harvest report form has 1 sheet for each survey season (spring, summer, and fall or fall–winter). Each seasonal sheet has color drawings of bird species in breeding plumage and fields to record the number of birds and eggs harvested by species. Due to variation in the geographic distribution of bird species, there are 3 versions of the harvest report form, each with a different set of species. The 3 versions are the Interior Alaska form, the Southern Coastal Alaska form, and the “main form” for villages in other regions (Appendix B). This helps to prevent erroneously recording bird species as harvested in areas where they do not usually occur.

To avoid double-reporting, if a household harvests birds or eggs and gives them to another household, the harvest is to be reported by the household that originally harvested the birds or eggs, and not by the

household that received them. Birds or eggs received from other households are not to be reported on the survey form of the receiving household.

## **Species Represented on the Harvest Report Form**

The diverse subsistence cultures and economies across Alaska use a wide variety of migratory bird species, subject to seasonal availability, hunter access, and local traditions. The 2003 federal subsistence regulations and the subsequent yearly regulations allowed spring and summer harvests of about 90 species and subspecies of migratory birds, subject to seasons and restrictions (CFR vol. 68, No. 139, pp. 43010–43030, July 21, 2003). Because representing all species open to harvest on the survey form would result in an unwieldy, long survey, the survey form was designed to record harvests of those species that are significant to subsistence uses. The harvest report form shows about 50 species. Harvests of species not represented in the survey form can be reported in the “other bird” field. Some species that are difficult to tell apart are combined in the survey form (these species include teal, goldeneye, scaup, swan, grouse, ptarmigan, cormorant, tern, auklet, murre, guillemot, puffin, godwit, golden plover, small shorebird, and grebe; see Appendix C).

Some bird species and eggs that are closed to subsistence harvests are also shown on the survey form. Birds and eggs closed to harvest vary among regions according to the yearly hunting regulations. The inclusion of species closed to harvest on the survey form is not an endorsement of or consent to engage in the harvest of closed species; rather, it is an attempt to collect accurate harvest data to aid in the sustainable management of all bird species. Management and conservation bodies, such as the AMBCC, the USFWS, and the flyway councils, need to know the numbers of birds and eggs harvested to successfully plan for the sustainable management of bird populations. In order to elicit accurate answers to potentially sensitive questions, it is imperative that information from the survey not be used for punitive enforcement. To aid in this effort, identification of households is strictly confidential.

## **Data Transfer**

The surveyor must check completed survey forms for completeness and correctness before sending them to the field coordinator. Upon receiving each batch of completed forms from surveyors, the field coordinator organizes and reviews all survey materials before sending them to the statewide survey coordinator. This step allows field coordinators to correct potential inconsistencies in data collection and to manage surveyor payment.

## **Data Management**

Data entry and archiving are completed by the Information Management unit of the ADF&G Division of Subsistence. The statewide survey coordinator works closely with the unit to produce harvest estimates.

Data are entered in Microsoft Office Access 2007 forms designed to mimic survey forms.<sup>1</sup> The multiyear raw data are stored in a Microsoft SQL Server 2008 relational database and backups occur on a monthly basis. The structure of the database is documented in appropriate metadata. Double data entry and logical checks help ensure the accuracy of the information stored in the database and of the sampling information provided with completed survey forms (e.g., sampling method used, sample sizes, strata size). Logical checks and data analysis are done with SPSS Statistics 2008.

Original survey forms are scanned and archived as digital files. Archived survey materials do not include household names or other personal information in order to ensure confidentiality of household harvest reports. If household names are provided in survey forms, the information is redacted prior to archiving.

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



## DATA ANALYSIS

### Geographic Scale of Harvest Estimates

This report presents subregional and regional harvest estimates. Regional harvest estimates are not presented if less than 75% of the households within the region are represented in the sample (see below). Because of issues related to species of conservation concern, the North Slope and the Bering Strait-Norton Sound regions have requested that only regional harvest estimates be presented, which still satisfies survey reporting standards, given that at least 75% of the households within the region are represented in the sample.

Subregional and regional harvest estimates may vary considerably between years. A number of factors may contribute to this variation in harvest estimates, such as:

- Local abundance of birds (bird population levels, changes in migratory behavior and routes, and changes in the local environment);
- Hunter access to productive hunting grounds (timing and pace of spring breakup that may affect travel conditions, and changes in waterways);
- Hunting effort directed to birds or other subsistence resources (bird harvests are often concurrent to harvests of other resources).

Availability of employment in the cash economy may also affect hunting effort.

Potential issues related to data collection may result in apparent yearly variation in harvest estimates; these issues range from inappropriate subregional sampling coverage or heterogeneity of harvest patterns in villages within a subregion. Further analysis will be necessary to evaluate this potential source of error.

To calculate regional and statewide harvest estimates, large yearly variation in subregional harvest estimates requires analytical approaches that account for variability in harvests between years as well within subregions. For a better understanding of yearly variation in harvest estimates, it is therefore important to report subregional harvest estimates for all regions. Development of statewide estimates may require more years of data as well as appropriate coverage of infrequently surveyed regions (Northwest Arctic, Kodiak Archipelago, Aleutian-Pribilof Islands) and nonsurveyed regions (Southeast Alaska).

### Subregional Harvest Expansion

Formulas used to calculate subregional harvest estimates and confidence intervals are based on Cochran (1977) and Bernard et al. (1998; Appendix D). The formula used to calculate estimated harvests accounts for missing data at the harvest level stratum. However, if seasonal data are missing for all harvest level strata in a village, additional analytical steps are necessary to fill out missing data with average harvests. Harvest estimates are then calculated for each season and the yearly estimate is calculated as the sum of seasonal harvests.

To implement formulas presented in Appendix D, the reported harvest is first expanded to each harvest level stratum and village: harvests reported by households sampled in each stratum are expanded to all households in that stratum. Depending on the sampling method used in a village, the number of harvest level strata may be 3 (“none, low, high”), 2 (“harvester, other”), or 1 (census or simple random sampling). The following formula is used for the first expansion:

Estimated harvest at harvest level stratum = sum of harvests reported by all households in a stratum  $\times$  (number of households sampled in the stratum  $\div$  total number of households in the stratum).

At the first expansion, sample sizes refer to each harvest level stratum, season, and village because one or more seasonal pages of the harvest report form may be missing for individual households. Also, seasonal

data may be missing for a harvest level stratum or a village. Calculation of yearly harvest estimates and confidence intervals requires yearly sample sizes. The maximum number of households sampled among seasons is used as the yearly sample size (Table 3).

Occasionally, an adjustment to harvest level stratification (“none, low, high” or “harvester, other”) is employed to avoid harvest expansion in strata with insufficient sample sizes. If the seasonal sampling proportion in a harvest level is equal to or less than 5% and if the stratum size is equal to or less than 50 households (hence, sample sizes equal to 1 or 2), households in the insufficiently sampled stratum are re-assigned to a stratum properly sampled and the original stratum is considered as missing. Because stratification is based on household harvest patterns of previous years, a degree of misclassification of households into strata is expected to occur even under standard stratification procedures. Therefore, this adjustment most likely does not result in undesirable sources of error in harvest estimates.

The average household harvest within the subregion is used as a substitute for missing data at the harvest level and the season. The harvest estimates per year, per village, per season, and per species are calculated as the sum of the estimated harvest at each harvest level stratum.

Table 3.—Number of villages and households included in data analysis, 2004–2009.

Survey year	Villages included in harvest estimates	Households surveyed		
		Spring	Summer	Fall
2004	77	1,770	1,707	1,673
2005	75	2,226	2,251	1,742
2006	62	1,793	1,773	1,687
2007	74	2,076	2,051	1,491
2008	44	1,630	1,568	1,189
2009	27	923	909	762
2004–2009 Average	60	1,736	1,710	1,424

*Source* Survey results for 2004–2007 were reported in Naves 2010a and for 2008 in Naves 2010b.

At the second expansion, estimated harvests in surveyed villages are expanded to all villages within the subregion. Because numbers of households differ among villages within a subregion, the second expansion is calculated using the number of households in surveyed and nonsurveyed villages in a subregion. The following formula is used:

$$\text{Subregional estimated harvest} = \text{sum of the estimated harvest in surveyed villages} \times (\text{number of households in surveyed villages} \div \text{total number of households in the subregion}).$$

The total number of households in the subregion is calculated as the sum of total resident households in the surveyed villages plus the estimated village size of the nonsurveyed villages. For surveyed villages, the total number of households represents the number of households resident in the village for at least 12 months and excludes unoccupied dwellings and households that recently moved to the village. The total number of resident households in surveyed villages is provided by the field coordinator as part of the sampling information in the “household list.” For nonsurveyed villages, village size estimates are calculated by dividing the yearly village population estimates from the Alaska Department of Labor and Workforce Development<sup>2</sup> by the average household size (village population divided by the number of households) as reported in the 2000 federal census (U.S. Census Bureau 2001).

For surveyed villages, the total number of households provided is compared to the estimated village size (as calculated as above) in order to assess whether household lists are complete. Yearly village size as

2. <http://almis.labor.state.ak.us/?PAGEID=67&SUBID=171>, accessed July 2010.

recorded in the Division of Subsistence Community Subsistence Information System<sup>3</sup> (CSIS) is also used to assess the completeness of household lists. If these sources yield a difference greater than 30–40% in the number of households, efforts are made to contact the field coordinator and obtain local information on village size. If local information on village size cannot be obtained, CSIS information or estimated village sizes are used in harvest expansions.

Reported harvests from villages for which sampling information is missing (e.g., the household list, sampling method, or harvest level strata size) are not included in the calculation of harvest rates.<sup>4</sup> Such villages are treated like nonsurveyed villages and are therefore still included in the estimation of total subregional harvests.

## **Regional Harvest Expansion**

Formulas used to estimate regional harvests and confidence intervals (Appendix E) are based on Cochran (1977:274) and Bernard et al. (1998). The formula to estimate regional harvests does account for missing data at the harvest level stratum. However, if seasonal data are missing for a harvest level stratum in a village, additional analytical steps are necessary to fill out missing data with average harvest amounts. Harvest estimates are calculated for each season and the yearly estimate is calculated as the sum of seasonal harvests.

To implement formulas presented in Appendix E, a third expansion is necessary in addition to the first and second expansions described above. At the third expansion, the estimated harvest in surveyed subregions is expanded to all subregions within a region. Because the number of households in each subregion differs, the third expansion is based on the number of households in both the surveyed and nonsurveyed subregions as follows:

Regional estimated harvest = sum of the estimated harvest in surveyed subregions × (number of households in surveyed subregions ÷ total number of households in all subregions of the region).

Subregional estimates are expanded to the regional level only if at least 75% of the households within the region are represented in the sample (nonsurveyed subregions must represent less than 25% of the total households in the region).

If the low end of the confidence interval around subregional and regional harvest estimates is less than the reported harvest, the calculated low end is replaced by the reported harvest.

## **Conversion of Egg Volume to Numbers of Eggs**

Egg harvests are sometimes reported on this survey by volume, such as the number of “5-gallon buckets” or the number of “1-gallon buckets” filled with eggs. Conversion factors for volumes of eggs to numbers of eggs were estimated by comparing the volumes of eggs of wild bird species reported in the “Birds of North America Series<sup>5</sup>” to the volumes of “large” domestic chicken eggs (J. Magdanz, Subsistence Resource Specialist, ADF&G, Kotzebue, Alaska, personal communication; Table 4). It is known that a 1-gallon bucket can hold 48 large chicken eggs (24 oz per dozen, U.S. Department of Agriculture standard). This comparison is necessary because eggs of different sizes and shapes arrange differently in a given volume; i.e., the amount of empty space among eggs is related to the size and shape of the eggs. In the future, actual counts of eggs per gallon should be documented on the egg gathering grounds.

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3. <http://www.adfg.alaska.gov/sb/CSIS/>. Hereinafter cited as CSIS.

4. In 2009, this was 3 out of 30 villages surveyed.

5. <http://bna.birds.cornell.edu/bna/>.

## Reports of Egg Harvest in Fall

Harvest reports occasionally include eggs gathered in fall (1 September–31 October) or fall–winter (1 September–9 March). However, the nesting period of birds in Alaska usually extends only into July and there are no records of customary and traditional uses of eggs that have failed to hatch. For these reasons, reports of eggs harvested in fall or fall–winter are considered to be recording mistakes in which the surveyor or the household member records an egg harvest on the wrong seasonal sheet of the harvest report form or records a bird harvest in the field reserved for “eggs” rather than in the field reserved for “birds.” Each of these cases is individually assessed and assumed to be harvests of birds in fall or harvests of eggs in spring, based on the harvest patterns of the household and of the village.

Table 4.—Estimated conversion factors, egg volume to number of eggs.

Species	Number of eggs in 5-gallon bucket	Number of eggs in 1-gallon bucket
Mallard <sup>a</sup>	261	52
Northern pintail <sup>b</sup>	327	65
Arctic tern <sup>c</sup>	716	143
Mew gull <sup>d</sup>	261	52
Glaucous gull <sup>e</sup>	121	24
Glaucous-winged gull <sup>f</sup>	147	29
Herring gull <sup>g</sup>	147	29
Murre <sup>h</sup>	126	25

*Source* Personal communication, James Magdanz, ADF&G Subsistence Resource Specialist, Kotzebue, Alaska.

*Note* Sources for egg volumes:

- a. Drilling et al. (2002)
- b. Austin and Miller (1995)
- c. Hatch (2002)
- d. Moskoff and Bevier (2002)
- e. Gilchrist (2001)
- f. Hayward and Verbeek (2008)
- g. Pierotti and Good (1994)
- h. Ainley et al. (2002)

## Household Participation Rate

Household participation in the survey is voluntary. The original survey method used permission slips to document household participation in the survey. During the first visit, when the surveyor invited each selected household to participate, he or she completed a permission slip for every visited household and noted whether the household agreed to participate (“yes”) or not (“no”). The following issues in the use of permission slips were identified:

- Permission slips were not completed for a surveyed village;
- Permission slips were not completed for some households in a surveyed village;
- Permission slips were completed incorrectly (“no” represented “no harvest” or “no contact” rather than “no consent to conduct the survey”); and
- Completed permission slips were not submitted for data management and analysis at ADF&G.

Permission slips were used for data collection in the period 2004–2009. Regional and subregional household participation rates were calculated based on the permission slips available for analysis. Identified instances where “no” could represent “no contact” or “no harvest,” rather than “no consent,” were not included in the analysis of household participation rates. Household participation rates were calculated as the number of households that agreed to participate in the survey (“yes”) divided by the total number of households contacted.

## **RESULTS**

### **2009 HARVEST ESTIMATES**

Harvest estimate tables presented in this report include only the bird species represented in the version of the harvest report form used in each region or subregion (Appendix C). The species categories “Duck (unidentified)” and “Other and unknown bird” are included in tables only if harvest in these categories was reported.

Information on sampling effort is presented as a footnote to each harvest estimate table. For subregional tables, “sampling effort” refers to the number of villages surveyed and the proportion of subregion households represented in the sample (total number of households in surveyed villages in relation to the total number of households in the subregion). For regional tables, sampling effort refers to the number of villages and subregions surveyed. Significant deviations from survey methods, such as significantly incomplete geographic coverage or nonstandard village sampling approaches, are also documented in table footnotes.

If not all subregions were surveyed, regional harvest estimates may be larger than the sum of the surveyed subregions because expanded estimates account for nonsurveyed subregions. This is important to note because regional estimates are not presented if nonsurveyed subregions represent more than 25% of the regional households.

Yearly regional and subregional estimates for the total harvests of birds and eggs are summarized in Table 5 (birds) and Table 6 (eggs). Regional and subregional estimates in these tables indicate that estimates detailed by species are available in the regional and subregional tables that follow (tables 7–24). A regional table precedes the tables for its subregions unless survey coverage was inadequate to allow calculation of regional estimates (e.g., Interior Alaska region, 2008). Household participation rates for 2004–2009 are presented in Table 25.

Table 5.—Yearly estimated bird harvest at subregions and regions (total birds), 2004–2009.

Region	2004		2005		2006		2007		2008		2009	
	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI
<b>Gulf of Alaska-Cook Inlet</b>	<b>2,995</b>	<b>32%</b>	**		**		-	-	-	-	-	-
Gulf of Alaska	2,756	17%	-	-	596	42%	-	-	-	-	-	-
Cook Inlet	239	30%	13	57%	-	-	-	-	-	-	-	-
<b>Kodiak Archipelago</b>	-	-	-	-	-	-	-	-	-	-	-	-
Kodiak Villages	-	-	-	-	5,552	28%	-	-	-	-	-	-
Kodiak City & Road-connected	-	-	-	-	<sup>a</sup>		-	-	-	-	-	-
<b>Aleutian-Pribilof Islands</b>	-	-	**		-	-	**		<b>8,401</b>	<b>30%</b>	-	-
Aleutian-Pribilof Villages	-	-	16,876	35%	-	-	(7,371)	(77%)	7,642	21%	-	-
Unalaska	-	-	-	-	-	-	-	-	760	41%	-	-
<b>Bristol Bay</b>	**		<b>47,336</b>	<b>32%</b>	**		<b>28,285</b>	<b>20%</b>	<b>32,995</b>	<b>14%</b>	-	-
South Alaska Peninsula	801	24%	-	-	-	-	968	50%	(115)	(111%)	-	-
Southwest Bristol Bay	14,955	10%	32,769	18%	(26,715)	(22%)	20,169	15%	(29,352)	(14%)	-	-
Dillingham	-	-	11,769	30%	-	-	7,148	25%	3,527	15%	-	-
<b>Yukon-Kuskokwim Delta</b>	<b>130,343</b>	<b>6%</b>	<b>114,514</b>	<b>8%</b>	<b>171,856</b>	<b>7%</b>	<b>148,715<sup>b</sup></b>	<b>8%</b>	<b>79,088</b>	<b>9%</b>	<b>195,082</b>	<b>6%</b>
Y-K Delta South Coast	25,764	11%	35,508	7%	31,918	8%	33,927	11%	19,999	12%	35,203	15%
Y-K Delta Mid Coast	34,480	8%	17,546	11%	(61,998)	(12%)	43,737	13%	17,160	15%	82,654	7%
Y-K Delta North Coast	8,806	17%	11,206	14%	4,493	21%	1,206	31%	4,867	22%	13,637	13%
Lower Yukon	(6,201)	(19%)	6,815	9%	10,269	12%	3,988	15%	4,727	16%	6,904	12%
Lower Kuskokwim	46,033	15%	16,557	11%	48,849	8%	58,983	7%	22,813	14%	44,934	9%
Central Kuskokwim	440	32%	-	-	1,167	35%	219	79%	-	-	-	-
Bethel <sup>c</sup>	8,618	17%	23,954	24%	13,163	24%	6,654 <sup>b</sup>	28%	7,789	16%	7,478	14%
<b>Bering Strait-Norton Sound</b>	<b>53,576</b>	<b>8%</b>	<b>74,115</b>	<b>17%</b>	-	-	<b>123,257</b>	<b>10%</b>	-	-	**	
St. Lawrence-Diomedes Is.	33,600	7%	30,481	9%	-	-	88,362	8%	-	-	41,176	16%
Bering Strait Mainland Villages	17,195	9%	37,482	18%	-	-	31,169	10%	-	-	-	-
Nome	2,782	21%	6,152	31%	-	-	3,726	37%	-	-	-	-
<b>Northwest Arctic</b>	-	-	-	-	**		-	-	-	-	-	-
Northwest Arctic Villages	-	-	-	-	9,676	21%	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	-	-	-	-
<b>North Slope</b>	-	-	<b>15,615</b>	<b>11%</b>	-	-	<b>44,270</b>	<b>23%</b>	<b>45,123</b>	<b>22%</b>	<b>19,075</b>	<b>24%</b>
North Slope Villages	-	-	4,672	12%	-	-	6,118	24%	9,873	38%	10,411	20%
Barrow	-	-	10,943	10%	-	-	38,152 <sup>d</sup>	15%	35,250	17%	8,664	21%
<b>Interior Alaska</b>	<b>50,995</b>	<b>13%</b>	**		<b>37,068</b>	<b>17%</b>	**		**		-	-
Mid Yukon-Upper Kuskokwim	(3,086)	(43%)	2,744	29%	697	36%	-	-	-	-	-	-
Yukon-Koyukuk	3,108	18%	(930)	(44%)	(1,764)	(60%)	(3,031)	(72%)	(6,908)	(89%)	-	-
Upper Yukon	(14,418)	(16%)	-	-	10,927	12%	18,402	14%	-	-	-	-
Tanana Villages	20,388	16%	-	-	17,358	14%	-	-	-	-	-	-
Tok	-	-	-	-	6,321 <sup>d</sup>	31%	-	-	-	-	-	-
<b>Upper Copper River<sup>e</sup></b>	<b>1,120</b>	<b>30%</b>	-	-	-	-	<b>247</b>	<b>30%</b>	-	-	-	-

-: Region/subregion not surveyed. \*: 95% CI  $\geq$  100% (Starting in 2008: if "Low" was smaller than reported harvest, "Low" was replaced by reported harvest). \*\*: Less than 75% of region households represented in sample, harvest estimates not produced at the regional level. (In parenthesis): Less than 30% of subregion households represented in the sample and/or only 1 out of several subregion villages surveyed.

<sup>a</sup> Fall bird harvest data not available for Kodiak City & Road-connected subregion; annual harvest estimates not available.

<sup>b</sup> Does not include fall bird harvest for Bethel subregion.

<sup>c</sup> Bethel harvest expansions assume that harvester households account for 30% of the total village households (village size estimates).

<sup>d</sup> Subregional harvest estimates assumed simple random sampling.

<sup>e</sup> Sampling and harvest expansions represent Alaska Native households only.

2004–2007 Harvest estimates from Naves (2010a) and 2008 estimates from Naves (2010b).

Table 6.—Yearly estimated egg harvest at subregions and regions (total eggs), 2004–2009.

Region	2004		2005		2006		2007		2008		2009	
	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI	Number	95% CI
<b>Gulf of Alaska-Cook Inlet</b>	<b>2,178</b>	<b>17%</b>	**	-	**	-	-	-	-	-	-	-
Gulf of Alaska	2,173	24%	-	-	102	115%	-	-	-	-	-	-
Cook Inlet	5	75%	0	***	-	-	-	-	-	-	-	-
<b>Kodiak Archipelago</b>	-	-	-	-	<b>5,222</b>	<b>73%</b>	-	-	-	-	-	-
Kodiak Villages	-	-	-	-	4,545	56%	-	-	-	-	-	-
Kodiak City & Road-connected	-	-	-	-	(677 <sup>a</sup> )	(41%)	-	-	-	-	-	-
<b>Aleutian-Pribilof Islands</b>	-	-	**	-	-	-	**	-	<b>4,778</b>	<b>43%</b>	-	-
Aleutian-Pribilof Villages	-	-	11,733	38%	-	-	6,127	74%	4,018	30%	-	-
Unalaska	-	-	-	-	-	-	-	-	760	80%	-	-
<b>Bristol Bay</b>	**	-	<b>47,799</b>	<b>35%</b>	**	-	<b>30,801</b>	<b>27%</b>	<b>47,653</b>	<b>30%</b>	-	-
South Alaska Peninsula	409	49%	-	-	-	-	651	81%	(106)	(104%)	-	-
Southwest Bristol Bay	54,437	20%	39,206	24%	(31,292)	(26%)	25,118	21%	(37,630)	(18%)	-	-
Dillingham	-	-	5,768	74%	-	-	5,032	56%	9,917	74%	-	-
<b>Yukon-Kuskokwim Delta</b>	<b>27,288</b>	<b>14%</b>	<b>22,268</b>	<b>11%</b>	<b>30,723</b>	<b>20%</b>	<b>19,153</b>	<b>16%</b>	<b>31,195</b>	<b>15%</b>	<b>58,995</b>	<b>14%</b>
Y-K Delta South Coast	7,768	20%	13,424	13%	7,406	23%	1,746	28%	8,442	23%	29,065	19%
Y-K Delta Mid Coast	14,598	17%	2,140	25%	(21,354)	(27%)	11,930	19%	16,195	18%	24,640	14%
Y-K Delta North Coast	2,466	40%	3,921	43%	188	50%	22	118%	554	66%	345	35%
Lower Yukon	(191)	(69%)	652	71%	232	42%	565	54%	0	***	386	40%
Lower Kuskokwim	2,265	32%	1,302	31%	1,498	27%	4,891	19%	5,298	23%	3,087	28%
Central Kuskokwim	0	***	-	-	15	93%	0	***	-	-	-	-
Bethel <sup>b</sup>	0	***	261	60%	29	96%	0	***	23	91%	179	84%
<b>Bering Strait-Norton Sound</b>	<b>99,494</b>	<b>15%</b>	<b>113,082</b>	<b>19%</b>	-	-	<b>146,557</b>	<b>13%</b>	-	-	**	-
St. Lawrence-Diomedes Is.	81,675	17%	75,373	17%	-	-	129,656	13%	-	-	117,174	17%
Bering Strait Mainland Villages	16,467	17%	29,321	31%	-	-	12,240	16%	-	-	-	-
Nome	1,351	26%	8,387	28%	-	-	4,661	33%	-	-	-	-
<b>Northwest Arctic</b>	-	-	-	-	**	-	-	-	-	-	-	-
Northwest Arctic Villages	-	-	-	-	10,081	51%	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	-	-	-	-
<b>North Slope</b>	-	-	<b>4,705</b>	<b>35%</b>	-	-	<b>2,388</b>	<b>117%</b>	<b>858</b>	<b>70%</b>	<b>2,430</b>	<b>66%</b>
North Slope Villages	-	-	4,672	30%	-	-	606	64%	654	62%	2,341	42%
Barrow	-	-	32	78%	-	-	1,783 <sup>c</sup>	109%	204	46%	88	99%
<b>Interior Alaska</b>	<b>1,009</b>	<b>104%</b>	-	-	<b>911</b>	<b>58%</b>	**	-	**	-	-	-
Mid Yukon-Upper Kuskokwim	(0)	***	2	149%	0	***	-	-	-	-	-	-
Yukon-Koyukuk	11	78%	(0)	***	(0)	***	(0)	***	(0)	***	-	-
Upper Yukon	(40)	(121%)	-	-	0	***	0	***	-	-	-	-
Tanana Villages	760	73%	-	-	875	44%	-	-	-	-	-	-
Tok	-	-	-	-	36 <sup>c</sup>	93%	-	-	-	-	-	-
<b>Upper Copper River<sup>d</sup></b>	<b>82</b>	<b>101%</b>	-	-	-	-	<b>0</b>	<b>***</b>	-	-	-	-

-: Region/subregion not surveyed. \*: 95% CI ≥ 100% (Starting in 2008: if "Low" was smaller than reported harvest, "Low" was replaced by reported harvest). \*\*: Less than 75% of region households represented in sample, harvest estimates not produced at the regional level. \*\*\*: No reported harvest. (In parenthesis): Less than 30% of subregion households represented in the sample and/or only 1 out of several subregion villages surveyed.

<sup>a</sup> Harvest estimates based on a sample of only known harvester households.

<sup>b</sup> Bethel harvest expansions assume that harvester households account for 30% of the total village households (village size estimates).

<sup>c</sup> Subregional harvest estimates assumed simple random sampling.

<sup>d</sup> Sampling and harvest expansions represent Alaska Native households only.

2004–2007 Harvest estimates from Naves (2010a) and 2008 estimates from Naves (2010b).

Table 7.–Estimated bird harvest, Yukon-Kuskokwim Delta region, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	3,835	24%	2,924 – 4,746	587	28%	497	45%	2,750	29%
Green-winged teal	2,486	17%	2,070 – 2,902	186	46%	204	64%	2,096	22%
Mallard	9,372	10%	8,430 – 10,315	2,361	17%	1,723	25%	5,287	15%
Northern pintail	11,973	16%	10,048 – 13,899	2,507	24%	2,324	34%	7,142	24%
Northern shoveler	5,427	17%	4,524 – 6,330	518	36%	1,645	42%	3,264	19%
Black scoter	8,083	13%	7,012 – 9,155	5,862	14%	913	43%	1,308	28%
Surf scoter	1,268	35%	824 – 1,712	1,214	36%	0	-	53	76%
White-winged scoter	2,141	34%	1,411 – 2,871	1,658	38%	20	134%	462	49%
Bufflehead	37	78%	12 – 65	28	103%	0	-	9	79%
Goldeneye	288	46%	155 – 421	148	74%	16	98%	124	59%
Canvasback	584	30%	410 – 759	446	36%	47	72%	91	72%
Scaup	7,110	16%	5,959 – 8,260	4,560	19%	1,895	26%	655	38%
Common eider	285	40%	171 – 398	285	40%	0	-	0	-
King eider	11,573	25%	8,732 – 14,414	7,750	31%	2,238	53%	1,586	83%
Spectacled eider	225	71%	65 – 385	215	74%	9	112%	0	-
Steller's eider	40	119%	2 – 88	0	-	0	-	40	119%
Harlequin duck	218	56%	95 – 341	36	37%	0	-	183	86%
Long-tailed duck	1,289	27%	935 – 1,643	444	29%	167	66%	678	46%
Common merganser	49	60%	20 – 78	25	97%	15	104%	9	96%
Red-breasted merganser	21	93%	3 – 40	21	93%	0	-	0	-
<b>Total ducks</b>	<b>66,303</b>	<b>9%</b>	<b>60,336 – 72,270</b>	<b>28,851</b>	<b>12%</b>	<b>11,714</b>	<b>19%</b>	<b>25,739</b>	<b>14%</b>
<b>Geese</b>									
Black brant	14,542	15%	12,375 – 16,708	9,587	17%	1,577	40%	3,378	38%
Cackling Canada goose	22,232	11%	19,684 – 24,780	7,509	12%	4,350	25%	10,373	20%
Lesser Canada goose	17,624	10%	15,926 – 19,322	6,844	11%	4,669	20%	6,111	19%
White-fronted goose	33,600	8%	30,919 – 36,281	19,890	9%	6,961	21%	6,749	17%
Emperor goose	2,559	34%	1,696 – 3,421	1,113	25%	560	67%	886	83%
Lesser snow goose	2,281	31%	1,577 – 2,985	875	29%	50	63%	1,356	58%
<b>Total geese</b>	<b>92,837</b>	<b>7%</b>	<b>86,579 – 99,095</b>	<b>45,818</b>	<b>8%</b>	<b>18,166</b>	<b>15%</b>	<b>28,853</b>	<b>14%</b>
<b>Swans</b>									
Tundra swan	5,064	8%	4,635 – 5,494	2,691	11%	900	20%	1,473	19%
<b>Cranes</b>									
Sandhill crane	5,620	12%	4,958 – 6,281	3,733	13%	785	27%	1,101	35%
<b>Ptarmigans and grouses</b>									
Spruce grouse	87	77%	20 – 153	31	54%	22	132%	33	132%
Ptarmigan	22,946	11%	20,329 – 25,564	20,033	13%	1,474	45%	1,440	55%
<b>Total ptarmigans and grouses</b>	<b>23,033</b>	<b>11%</b>	<b>20,414 – 25,652</b>	<b>20,064</b>	<b>13%</b>	<b>1,496</b>	<b>44%</b>	<b>1,473</b>	<b>54%</b>
<b>Seabirds</b>									
Comorant	0	-	-	0	-	0	-	0	-
Arctic tern	25	116%	3 – 54	25	116%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	102	88%	15 – 191	71	120%	11	132%	20	123%
Glaucous gull	235	64%	84 – 386	235	68%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	13	160%	1 – 34	13	160%	0	-	0	-
<b>Total seabirds</b>	<b>375</b>	<b>59%</b>	<b>152 – 598</b>	<b>344</b>	<b>66%</b>	<b>11</b>	<b>132%</b>	<b>20</b>	<b>123%</b>
<b>Shorebirds</b>									
Whimbrel	20	119%	1 – 44	0	-	20	119%	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	1,658	37%	1,046 – 2,270	5	120%	1,628	38%	25	134%
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	9	120%	2 – 20	9	120%	0	-	0	-
<b>Total shorebirds</b>	<b>1,688</b>	<b>36%</b>	<b>1,075 – 2,300</b>	<b>14</b>	<b>120%</b>	<b>1,648</b>	<b>37%</b>	<b>25</b>	<b>134%</b>
<b>Loons</b>									
Common loon	96	62%	36 – 156	96	67%	0	-	0	-
Pacific loon	22	67%	7 – 36	22	70%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>118</b>	<b>53%</b>	<b>55 – 180</b>	<b>118</b>	<b>57%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Other/unknown bird</b>	<b>44</b>	<b>117%</b>	<b>4 – 96</b>	<b>0</b>	<b>-</b>	<b>44</b>	<b>132%</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>195,082</b>	<b>6%</b>	<b>183,043 – 207,121</b>	<b>101,633</b>	<b>7%</b>	<b>34,764</b>	<b>14%</b>	<b>58,684</b>	<b>13%</b>

Sampling effort (Yukon-Kuskokwim Delta, 2009): 21 out of 47 villages in this region were included in analysis; 6 out of 7 subregions were surveyed; 98% of the region households were represented in the sample. -: No reported harvest.



Table 8.–Estimated egg harvest, Yukon-Kuskokwim Delta region, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	19	122%	5 – 43	19	122%	0	-	0	-
Green-winged teal	890	60%	353 – 1,427	890	71%	0	-	0	-
Mallard	434	50%	217 – 652	294	48%	141	119%	0	-
Northern pintail	4,940	26%	3,673 – 6,206	4,550	31%	389	114%	0	-
Northern shoveler	220	62%	83 – 358	220	73%	0	-	0	-
Black scoter	67	93%	14 – 128	67	93%	0	-	0	-
Surf scoter	66	116%	8 – 143	66	116%	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	764	88%	95 – 1,434	764	96%	0	-	0	-
Common eider	99	116%	12 – 215	99	116%	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	66	116%	8 – 143	66	116%	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	31	121%	9 – 69	31	121%	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>7,598</b>	<b>23%</b>	<b>5,819 – 9,377</b>	<b>7,068</b>	<b>26%</b>	<b>530</b>	<b>89%</b>	<b>0</b>	<b>-</b>
<b>Geese</b>									
Black brant	2,788	30%	1,963 – 3,613	2,788	30%	0	-	0	-
Cackling Canada goose	8,380	18%	6,889 – 9,871	7,296	21%	1,084	47%	0	-
Lesser Canada goose	3,843	27%	2,798 – 4,889	3,560	30%	283	72%	0	-
White-fronted goose	14,712	17%	12,263 – 17,161	11,282	19%	3,430	46%	0	-
Emperor goose	1,309	46%	712 – 1,907	1,068	49%	242	119%	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>31,032</b>	<b>14%</b>	<b>26,694 – 35,370</b>	<b>25,993</b>	<b>16%</b>	<b>5,039</b>	<b>38%</b>	<b>0</b>	<b>-</b>
<b>Swans</b>									
Tundra swan	1,931	24%	1,462 – 2,399	1,594	29%	337	52%	0	-
<b>Cranes</b>									
Sandhill crane	2,673	19%	2,152 – 3,194	2,585	20%	88	90%	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	2,087	41%	1,225 – 2,950	1,954	50%	133	83%	0	-
<b>Total ptarmigans and grouses</b>	<b>2,087</b>	<b>41%</b>	<b>1,225 – 2,950</b>	<b>1,954</b>	<b>50%</b>	<b>133</b>	<b>83%</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	29	123%	3 – 65	29	123%	0	-	0	-
Arctic tern	591	39%	364 – 819	591	43%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	1,334	41%	786 – 1,882	1,334	45%	0	-	0	-
Mew gull	4,854	28%	3,480 – 6,227	4,192	32%	662	85%	0	-
Glaucous gull	4,919	39%	3,013 – 6,825	3,595	42%	1,323	85%	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>11,727</b>	<b>27%</b>	<b>8,526 – 14,928</b>	<b>9,742</b>	<b>29%</b>	<b>1,985</b>	<b>82%</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	33	116%	4 – 72	33	116%	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	281	88%	35 – 527	281	88%	0	-	0	-
Golden plover	547	47%	293 – 802	547	54%	0	-	0	-
Small shorebird	973	53%	457 – 1,489	893	69%	81	119%	0	-
<b>Total shorebirds</b>	<b>1,835</b>	<b>42%</b>	<b>1,064 – 2,605</b>	<b>1,754</b>	<b>51%</b>	<b>81</b>	<b>119%</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	10	118%	2 – 22	10	118%	0	-	0	-
Pacific loon	102	88%	12 – 191	102	96%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>112</b>	<b>81%</b>	<b>22 – 202</b>	<b>112</b>	<b>88%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total eggs</b>	<b>58,995</b>	<b>14%</b>	<b>50,751 – 67,238</b>	<b>50,802</b>	<b>16%</b>	<b>8,192</b>	<b>32%</b>	<b>0</b>	<b>-</b>

Sampling effort (Yukon-Kuskokwim Delta, 2009): 21 out of 47 villages in this region were included in analysis; 6 out of 7 subregions were surveyed; 98% of the region households were represented in the sample. - : No reported harvest.

Table 9.–Estimated bird harvest, Yukon-Kuskokwim Delta region, South Coast subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	266	54%	123 – 410	0	-	0	-	266	83%
Green-winged teal	241	38%	150 – 332	28	104%	0	-	213	65%
Mallard	719	25%	537 – 900	0	-	98	96%	620	39%
Northern pintail	1,823	28%	1,314 – 2,331	524	98%	20	120%	1,279	48%
Northern shoveler	351	29%	249 – 453	55	104%	79	91%	217	60%
Black scoter	144	76%	34 – 254	144	106%	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	10	71%	3 – 18	0	-	0	-	10	103%
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	20	75%	5 – 35	0	-	20	120%	0	-
Scaup	90	51%	44 – 135	0	-	0	-	90	76%
Common eider	0	-	-	0	-	0	-	0	-
King eider	8,140	23%	6,249 – 10,031	4,409	48%	2,189	53%	1,542	84%
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	39	75%	10 – 69	0	-	0	-	39	120%
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	11,842	18%	9,707 – 13,977	5,159	42%	2,405	49%	4,278	41%
<b>Geese</b>									
Black brant	5,984	20%	4,759 – 7,209	3,700	33%	878	61%	1,406	77%
Cackling Canada goose	5,135	27%	3,759 – 6,511	0	-	217	80%	4,918	36%
Lesser Canada goose	1,021	35%	660 – 1,383	293	71%	157	80%	571	81%
White-fronted goose	6,703	17%	5,571 – 7,834	3,770	26%	1,607	69%	1,326	45%
Emperor goose	1,047	48%	547 – 1,548	0	-	457	80%	591	120%
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	19,891	16%	16,759 – 23,022	7,763	24%	3,316	53%	8,812	34%
<b>Swans</b>									
Tundra swan	262	24%	199 – 326	185	45%	0	-	77	69%
<b>Cranes</b>									
Sandhill crane	1,345	19%	1,094 – 1,597	849	32%	458	40%	38	115%
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	1,730	33%	1,161 – 2,298	1,216	72%	514	86%	0	-
<b>Total ptarmigans and grouses</b>	1,730	33%	1,161 – 2,298	1,216	72%	514	86%	0	-
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	0	-	-	0	-	0	-	0	-
Glaucous gull	112	61%	44 – 181	112	107%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	112	61%	44 – 181	112	107%	0	-	0	-
<b>Shorebirds</b>									
Whimbrel	20	75%	5 – 35	0	-	20	120%	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	20	75%	5 – 35	0	-	20	120%	0	-
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	0	-	-	0	-	0	-	0	-
<b>Total birds</b>	35,203	15%	29,950 – 40,455	15,285	24%	6,713	44%	13,205	33%

Sampling effort (Yukon-Kuskokwim Delta South Coast, 2009): 2 out of 8 villages in this subregion were included in analysis; 32% of subregion households were represented in the sample. -: No reported harvest.

Table 10.–Estimated egg harvest, Yukon-Kuskokwim Delta region, South Coast subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	551	54%	254 – 848	551	104%	0	-	0	-
Mallard	138	75%	34 – 242	0	-	138	120%	0	-
Northern pintail	4,494	22%	3,516 – 5,473	4,114	33%	381	115%	0	-
Northern shoveler	138	54%	64 – 212	138	104%	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	675	61%	265 – 1,084	675	107%	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	5,996	20%	4,797 – 7,195	5,478	31%	518	90%	0	-
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	2,227	30%	1,561 – 2,893	2,227	45%	0	-	0	-
Lesser Canada goose	1,265	32%	863 – 1,667	1,147	55%	118	120%	0	-
White-fronted goose	6,735	22%	5,238 – 8,233	4,423	36%	2,312	63%	0	-
Emperor goose	236	75%	58 – 414	0	-	236	120%	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	10,464	20%	8,398 – 12,529	7,797	28%	2,667	60%	0	-
<b>Swans</b>									
Tundra swan	0	-	-	0	-	0	-	0	-
<b>Cranes</b>									
Sandhill crane	697	31%	479 – 915	697	48%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	1,752	31%	1,204 – 2,300	1,676	57%	76	115%	0	-
<b>Total ptarmigans and grouses</b>	1,752	31%	1,204 – 2,300	1,676	57%	76	115%	0	-
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	363	34%	240 – 486	363	60%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	1,305	30%	910 – 1,700	1,305	46%	0	-	0	-
Mew gull	3,555	25%	2,676 – 4,433	2,907	40%	647	86%	0	-
Glaucous gull	3,679	30%	2,579 – 4,778	2,384	52%	1,294	86%	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	8,901	24%	6,756 – 11,045	6,959	37%	1,941	83%	0	-
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	535	31%	372 – 699	535	55%	0	-	0	-
Small shorebird	630	49%	324 – 936	551	104%	79	120%	0	-
<b>Total shorebirds</b>	1,165	37%	730 – 1,601	1,087	75%	79	120%	0	-
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	90	61%	35 – 145	90	107%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	90	61%	35 – 145	90	107%	0	-	0	-
<b>Total eggs</b>	29,065	19%	23,646 – 34,484	23,784	28%	5,281	45%	0	-

Sampling effort (Yukon-Kuskokwim Delta South Coast, 2009): 2 out of 8 villages in this subregion were included in analysis; 32% of subregion households were represented in the sample. -: No reported harvest.

Table 11.–Estimated bird harvest, Yukon-Kuskokwim Delta region, Mid Coast subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	1,361	24%	1,029 – 1,693	0	-	344	56%	1,017	35%
Green-winged teal	1,200	16%	1,004 – 1,396	53	91%	38	122%	1,109	30%
Mallard	3,250	11%	2,892 – 3,609	294	56%	494	33%	2,462	23%
Northern pintail	6,310	16%	5,308 – 7,313	251	58%	1,442	37%	4,617	34%
Northern shoveler	3,805	12%	3,332 – 4,278	197	78%	1,206	43%	2,402	24%
Black scoter	401	49%	205 – 598	328	101%	0	-	74	108%
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	278	30%	196 – 361	278	40%	0	-	0	-
King eider	2,953	26%	2,197 – 3,709	2,953	35%	0	-	0	-
Spectacled eider	175	57%	75 – 275	166	87%	9	113%	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	169	47%	90 – 247	0	-	0	-	169	92%
Long-tailed duck	644	34%	428 – 861	8	118%	9	113%	627	48%
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>20,547</b>	<b>10%</b>	<b>18,461 – 22,632</b>	<b>4,529</b>	<b>27%</b>	<b>3,542</b>	<b>30%</b>	<b>12,476</b>	<b>21%</b>
<b>Geese</b>									
Black brant	7,714	12%	6,825 – 8,603	5,189	18%	636	53%	1,889	34%
Cackling Canada goose	9,287	11%	8,266 – 10,308	2,231	26%	3,446	30%	3,610	26%
Lesser Canada goose	8,460	10%	7,578 – 9,342	2,202	22%	2,607	24%	3,651	27%
White-fronted goose	15,597	8%	14,384 – 16,811	8,142	14%	4,601	19%	2,854	27%
Emperor goose	1,407	16%	1,177 – 1,638	1,041	26%	91	69%	276	57%
Lesser snow goose	1,207	35%	785 – 1,628	0	-	0	-	1,207	65%
<b>Total geese</b>	<b>43,673</b>	<b>7%</b>	<b>40,664 – 46,681</b>	<b>18,805</b>	<b>12%</b>	<b>11,380</b>	<b>17%</b>	<b>13,488</b>	<b>20%</b>
<b>Swans</b>									
Tundra swan	1,729	11%	1,545 – 1,914	591	25%	690	24%	448	35%
<b>Cranes</b>									
Sandhill crane	2,714	13%	2,361 – 3,068	1,790	21%	119	53%	806	45%
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	12,110	12%	10,686 – 13,534	10,754	16%	0	-	1,356	58%
<b>Total ptarmigans and grouses</b>	<b>12,110</b>	<b>12%</b>	<b>10,686 – 13,534</b>	<b>10,754</b>	<b>16%</b>	<b>0</b>	<b>-</b>	<b>1,356</b>	<b>58%</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	24	76%	6 – 43	24	118%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	69	80%	14 – 125	69	121%	0	-	0	-
Glaucous gull	118	57%	51 – 184	118	86%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>211</b>	<b>59%</b>	<b>87 – 335</b>	<b>211</b>	<b>89%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	1,592	29%	1,133 – 2,052	0	-	1,592	38%	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>1,592</b>	<b>29%</b>	<b>1,133 – 2,052</b>	<b>0</b>	<b>-</b>	<b>1,592</b>	<b>38%</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	59	55%	26 – 91	59	95%	0	-	0	-
Pacific loon	18	49%	9 – 27	18	81%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>76</b>	<b>45%</b>	<b>42 – 111</b>	<b>76</b>	<b>77%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>82,654</b>	<b>7%</b>	<b>77,275 – 88,033</b>	<b>36,756</b>	<b>11%</b>	<b>17,324</b>	<b>15%</b>	<b>28,573</b>	<b>19%</b>

Sampling effort (Yukon-Kuskokwim Delta Mid-Coast, 2009): 5 out of 9 villages in this subregion were included in analysis; 47% of subregion households were represented in the sample. - : No reported harvest.

Table 12.–Estimated egg harvest, Yukon-Kuskokwim Delta region, Mid -Coast subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	195	65%	69 – 322	195	112%	0	-	0	-
Mallard	111	55%	50 – 172	111	86%	0	-	0	-
Northern pintail	158	54%	73 – 244	158	86%	0	-	0	-
Northern shoveler	32	76%	8 – 57	32	118%	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	65	76%	15 – 114	65	118%	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	73	76%	17 – 128	73	118%	0	-	0	-
Common eider	97	76%	23 – 171	97	118%	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	65	76%	15 – 114	65	118%	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	797	38%	494 – 1,100	797	59%	0	-	0	-
<b>Geese</b>									
Black brant	2,727	21%	2,154 – 3,299	2,727	30%	0	-	0	-
Cackling Canada goose	5,593	16%	4,689 – 6,497	4,533	25%	1,060	47%	0	-
Lesser Canada goose	2,197	26%	1,617 – 2,777	2,038	41%	159	90%	0	-
White-fronted goose	7,043	15%	5,974 – 8,112	6,000	22%	1,043	51%	0	-
Emperor goose	1,001	36%	644 – 1,357	1,001	52%	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	18,561	15%	15,772 – 21,350	16,299	21%	2,262	44%	0	-
<b>Swans</b>									
Tundra swan	1,530	19%	1,236 – 1,824	1,200	34%	330	53%	0	-
<b>Cranes</b>									
Sandhill crane	1,679	18%	1,383 – 1,975	1,593	25%	86	91%	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	0	-	-	0	-	0	-	0	-
<b>Total ptarmigans and grouses</b>	0	-	-	0	-	0	-	0	-
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	122	54%	56 – 188	122	93%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	672	52%	322 – 1,023	672	80%	0	-	0	-
Glaucous gull	1,052	53%	493 – 1,611	1,052	76%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	1,847	36%	1,177 – 2,516	1,847	53%	0	-	0	-
<b>Shorebirds</b>									
Whimbrel	32	76%	8 – 57	32	118%	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	65	55%	29 – 100	65	81%	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	129	76%	31 – 228	129	118%	0	-	0	-
<b>Total shorebirds</b>	227	67%	75 – 378	227	101%	0	-	0	-
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	0	-	-	0	-	0	-	0	-
<b>Total eggs</b>	24,640	14%	21,150 – 28,129	21,962	20%	2,677	38%	0	-

Sampling effort (Yukon-Kuskokwim Delta Mid Coast, 2009): 5 out of 9 villages in this subregion were included in analysis; 47% of subregion households were represented in the sample. -: No reported harvest.

Table 13.–Estimated bird harvest, Yukon-Kuskokwim Delta region, North Coast subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	789	44%	442 – 1,136	48	76%	20	72%	722	81%
Green-winged teal	433	27%	314 – 551	20	70%	91	101%	322	49%
Mallard	1,900	17%	1,576 – 2,223	399	38%	678	51%	823	47%
Northern pintail	1,391	24%	1,052 – 1,730	657	25%	623	86%	111	65%
Northern shoveler	345	73%	93 – 597	31	109%	314	138%	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	20	81%	6 – 37	20	133%	0	-	0	-
Bufflehead	25	69%	9 – 41	20	133%	0	-	4	99%
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	36	53%	17 – 55	20	133%	16	124%	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	9	34%	6 – 12	0	-	0	-	9	100%
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	3	86%	1 – 6	3	139%	0	-	0	-
Long-tailed duck	22	76%	7 – 38	22	125%	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>4,972</b>	<b>20%</b>	<b>4,000 – 5,945</b>	<b>1,240</b>	<b>26%</b>	<b>1,743</b>	<b>73%</b>	<b>1,990</b>	<b>52%</b>
<b>Geese</b>									
Black brant	398	39%	242 – 554	361	72%	29	56%	8	97%
Cackling Canada goose	1,170	16%	983 – 1,357	516	32%	321	57%	333	55%
Lesser Canada goose	3,334	15%	2,846 – 3,823	1,146	20%	1,415	45%	774	49%
White-fronted goose	1,384	15%	1,183 – 1,585	1,059	21%	113	75%	212	93%
Emperor goose	38	49%	19 – 57	38	76%	0	-	0	-
Lesser snow goose	520	29%	367 – 673	520	42%	0	-	0	-
<b>Total geese</b>	<b>6,845</b>	<b>12%</b>	<b>6,033 – 7,656</b>	<b>3,641</b>	<b>20%</b>	<b>1,877</b>	<b>42%</b>	<b>1,327</b>	<b>43%</b>
<b>Swans</b>									
Tundra swan	939	15%	796 – 1,083	513	19%	87	51%	339	54%
<b>Cranes</b>									
Sandhill crane	500	16%	420 – 580	407	24%	61	80%	32	146%
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	368	78%	80 – 657	335	148%	16	151%	17	100%
<b>Total ptarmigans and grouses</b>	<b>368</b>	<b>78%</b>	<b>80 – 657</b>	<b>335</b>	<b>148%</b>	<b>16</b>	<b>151%</b>	<b>17</b>	<b>100%</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	0	-	-	0	-	0	-	0	-
Glaucous gull	0	-	-	0	-	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	13	95%	1 – 13	13	162%	0	-	0	-
<b>Total seabirds</b>	<b>13</b>	<b>95%</b>	<b>1 – 13</b>	<b>13</b>	<b>162%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>13,637</b>	<b>13%</b>	<b>11,826 – 15,448</b>	<b>6,147</b>	<b>22%</b>	<b>3,784</b>	<b>-</b>	<b>3,705</b>	<b>44%</b>

Sampling effort (Yukon-Kuskokwim Delta North Coast, 2009): 3 out of 4 villages in this subregion were included in analysis; 76% of subregion households were represented in the sample. -: No reported harvest.

Table 14.–Estimated eggs harvest, Yukon-Kuskokwim Delta region, North Coast subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	76	95%	6 – 148	76	162%	0	-	0	-
Mallard	4	97%	3 – 8	4	97%	0	-	0	-
Northern pintail	0	-	-	0	-	0	-	0	-
Northern shoveler	0	-	-	0	-	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	80	90%	9 – 152	80	154%	0	-	0	-
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	49	57%	34 – 77	49	63%	0	-	0	-
Lesser Canada goose	17	78%	13 – 30	17	77%	0	-	0	-
White-fronted goose	16	66%	11 – 26	16	72%	0	-	0	-
Emperor goose	44	66%	30 – 72	44	73%	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	125	47%	88 – 184	125	51%	0	-	0	-
<b>Swans</b>									
Tundra swan	22	51%	16 – 33	22	51%	0	-	0	-
<b>Cranes</b>									
Sandhill crane	51	43%	29 – 72	51	62%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	0	-	-	0	-	0	-	0	-
<b>Total ptarmigans and grouses</b>	0	-	-	0	-	0	-	0	-
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	26	97%	20 – 26	26	97%	0	-	0	-
Glaucous gull	2	91%	1 – 2	2	107%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	28	91%	21 – 28	28	91%	0	-	0	-
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	40	93%	4 – 77	40	160%	0	-	0	-
<b>Total shorebirds</b>	40	93%	4 – 77	40	160%	0	-	0	-
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	0	-	-	0	-	0	-	0	-
<b>Total eggs</b>	345	35%	224 – 467	345	49%	0	-	0	-

Sampling effort (Yukon-Kuskokwim Delta North Coast, 2009): 3 out of 4 villages in this subregion were included in analysis; 76% of subregion households were represented in the sample. -: No reported harvest.

Table 15.–Estimated bird harvest, Yukon-Kuskokwim Delta region, Lower Yukon subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	362	28%	260 – 465	168	39%	0	-	194	69%
Green-winged teal	0	-	-	0	-	0	-	0	-
Mallard	870	17%	726 – 1,015	331	23%	173	52%	367	46%
Northern pintail	187	24%	142 – 232	149	31%	0	-	38	77%
Northern shoveler	72	51%	35 – 110	42	88%	0	-	30	96%
Black scoter	227	12%	199 – 256	175	12%	15	90%	37	90%
Surf scoter	61	33%	41 – 81	38	40%	0	-	23	85%
White-winged scoter	67	33%	45 – 89	48	42%	0	-	19	86%
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	15	91%	4 – 29	0	-	0	-	15	123%
Canvasback	10	81%	2 – 18	10	132%	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	19	0%	19 – 19	19	0%	0	-	0	-
Long-tailed duck	82	32%	56 – 108	82	37%	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>1,973</b>	<b>16%</b>	<b>1,661 – 2,285</b>	<b>1,062</b>	<b>19%</b>	<b>188</b>	<b>50%</b>	<b>724</b>	<b>43%</b>
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	1,186	17%	984 – 1,387	854	26%	10	124%	321	41%
Lesser Canada goose	909	17%	757 – 1,061	582	26%	166	41%	161	42%
White-fronted goose	1,413	14%	1,221 – 1,604	785	17%	125	45%	502	41%
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	504	23%	386 – 622	336	36%	49	64%	119	53%
<b>Total geese</b>	<b>4,012</b>	<b>12%</b>	<b>3,513 – 4,511</b>	<b>2,558</b>	<b>17%</b>	<b>350</b>	<b>39%</b>	<b>1,104</b>	<b>31%</b>
<b>Swans</b>									
Tundra swan	647	14%	555 – 740	437	26%	73	49%	137	37%
<b>Cranes</b>									
Sandhill crane	21	50%	11 – 32	21	75%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	30	42%	18 – 43	30	54%	0	-	0	-
Ptarmigan	196	31%	135 – 257	196	40%	0	-	0	-
<b>Total ptarmigans and grouses</b>	<b>227</b>	<b>31%</b>	<b>156 – 297</b>	<b>227</b>	<b>40%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	20	85%	4 – 36	0	-	0	-	20	124%
Glaucous gull	0	-	-	0	-	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>20</b>	<b>85%</b>	<b>4 – 36</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>20</b>	<b>124%</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	4	0%	4 – 4	4	0%	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>4</b>	<b>0%</b>	<b>4 – 4</b>	<b>4</b>	<b>0%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>6,904</b>	<b>12%</b>	<b>6,073 – 7,735</b>	<b>4,309</b>	<b>15%</b>	<b>611</b>	<b>39%</b>	<b>1,984</b>	<b>32%</b>

Sampling effort (Lower Yukon, 2009): 4 out of 6 villages in this subregion were included in analysis; 53% of subregion households were represented in the sample. -: No reported harvest.



Table 16.–Estimated egg harvest, Yukon-Kuskokwim Delta region, Lower Yukon subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	19	91%	5 – 36	19	123%	0	-	0	-
Green-winged teal	0	-	-	0	-	0	-	0	-
Mallard	34	60%	14 – 55	34	87%	0	-	0	-
Northern pintail	0	-	-	0	-	0	-	0	-
Northern shoveler	0	-	-	0	-	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>53</b>	<b>51%</b>	<b>26 – 53</b>	<b>53</b>	<b>70%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	50	63%	18 – 82	50	94%	0	-	0	-
Lesser Canada goose	107	47%	57 – 157	107	73%	0	-	0	-
White-fronted goose	94	53%	44 – 143	94	83%	0	-	0	-
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>251</b>	<b>48%</b>	<b>129 – 372</b>	<b>251</b>	<b>75%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Swans</b>									
Tundra swan	74	38%	46 – 103	74	56%	0	-	0	-
<b>Cranes</b>									
Sandhill crane	8	91%	2 – 15	8	123%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	0	-	-	0	-	0	-	0	-
<b>Total ptarmigans and grouse:</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	0	-	-	0	-	0	-	0	-
Glaucous gull	0	-	-	0	-	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total eggs</b>	<b>386</b>	<b>40%</b>	<b>233 – 539</b>	<b>386</b>	<b>61%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>

Sampling effort (Lower Yukon, 2009): 4 out of 6 villages in this subregion were included in analysis; 53% of subregion households were represented in the sample. -: No reported harvest.

Table 17.–Estimated bird harvest, Yukon-Kuskokwim Delta region, Lower Kuskokwim subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	632	21%	499 – 765	359	40%	57	86%	216	51%
Green-winged teal	500	30%	348 – 651	79	77%	54	133%	367	55%
Mallard	2,133	13%	1,854 – 2,411	1,227	25%	242	54%	664	30%
Northern pintail	1,459	14%	1,253 – 1,664	774	29%	58	104%	626	29%
Northern shoveler	687	20%	546 – 827	172	40%	10	119%	505	40%
Black scoter	6,655	11%	5,934 – 7,376	4,657	15%	865	45%	1,133	31%
Surf scoter	1,179	26%	874 – 1,484	1,150	38%	0	-	29	119%
White-winged scoter	1,462	23%	1,125 – 1,799	1,032	42%	20	135%	410	55%
Bufflehead	11	71%	3 – 19	7	122%	0	-	5	122%
Goldeneye	260	32%	176 – 344	138	78%	16	99%	106	66%
Canvasback	529	24%	400 – 658	413	38%	27	90%	89	73%
Scaup	6,708	12%	5,885 – 7,531	4,342	19%	1,838	26%	529	44%
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	45	106%	10 – 92	45	140%	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	19	62%	7 – 31	9	122%	0	-	10	119%
Long-tailed duck	513	24%	389 – 636	323	38%	154	71%	36	100%
Common merganser	48	44%	27 – 69	25	98%	14	105%	9	-
Red-breasted merganser	20	63%	8 – 33	20	94%	0	-	0	-
<b>Total ducks</b>	<b>22,858</b>	<b>9%</b>	<b>20,746 – 24,969</b>	<b>14,770</b>	<b>15%</b>	<b>3,355</b>	<b>28%</b>	<b>4,733</b>	<b>22%</b>
<b>Geese</b>									
Black brant	91	94%	19 – 176	91	125%	0	-	0	-
Cackling Canada goose	3,793	13%	3,306 – 4,281	2,958	20%	262	42%	574	38%
Lesser Canada goose	3,214	12%	2,830 – 3,598	2,318	19%	199	54%	696	31%
White-fronted goose	5,845	12%	5,169 – 6,522	4,456	18%	297	63%	1,092	26%
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>12,943</b>	<b>10%</b>	<b>11,661 – 14,226</b>	<b>9,823</b>	<b>15%</b>	<b>758</b>	<b>43%</b>	<b>2,363</b>	<b>22%</b>
<b>Swans</b>									
Tundra swan	1,323	12%	1,169 – 1,477	877	18%	29	91%	417	25%
<b>Cranes</b>									
Sandhill crane	838	12%	739 – 937	509	18%	130	50%	198	41%
<b>Ptarmigans and grouses</b>									
Spruce grouse	54	55%	24 – 84	0	-	22	133%	33	133%
Ptarmigan	6,797	16%	5,704 – 7,891	5,852	24%	911	52%	34	119%
<b>Total ptarmigans and grouse</b>	<b>6,852</b>	<b>16%</b>	<b>5,756 – 7,947</b>	<b>5,852</b>	<b>24%</b>	<b>933</b>	<b>52%</b>	<b>67</b>	<b>89%</b>
<b>Seabirds</b>									
Comorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	11	75%	3 – 19	0	-	11	133%	0	-
Glaucous gull	0	-	-	0	-	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>11</b>	<b>75%</b>	<b>3 – 19</b>	<b>0</b>	<b>-</b>	<b>11</b>	<b>133%</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	29	81%	6 – 53	5	122%	0	-	25	135%
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	9	91%	2 – 17	9	122%	0	-	0	-
<b>Total shorebirds</b>	<b>38</b>	<b>69%</b>	<b>12 – 65</b>	<b>14</b>	<b>122%</b>	<b>0</b>	<b>-</b>	<b>25</b>	<b>135%</b>
<b>Loons</b>									
Common loon	25	86%	5 – 46	25	119%	0	-	0	-
Pacific loon	3	102%	1 – 7	3	122%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>28</b>	<b>76%</b>	<b>7 – 49</b>	<b>28</b>	<b>105%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Other/unknown bird</b>	<b>43</b>	<b>75%</b>	<b>11 – 76</b>	<b>0</b>	<b>-</b>	<b>43</b>	<b>133%</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>44,934</b>	<b>9%</b>	<b>40,918 – 48,950</b>	<b>31,872</b>	<b>13%</b>	<b>5,260</b>	<b>30%</b>	<b>7,802</b>	<b>20%</b>

Sampling effort (Lower Kuskokwim, 2009): 6 out of 13 villages in this subregion were included in analysis; 47% of subregion households were represented in the sample. -: No reported harvest.

Table 18.–Estimated egg harvest, Yukon-Kuskokwim Delta region, Lower Kuskokwim subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	48	78%	11 – 85	48	124%	0	-	0	-
Mallard	138	51%	68 – 207	138	69%	0	-	0	-
Northern pintail	179	54%	82 – 275	179	83%	0	-	0	-
Northern shoveler	45	91%	10 – 87	45	122%	0	-	0	-
Black scoter	65	70%	20 – 110	65	94%	0	-	0	-
Surf'scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	31	102%	9 – 62	31	122%	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>505</b>	<b>32%</b>	<b>343 – 667</b>	<b>505</b>	<b>47%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	278	47%	147 – 408	278	67%	0	-	0	-
Lesser Canada goose	173	63%	63 – 282	173	88%	0	-	0	-
White-fronted goose	469	29%	334 – 604	469	40%	0	-	0	-
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>920</b>	<b>30%</b>	<b>641 – 1,199</b>	<b>920</b>	<b>42%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Swans</b>									
Tundra swan	253	53%	120 – 386	253	72%	0	-	0	-
Sandhill crane	174	31%	120 – 227	174	44%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	250	46%	134 – 366	196	74%	54	119%	0	-
<b>Total ptarmigans and grouses</b>	<b>250</b>	<b>46%</b>	<b>134 – 366</b>	<b>196</b>	<b>74%</b>	<b>54</b>	<b>119%</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	29	78%	6 – 51	29	124%	0	-	0	-
Arctic tern	87	52%	42 – 132	87	63%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	429	54%	197 – 661	429	77%	0	-	0	-
Glaucous gull	59	86%	12 – 109	59	119%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>604</b>	<b>44%</b>	<b>339 – 869</b>	<b>604</b>	<b>62%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	210	71%	61 – 359	210	113%	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	153	59%	62 – 243	153	69%	0	-	0	-
<b>Total shorebirds</b>	<b>363</b>	<b>48%</b>	<b>189 – 536</b>	<b>363</b>	<b>72%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	10	86%	2 – 18	10	119%	0	-	0	-
Pacific loon	10	78%	10 – 17	10	124%	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>19</b>	<b>58%</b>	<b>8 – 31</b>	<b>19</b>	<b>86%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total eggs</b>	<b>3,087</b>	<b>28%</b>	<b>2,218 – 3,957</b>	<b>3,033</b>	<b>39%</b>	<b>54</b>	<b>119%</b>	<b>0</b>	<b>-</b>

Sampling effort (Lower Kuskokwim, 2009): 6 out of 13 villages in this subregion were included in analysis; 47% of subregion households were represented in the sample. -: No reported harvest.

Table 19.—Estimated bird harvest, Yukon-Kuskokwim Delta region, Bethel subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	340	41%	201 – 479	0	-	65	155%	275	79%
Green-winged teal	58	44%	33 – 84	3	154%	16	155%	39	94%
Mallard	295	26%	218 – 373	59	50%	0	-	237	55%
Northern pintail	542	28%	388 – 695	98	60%	130	122%	314	65%
Northern shoveler	49	62%	18 – 79	10	115%	0	-	39	131%
Black scoter	479	30%	335 – 622	430	57%	13	155%	36	98%
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	534	48%	276 – 793	521	86%	0	-	13	155%
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	7	89%	2 – 12	7	154%	0	-	0	-
Canvasback	13	89%	4 – 25	13	154%	0	-	0	-
Scaup	120	73%	37 – 208	98	154%	0	-	23	110%
Common eider	0	-	-	0	-	0	-	0	-
King eider	218	69%	67 – 369	218	120%	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	3	89%	1 – 6	3	154%	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>2,659</b>	<b>21%</b>	<b>2,106 – 3,211</b>	<b>1,460</b>	<b>55%</b>	<b>224</b>	<b>115%</b>	<b>975</b>	<b>48%</b>
<b>Geese</b>									
Black brant	36	50%	18 – 54	36	87%	0	-	0	-
Cackling Canada goose	1,174	17%	973 – 1,376	785	34%	0	-	389	57%
Lesser Canada goose	299	24%	227 – 371	153	62%	23	134%	123	61%
White-fronted goose	1,922	15%	1,634 – 2,210	1,242	30%	65	109%	616	51%
Emperor goose	10	89%	3 – 18	10	154%	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>3,441</b>	<b>14%</b>	<b>2,968 – 3,913</b>	<b>2,226</b>	<b>29%</b>	<b>87</b>	<b>88%</b>	<b>1,127</b>	<b>43%</b>
<b>Swans</b>									
Tundra swan	52	28%	37 – 67	29	56%	0	-	23	85%
Sandhill crane	78	34%	52 – 105	75	60%	0	-	3	155%
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	1,242	28%	895 – 1,589	1,242	48%	0	-	0	-
<b>Total ptarmigans and grouses</b>	<b>1,242</b>	<b>28%</b>	<b>895 – 1,589</b>	<b>1,242</b>	<b>48%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	0	-	-	0	-	0	-	0	-
Glaucous gull	0	-	-	0	-	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	7	89%	2 – 12	7	154%	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>7</b>	<b>89%</b>	<b>2 – 12</b>	<b>7</b>	<b>154%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total birds</b>	<b>7,478</b>	<b>14%</b>	<b>6,454 – 8,501</b>	<b>5,038</b>	<b>30%</b>	<b>311</b>	<b>90%</b>	<b>2,129</b>	<b>40%</b>

Sampling effort (Bethel, 2009): 1 out of 1 village in this subregion was included in analysis. Harvest expansion assumed that harvesters account for 30% of the total village households (village size estimate). - : No reported harvest.

Table 20.—Estimated egg harvest, Yukon-Kuskokwim Delta region, Bethel subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	0	-	-	0	-	0	-	0	-
Mallard	0	-	-	0	-	0	-	0	-
Northern pintail	0	-	-	0	-	0	-	0	-
Northern shoveler	0	-	-	0	-	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	0	-	-	0	-	0	-	0	-
King eider	0	-	-	0	-	0	-	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	0	-	-	0	-	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	0	-	-	0	-	0	-	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	0	-	-	0	-	0	-	0	-
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	0	-
Cackling Canada goose	0	-	-	0	-	0	-	0	-
Lesser Canada goose	0	-	-	0	-	0	-	0	-
White-fronted goose	33	89%	10 – 62	33	154%	0	-	0	-
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	33	89%	10 – 62	33	154%	0	-	0	-
<b>Swans</b>									
Tundra swan	10	89%	3 – 18	10	154%	0	-	0	-
<b>Cranes</b>									
Sandhill crane	7	89%	2 – 12	7	154%	0	-	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	39	89%	12 – 74	39	154%	0	-	0	-
<b>Total ptarmigans and grouses</b>	39	89%	12 – 74	39	154%	0	-	0	-
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	7	89%	2 – 12	7	154%	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	65	89%	20 – 123	65	154%	0	-	0	-
Glaucous gull	20	89%	6 – 37	20	154%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	91	89%	28 – 172	91	154%	0	-	0	-
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	0	-	-	0	-	0	-	0	-
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	0	-
Pacific loon	0	-	-	0	-	0	-	0	-
Red-throated loon	0	-	-	0	-	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	0	-	-	0	-	0	-	0	-
<b>Total eggs</b>	179	84%	55 – 330	179	146%	0	-	0	-

Sampling effort (Bethel, 2009): 1 out of 1 village in this subregion was included in analysis. Harvest expansion assumed that harvesters account for 30% of the total village households (village size estimate). -: No reported harvest.

Table 21.—Estimated bird harvest, Bering Strait-Norton Sound region, St. Lawrence-Diomedé subregion, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	18	94%	4 – 35	18	161%	0	-	0	-
Mallard	0	-	-	0	-	0	-	0	-
Northern pintail	99	61%	38 – 159	81	116%	7	155%	11	155%
Northern shoveler	0	-	-	0	-	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	18	94%	4 – 35	18	161%	0	-	0	-
White-winged scoter	45	96%	9 – 88	0	-	0	-	45	164%
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	2,409	21%	1,914 – 2,904	1,113	43%	494	72%	802	72%
King eider	983	39%	597 – 1,368	493	71%	71	89%	419	131%
Spectacled eider	144	38%	88 – 199	123	73%	3	154%	17	154%
Steller's eider	36	91%	10 – 68	36	155%	0	-	0	-
Harlequin duck	37	73%	10 – 64	27	161%	0	-	10	154%
Long-tailed duck	643	55%	291 – 994	532	109%	89	155%	21	155%
Common merganser	17	55%	8 – 26	5	164%	0	-	12	113%
Red-breasted merganser	0	-	-	0	-	0	-	0	-
Duck (unidentified)	9	94%	2 – 17	0	-	0	-	9	161%
<b>Total ducks</b>	<b>4,457</b>	<b>24%</b>	<b>3,376 – 5,537</b>	<b>2,445</b>	<b>55%</b>	<b>665</b>	<b>67%</b>	<b>1,347</b>	<b>85%</b>
<b>Geese</b>									
Black brant	660	24%	500 – 820	295	59%	71	119%	293	64%
Cackling Canada goose	21	91%	6 – 41	21	155%	0	-	0	-
Lesser Canada goose	43	77%	12 – 76	36	155%	7	155%	0	-
White-fronted goose	36	69%	11 – 61	36	118%	0	-	0	-
Emperor goose	1,286	51%	625 – 1,946	180	64%	205	91%	900	122%
Lesser snow goose	2,226	35%	1,436 – 3,016	193	70%	25	116%	2,008	64%
<b>Total geese</b>	<b>4,272</b>	<b>35%</b>	<b>2,788 – 5,756</b>	<b>762</b>	<b>51%</b>	<b>309</b>	<b>96%</b>	<b>3,201</b>	<b>77%</b>
<b>Swans</b>									
Tundra swan	254	25%	189 – 319	159	36%	32	120%	62	134%
<b>Cranes</b>									
Sandhill crane	120	46%	65 – 176	35	100%	29	110%	57	145%
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	0	-	-	0	-	0	-	0	-
<b>Total ptarmigans and grouses</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Cormorant	6,363	22%	4,988 – 7,739	412	83%	464	107%	5,487	39%
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	106	48%	55 – 156	43	155%	0	-	63	87%
Sabine's gull	18	94%	4 – 35	18	161%	0	-	0	-
Mew gull	0	-	-	0	-	0	-	0	-
Glaucous gull	542	37%	341 – 742	7	155%	73	77%	461	71%
Auklet	9,151	21%	7,236 – 11,066	7,025	36%	1,770	106%	357	155%
Murre	13,855	18%	11,347 – 16,364	10,865	26%	2,290	125%	700	80%
Guillemot	1,141	47%	605 – 1,677	0	-	0	-	1,141	79%
Puffin	4	91%	1 – 7	4	155%	0	-	0	-
<b>Total seabirds</b>	<b>31,179</b>	<b>15%</b>	<b>26,541 – 35,817</b>	<b>18,373</b>	<b>28%</b>	<b>4,597</b>	<b>98%</b>	<b>8,209</b>	<b>45%</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	126	67%	42 – 209	0	-	72	161%	54	161%
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>126</b>	<b>67%</b>	<b>42 – 209</b>	<b>0</b>	<b>-</b>	<b>72</b>	<b>161%</b>	<b>54</b>	<b>161%</b>
<b>Loons</b>									
Common loon	241	26%	179 – 303	41	112%	21	95%	178	51%
Pacific loon	106	42%	62 – 150	39	112%	11	155%	56	106%
Red-throated loon	254	29%	182 – 327	30	114%	14	120%	210	55%
Yellow-billed loon	167	60%	67 – 267	34	108%	11	155%	123	135%
<b>Total loons</b>	<b>768</b>	<b>32%</b>	<b>520 – 1,016</b>	<b>145</b>	<b>100%</b>	<b>57</b>	<b>118%</b>	<b>567</b>	<b>68%</b>
<b>Total birds</b>	<b>41,176</b>	<b>16%</b>	<b>34,634 – 47,718</b>	<b>21,919</b>	<b>28%</b>	<b>5,760</b>	<b>88%</b>	<b>13,497</b>	<b>56%</b>

Sampling effort (St. Lawrence-Diomedé Is., 2009): 2 out of 3 villages in this subregion were included in analysis; 89% of subregion households were represented in the sample. -: No reported harvest.

Table 22.—Estimated egg harvest, Bering Strait-Norton Sound region, St. Lawrence-Diomedé subregion, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number	95% CI
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	0	-
Green-winged teal	0	-	-	0	-	0	-	0	-
Mallard	4	91%	1 – 7	0	-	4	155%	0	-
Northern pintail	0	-	-	0	-	0	-	0	-
Northern shoveler	0	-	-	0	-	0	-	0	-
Black scoter	0	-	-	0	-	0	-	0	-
Surf scoter	0	-	-	0	-	0	-	0	-
White-winged scoter	0	-	-	0	-	0	-	0	-
Bufflehead	0	-	-	0	-	0	-	0	-
Goldeneye	0	-	-	0	-	0	-	0	-
Canvasback	0	-	-	0	-	0	-	0	-
Scaup	0	-	-	0	-	0	-	0	-
Common eider	887	36%	563 – 1,211	709	65%	178	155%	0	-
King eider	400	57%	171 – 630	222	126%	178	155%	0	-
Spectacled eider	0	-	-	0	-	0	-	0	-
Steller's eider	36	91%	10 – 68	36	155%	0	-	0	-
Harlequin duck	0	-	-	0	-	0	-	0	-
Long-tailed duck	357	64%	129 – 585	178	155%	178	155%	0	-
Common merganser	0	-	-	0	-	0	-	0	-
Red-breasted merganser	0	-	-	0	-	0	-	0	-
<b>Total ducks</b>	<b>1,683</b>	<b>44%</b>	<b>938 – 2,429</b>	<b>1,145</b>	<b>84%</b>	<b>539</b>	<b>153%</b>	<b>0</b>	<b>-</b>
<b>Geese</b>									
Black brant	45	94%	10 – 87	45	161%	0	-	0	-
Cackling Canada goose	0	-	-	0	-	0	-	0	-
Lesser Canada goose	0	-	-	0	-	0	-	0	-
White-fronted goose	0	-	-	0	-	0	-	0	-
Emperor goose	0	-	-	0	-	0	-	0	-
Lesser snow goose	0	-	-	0	-	0	-	0	-
<b>Total geese</b>	<b>45</b>	<b>94%</b>	<b>10 – 87</b>	<b>45</b>	<b>161%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Swans</b>									
Tundra swan	21	91%	6 – 41	0	-	21	155%	0	-
<b>Cranes</b>									
Sandhill crane	29	91%	8 – 55	0	-	29	155%	0	-
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	0	-
Ptarmigan	0	-	-	0	-	0	-	0	-
<b>Total ptarmigans and grouses</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Seabirds</b>									
Comorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	196	91%	55 – 375	196	155%	0	-	0	-
Glaucous gull	357	64%	129 – 585	178	155%	178	155%	0	-
Auklet	224	75%	66 – 391	224	127%	0	-	0	-
Murre	114,415	17%	95,173 – 133,657	110,573	22%	3,842	143%	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>115,192</b>	<b>17%</b>	<b>95,860 – 134,525</b>	<b>111,172</b>	<b>22%</b>	<b>4,020</b>	<b>144%</b>	<b>0</b>	<b>-</b>
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	0	-
Bristle-thighed curlew	0	-	-	0	-	0	-	0	-
Godwit	0	-	-	0	-	0	-	0	-
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	0	-	-	0	-	0	-	0	-
<b>Total shorebirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Loons</b>									
Common loon	54	91%	15 – 102	54	155%	0	-	0	-
Pacific loon	54	91%	15 – 102	54	155%	0	-	0	-
Red-throated loon	46	91%	13 – 89	46	155%	0	-	0	-
Yellow-billed loon	50	91%	14 – 95	50	155%	0	-	0	-
<b>Total loons</b>	<b>203</b>	<b>91%</b>	<b>57 – 388</b>	<b>203</b>	<b>155%</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>
<b>Total eggs</b>	<b>117,174</b>	<b>17%</b>	<b>97,604 – 136,744</b>	<b>112,565</b>	<b>22%</b>	<b>4,609</b>	<b>145%</b>	<b>0</b>	<b>-</b>

Sampling effort (St. Lawrence-Diomedé Is., 2009): 2 out of 3 villages in this subregion were included in analysis; 89% of subregion households were represented in the sample. - : No reported harvest.

Table 23.—Estimated bird harvest, North Slope region, 2009.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low	High	Number	95% CI	Number	95% CI	Number
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	a	
Green-winged teal	0	-	-	0	-	0	-	a	
Mallard	13	119%	2 – 28	0	-	13	119%	a	
Northern pintail	9	172%	2 – 24	9	172%	0	-	a	
Northern shoveler	0	-	-	0	-	0	-	a	
Black scoter	46	75%	11 – 80	46	75%	0	-	a	
Surf scoter	0	-	-	0	-	0	-	a	
White-winged scoter	0	-	-	0	-	0	-	a	
Bufflehead	0	-	-	0	-	0	-	a	
Goldeneye	0	-	-	0	-	0	-	a	
Canvasback	0	-	-	0	-	0	-	a	
Scaup	0	-	-	0	-	0	-	a	
Common eider	1,912	57%	829 – 2,996	1,582	62%	330	82%	a	
King eider	4,319	49%	2,212 – 6,426	3,217	38%	1,102	112%	a	
Spectacled eider	392	151%	31 – 984	164	151%	228	151%	a	
Steller's eider	0	-	-	0	-	0	-	a	
Harlequin duck	0	-	-	0	-	0	-	a	
Long-tailed duck	57	65%	20 – 95	12	124%	46	75%	a	
Common merganser	0	-	-	0	-	0	-	a	
Red-breasted merganser	0	-	-	0	-	0	-	a	
<b>Total ducks</b>	<b>6,748</b>	<b>43%</b>	<b>3,842 – 9,654</b>	<b>5,030</b>	<b>40%</b>	<b>1,718</b>	<b>83%</b>	<b>a</b>	
<b>Geese</b>									
Black brant	2,011	55%	907 – 3,114	1,764	60%	247	75%	a	
Cackling Canada goose	275	55%	123 – 427	184	52%	91	75%	a	
Lesser Canada goose	475	57%	206 – 745	475	57%	0	-	a	
White-fronted goose	7,825	25%	5,857 – 9,793	7,762	25%	62	193%	a	
Emperor goose	0	-	-	0	-	0	-	a	
Lesser snow goose	356	45%	196 – 516	356	45%	0	-	a	
<b>Total geese</b>	<b>10,942</b>	<b>22%</b>	<b>8,522 – 13,362</b>	<b>10,541</b>	<b>22%</b>	<b>401</b>	<b>65%</b>	<b>a</b>	
<b>Swans</b>									
Tundra swan	9	172%	2 – 24	9	172%	0	-	a	
<b>Cranes</b>									
Sandhill crane	4	172%	1 – 12	4	172%	0	-	a	
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	a	
Ptarmigan	1,267	33%	847 – 1,687	1,267	33%	0	-	a	
<b>Total ptarmigans and grouses</b>	<b>1,267</b>	<b>33%</b>	<b>847 – 1,687</b>	<b>1,267</b>	<b>33%</b>	<b>0</b>	<b>-</b>	<b>a</b>	
<b>Seabirds</b>									
Comorant	0	-	-	0	-	0	-	a	
Arctic tern	0	-	-	0	-	0	-	a	
Kittiwake	0	-	-	0	-	0	-	a	
Sabine's gull	0	-	-	0	-	0	-	a	
Mew gull	0	-	-	0	-	0	-	a	
Glaucous gull	0	-	-	0	-	0	-	a	
Auklet	0	-	-	0	-	0	-	a	
Murre	0	-	-	0	-	0	-	a	
Guillemot	0	-	-	0	-	0	-	a	
Puffin	0	-	-	0	-	0	-	a	
<b>Total seabirds</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>a</b>	
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	a	
Bristle-thighed curlew	0	-	-	0	-	0	-	a	
Godwit	0	-	-	0	-	0	-	a	
Golden plover	46	75%	11 – 80	46	75%	0	-	a	
Small shorebird	0	-	-	0	-	0	-	a	
<b>Total shorebirds</b>	<b>46</b>	<b>75%</b>	<b>11 – 80</b>	<b>46</b>	<b>75%</b>	<b>0</b>	<b>-</b>	<b>a</b>	
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	a	
Pacific loon	0	-	-	0	-	0	-	a	
Red-throated loon	9	172%	2 – 24	0	-	9	-	a	
Yellow-billed loon <sup>b</sup>	51	151%	4 – 127	51	-	0	-	a	
<b>Total loons</b>	<b>59</b>	<b>131%</b>	<b>6 – 137</b>	<b>51</b>	<b>-</b>	<b>9</b>	<b>172%</b>	<b>a</b>	
<b>Total birds</b>	<b>19,075</b>	<b>24%</b>	<b>14,509 – 23,642</b>	<b>16,948</b>	<b>-</b>	<b>2,128</b>	<b>71%</b>	<b>a</b>	

Sampling effort (North Slope, 2009): 4 out of 8 villages in this region were included in analysis; 2 out of 2 subregions were represented in the sample. -: No reported harvest. a: There is no fall survey in the North Slope Region.

b. In the North Slope Region, loons are occasionally entangled in subsistence fishing nets. Entangled yellow-billed loons salvaged from fishing nets are used for ceremonial purposes and were reported as "harvested" in this survey. Reported numbers of yellow-billed loons for the region were 4 birds in 2009.



Table 24.–Estimated egg harvest, North Slope region, 2009.

Species	Annual estimated egg harvest			Estimated egg harvest by season					
	Number	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low	High	Number	95% CI	Number	95% CI	Number
<b>Ducks</b>									
American wigeon	0	-	-	0	-	0	-	a	
Green-winged teal	0	-	-	0	-	0	-	a	
Mallard	0	-	-	0	-	0	-	a	
Northern pintail	0	-	-	0	-	0	-	a	
Northern shoveler	0	-	-	0	-	0	-	a	
Black scoter	137	75%	34	240	137	75%	0	-	a
Surf scoter	0	-	-	0	-	0	-	a	
White-winged scoter	114	75%	28	200	114	75%	0	-	a
Bufflehead	0	-	-	0	-	0	-	a	
Goldeneye	0	-	-	0	-	0	-	a	
Canvasback	0	-	-	0	-	0	-	a	
Scaup	0	-	-	0	-	0	-	a	
Common eider	1,736	75%	427	3,044	1,736	75%	0	-	a
King eider	0	-	-	0	-	0	-	a	
Spectacled eider	0	-	-	0	-	0	-	a	
Steller's eider	0	-	-	0	-	0	-	a	
Harlequin duck	0	-	-	0	-	0	-	a	
Long-tailed duck	0	-	-	0	-	0	-	a	
Common merganser	0	-	-	0	-	0	-	a	
Red-breasted merganser	0	-	-	0	-	0	-	a	
<b>Total ducks</b>	1,987	75%	489	3,485	1,987	75%	0	-	a
<b>Geese</b>									
Black brant	0	-	-	0	-	0	-	a	
Cackling Canada goose	0	-	-	0	-	0	-	a	
Lesser Canada goose	0	-	-	0	-	0	-	a	
White-fronted goose	404	124%	45	905	404	124%	0	-	a
Emperor goose	0	-	-	0	-	0	-	a	
Lesser snow goose	0	-	-	0	-	0	-	a	
<b>Total geese</b>	404	124%	45	905	404	124%	0	-	a
<b>Swans</b>									
Tundra swan	38	151%	3	95	38	151%	0	-	a
<b>Cranes</b>									
Sandhill crane	0	-	-	0	-	0	-	a	
<b>Ptarmigans and grouses</b>									
Spruce grouse	0	-	-	0	-	0	-	a	
Ptarmigan	0	-	-	0	-	0	-	a	
<b>Total ptarmigans and grouses</b>	0	-	-	0	-	0	-	a	
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	a	
Arctic tern	0	-	-	0	-	0	-	a	
Kittiwake	0	-	-	0	-	0	-	a	
Sabine's gull	0	-	-	0	-	0	-	a	
Mew gull	0	-	-	0	-	0	-	a	
Glaucous gull	0	-	-	0	-	0	-	a	
Auklet	0	-	-	0	-	0	-	a	
Murre	0	-	-	0	-	0	-	a	
Guillemot	0	-	-	0	-	0	-	a	
Puffin	0	-	-	0	-	0	-	a	
<b>Total seabirds</b>	0	-	-	0	-	0	-	a	
<b>Shorebirds</b>									
Whimbrel	0	-	-	0	-	0	-	a	
Bristle-thighed curlew	0	-	-	0	-	0	-	a	
Godwit	0	-	-	0	-	0	-	a	
Golden plover	0	-	-	0	-	0	-	a	
Small shorebird	0	-	-	0	-	0	-	a	
<b>Total shorebirds</b>	0	-	-	0	-	0	-	a	
<b>Loons</b>									
Common loon	0	-	-	0	-	0	-	a	
Pacific loon	0	-	-	0	-	0	-	a	
Red-throated loon	0	-	-	0	-	0	-	a	
Yellow-billed loon	0	-	-	0	-	0	-	a	
<b>Total loons</b>	0	-	-	0	-	0	-	a	
<b>Total eggs</b>	2,430	66%	834	4,025	2,430	66%	0	-	a

Sampling effort (North Slope, 2009): 4 out of 8 villages in this region were included in analysis; 2 out of 2 subregions were represented in the sample. -: No reported harvest. a: There is no fall survey in the North Slope Region.

# HOUSEHOLD PARTICIPATION RATES 2004–2009

Table 25.—Household participation rates, 2004–2009.

Region Subregion	2004		2005		2006		2007		2008		2009	
	Household participation rate	Households contacted <sup>a</sup>	Household participation rate	Households contacted <sup>a</sup>	Household participation rate	Households contacted <sup>a</sup>	Household participation rate	Households contacted <sup>a</sup>	Household participation rate	Households contacted <sup>a</sup>	Household participation rate	Households contacted <sup>a</sup>
<b>Gulf of Alaska-Cook Inlet</b>	<b>97%</b>	<b>32</b>	-	-	-	-	-	-	-	-	-	-
Gulf of Alaska	100%	18	-	-	79%	24	-	-	-	-	-	-
Cook Inlet	93%	14	71%	17	-	-	-	-	-	-	-	-
<b>Kodiak Archipelago</b>	-	-	-	-	<b>72%</b>	<b>233</b>	-	-	-	-	-	-
Kodiak Villages	100%	65b	-	-	75%	169	-	-	-	-	-	-
Kodiak City & Road-connected	-	-	-	-	64%	64	-	-	-	-	-	-
<b>Aleutian-Pribilof Islands</b>	-	-	-	-	-	-	-	-	<b>97%</b>	<b>189</b>	-	-
Aleutian-Pribilof Villages	-	-	97%	38	-	-	100%	25	95%	73	-	-
Unalaska	-	-	-	-	-	-	-	-	99%	116	-	-
<b>Bristol Bay</b>	-	-	-	-	-	-	<b>89%</b>	<b>354</b>	<b>98%</b>	<b>357</b>	-	-
South Alaska Peninsula	-	-	-	-	-	-	93%	29	-	-	-	-
Southwest Bristol Bay	-	-	-	-	-	-	85%	214	96%	155	-	-
Dillingham	-	-	-	-	-	-	97%	111	100%	202	-	-
<b>Yukon-Kuskokwim Delta</b>	-	-	-	-	-	-	-	-	<b>62%</b>	<b>1,300</b>	-	-
Y-K Delta South Coast	-	-	-	-	78%	90	86%	283	73%	173	-	-
Y-K Delta Mid Coast	-	-	-	-	81%	156	54%	257	50%	400	-	-
Y-K Delta North Coast	-	-	-	-	56%	107	44%	255	63%	300	-	-
Lower Yukon	-	-	-	-	84%	56	60%	211	98%	94	-	-
Lower Kuskokwim	-	-	-	-	63%	294	60%	602	61%	333	-	-
Central Kuskokwim	-	-	-	-	74%	73	-	-	-	-	-	-
Bethel	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bering Strait-Norton Sound</b>	<b>71%</b>	<b>525</b>	<b>80%</b>	<b>354</b>	-	-	<b>90%</b>	<b>436</b>	-	-	-	-
St. Lawrence-Diomedes Is.	75%	109	87%	75	-	-	95%	86	-	-	42%	191
Bering Strait Mainland Villages	85%	206	78%	143	-	-	93%	159	-	-	-	-
Nome	57%	210	77%	136	-	-	86%	191	-	-	-	-
<b>Northwest Arctic</b>	-	-	-	-	-	-	-	-	-	-	-	-
Northwest Arctic Villages	-	-	-	-	86%	242	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	-	-	-	-
<b>North Slope</b>	-	-	<b>91%</b>	<b>600</b>	-	-	-	-	-	-	-	-
North Slope Villages	-	-	87%	394	-	-	-	-	-	-	-	-
Barrow	-	-	98%	206	-	-	-	-	-	-	-	-
<b>Interior</b>	-	-	-	-	-	-	-	-	-	-	-	-
Mid Yukon-Upper Kuskokwim	-	-	-	-	-	-	-	-	-	-	-	-
Yukon-Koyukuk	100%	18	-	-	90%	83	100%	50	100%	51	-	-
Upper Yukon	-	-	-	-	95%	246	100%	147	-	-	-	-
Tanana Villages	99%	100	-	-	99%	123	-	-	-	-	-	-
Tok	-	-	-	-	100%	60	-	-	-	-	-	-
<b>Upper Copper River</b>	<b>96%</b>	<b>57</b>	-	-	-	-	<b>84%</b>	<b>38</b>	-	-	-	-

Household Participation Rate = Number of households that agreed to participate ÷ Total number of households contacted.

-: Information not available. Region/subregion not surveyed or permission slips not available for data management and analysis. 2004–2008 Participation rates from Naves (2010a, 2010b).

Gray background: surveyed subregions.

a. The number of households contacted may not represent the total number of households surveyed.

b. Permission slips are available, although harvest data are not available.

## 2004–2009 REGIONAL AND SUBREGIONAL HARVEST PATTERNS

This section describes general harvest patterns for regions and subregions for the period 2004–2009. Harvest data for 2004–2008 were previously presented in Naves (2010a, b); these previous reports did not include such a description of harvest patterns.

### Gulf of Alaska-Cook Inlet

The Gulf of Alaska-Cook Inlet region is surveyed for spring, summer, and fall–winter harvest using the Southern Coastal Form. This region is divided in 2 subregions (Figure 2). The Cook Inlet subregion was surveyed in 2004 and 2005 and the Gulf of Alaska subregion was surveyed in 2004 and 2006 (Appendix A). Regional harvest estimates are available for 2004 only.

#### *Amount, seasonality, and species composition of bird harvests*

In 2004, the regional harvest estimate was 2,995 birds, of which the Gulf of Alaska subregion accounted for 2,756 birds or 92% (Table 26, Figure 12). Subregional harvest estimates for 2004 were higher than for 2006 (Gulf of Alaska, 596 birds) and 2005 (Cook Inlet, 13 birds). The yearly average harvest was 1,676 birds for the Gulf of Alaska subregion and 126 birds for the Cook Inlet subregion (Table 27). The regional per capita bird harvest was 4.3 birds per person (Table 27, Figure 13). On average, the Gulf of Alaska subregion accounted for 75% of the region’s population (Table 28).

In the Gulf of Alaska subregion, fall–winter harvest accounted for 58% of the yearly harvest in 2004 and 79% in 2006 (Figure 14). In the Cook Inlet subregion, fall–winter harvest accounted for 58% of the yearly harvest in 2004 and 38% in 2005 (note that the 2005 estimated harvested was only 13 birds).

Ducks contributed 86% of the 2004 regional bird harvest, seabirds contributed 11%, and geese contributed 2% (Table 26, Figure 15). Mallard, goldeneye, and black scoter were the ducks harvested in the largest amounts in the region in 2004 (Naves 2010a). Seabirds were reported as harvested in the Gulf of Alaska subregion, and were represented by black-legged kittiwake (175 birds), glaucous-winged gull (117 birds), puffin (34 birds), and cormorant (9 birds; Naves 2010a).

Figure 12.—Total estimated bird harvest, Gulf of Alaska-Cook Inlet region, 2004–2009.

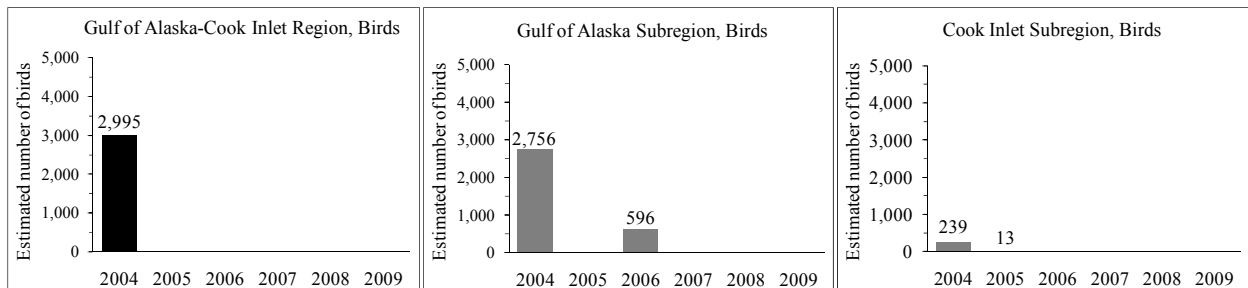


Figure 13.—Birds per capita, Gulf of Alaska-Cook Inlet region, 2004–2009.

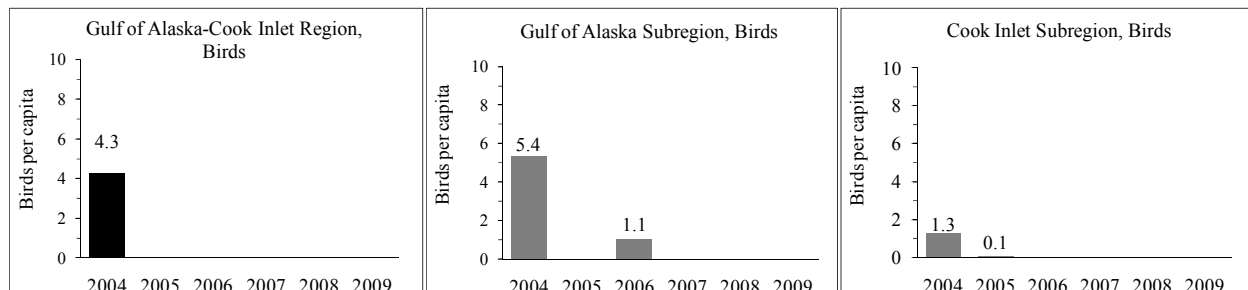


Table 26.–Estimated bird harvest (groups of birds), Gulf of Alaska-Cook Inlet region, 2004–2009.

Bird harvest	Gulf of Alaska-Cook Inlet region		Gulf of Alaska subregion				Cook Inlet subregion		
	2004	2005–2009	2004	2005	2006	2007–2009	2004	2005	2006–2009
Ducks	2,581 (86%)	-	2,386 (87%)	-	581 (97%)	-	195 (81%)	8 (63%)	-
Geese	68 (2%)	-	30 (1%)	-	0	-	38 (16%)	5 (38%)	-
Swans	2 (<1%)	-	0	-	0	-	2 (1%)	0	-
Cranes	5 (<1%)	-	0	-	0	-	5 (2%)	0	-
Ptarmigans	0	-	0	-	0	-	0	0	-
Seabirds	335 (11%)	-	335 (12%)	-	0	-	0	0	-
Shorebirds	0	-	0	-	15 (3%)	-	0	0	-
Loons	5 (<1%)	-	5 (<1%)	-	0	-	0	0	-
<b>Total birds</b>	<b>2,995</b>	<b>-</b>	<b>2,756</b>	<b>-</b>	<b>596</b>	<b>-</b>	<b>239</b>	<b>13</b>	<b>-</b>

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

Figure 14.–Seasonality of bird harvest, Gulf of Alaska-Cook Inlet region, 2004–2009.

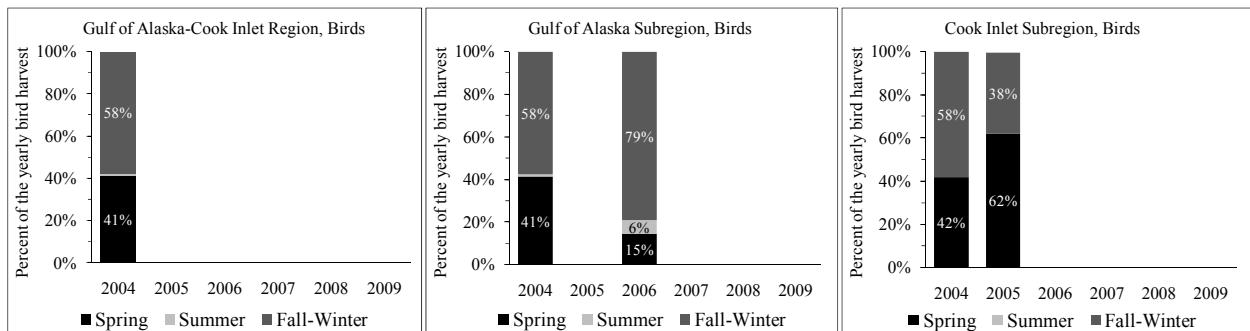


Table 27.–Average bird harvest, Gulf of Alaska-Cook Inlet region, 2004–2009.

Bird harvest	Estimated number of birds		Proportion of harvest	Birds per capita	
	Average	SD		Average	SD
Gulf of Alaska-Cook Inlet region	2,995	-		4.3	-
Gulf of Alaska subregion	1,676	1,527.5	92%	3.2	3.1
Cook Inlet subregion	126	160.1	8%	0.7	0.9

Figure 15. –Composition of bird and egg harvest (groups of birds), Gulf of Alaska-Cook Inlet region, 2004–2009.

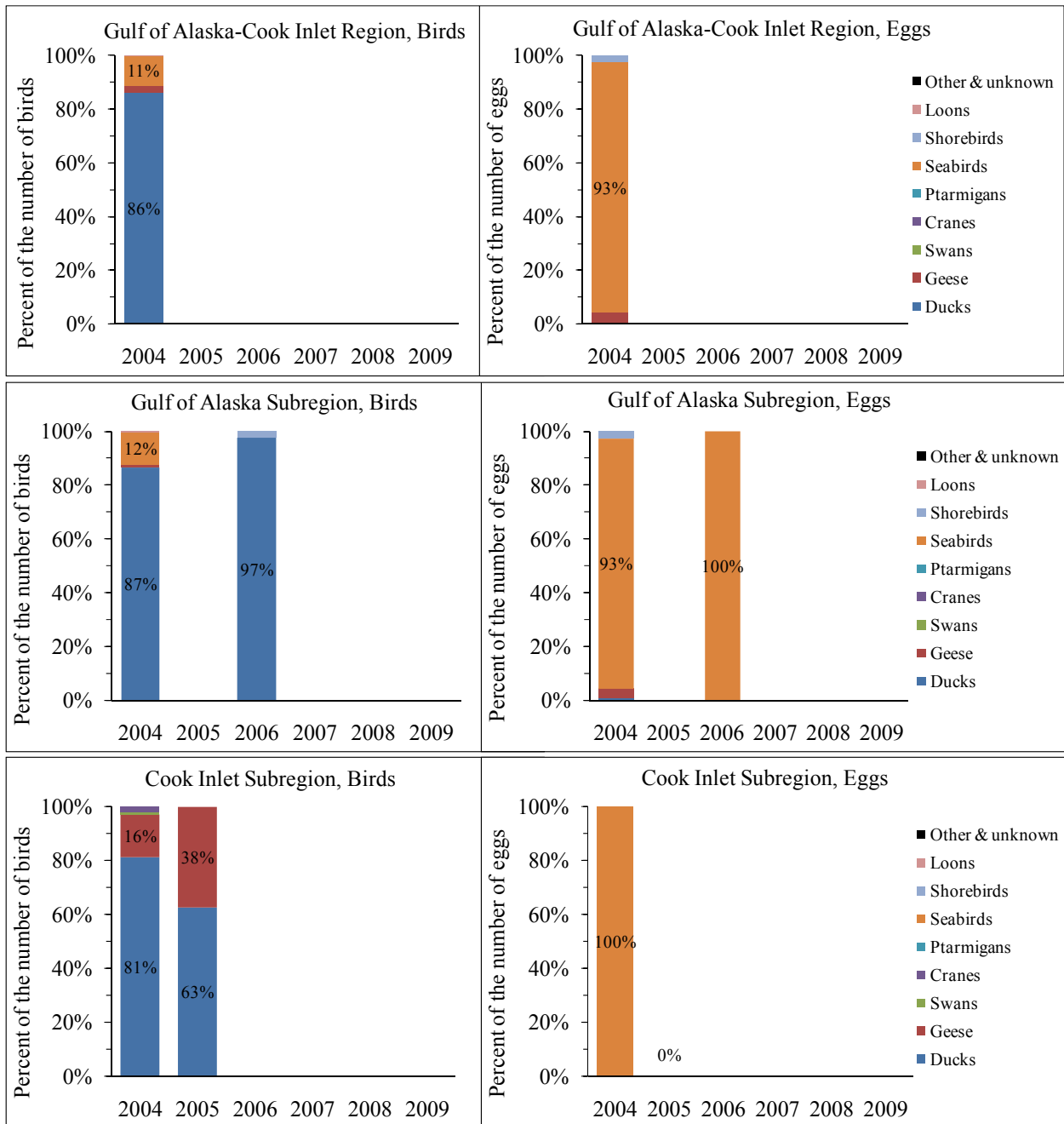


Table 28.—Estimated human population, Gulf of Alaska-Cook Inlet region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Gulf of Alaska-Cook Inlet region	698	693	765	724	697	683
Gulf of Alaska subregion	513	494	566	543	543	517
Cook Inlet subregion	185	199	199	181	154	166

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

***Amount, seasonality, and species composition of egg harvests***

In 2004, the estimated regional egg harvest was 2,178 eggs, of which the Gulf of Alaska subregion accounted for 2,173 eggs (99.8%) (Table 29, Figure 16). The egg harvest estimate for the Gulf of Alaska subregion was lower in 2006 (102 eggs). The estimated egg harvest in the Cook Inlet subregion was 5 eggs in 2004 and no eggs were reported as harvested in 2005. The regional per capita egg harvest was 3.1 eggs per person in 2004 (Table 30, Figure 17) and 99% of this harvest occurred in spring.

Seabirds accounted for 93% of the regional harvest of eggs reported in 2004 (Table 29). This harvest was mostly composed of glaucous-winged gull (40%), herring gull (28%), and arctic tern (16%; Naves 2010a).

Figure 16.—Total estimated egg harvest, Gulf of Alaska-Cook Inlet region, 2004–2009.

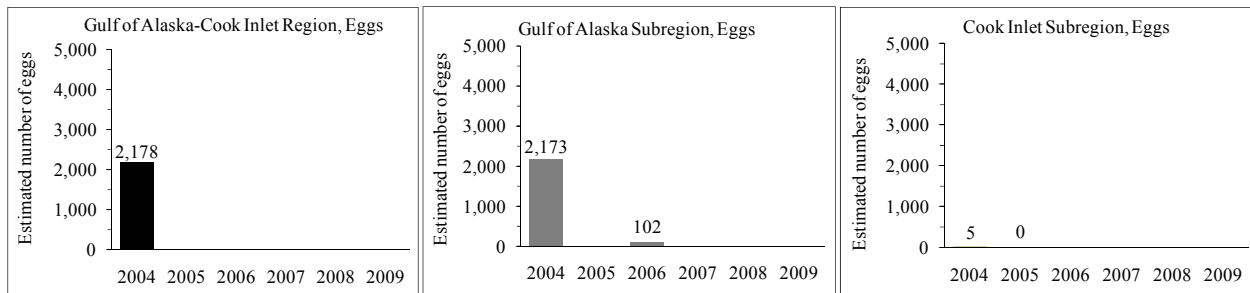


Figure 17.—Eggs per capita, Gulf of Alaska-Cook Inlet region, 2004–2009.

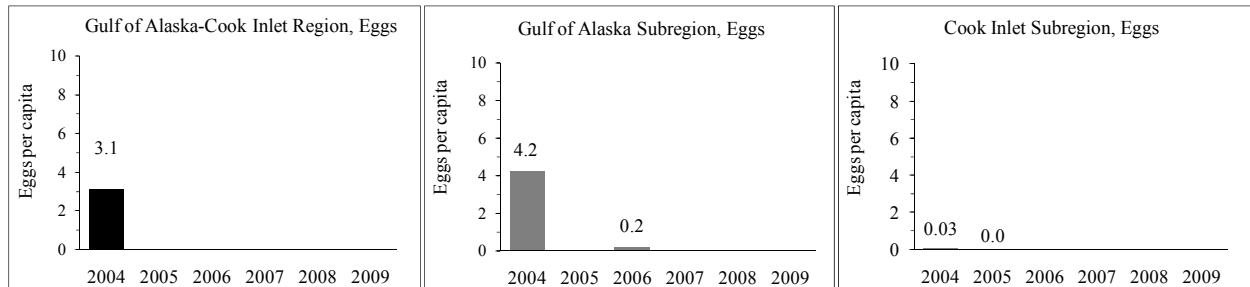


Table 29.—Estimated egg harvest (groups of birds), Gulf of Alaska-Cook Inlet region, 2004–2009.

Egg harvest	Gulf of Alaska-Cook Inlet region		Gulf of Alaska subregion				Cook Inlet subregion		
	2004	2005–2009	2004	2005	2006	2007–2009	2004	2005	2006–2009
Ducks	14 (1%)	-	14 (1%)	-	0	-	0	0	-
Geese	80 (4%)	-	80 (4%)	-	0	-	0	0	-
Swans	0	-	0	-	0	-	0	0	-
Cranes	0	-	0	-	0	-	0	0	-
Ptarmigans	0	-	0	-	0	-	0	0	-
Seabirds	2,026 (93%)	-	2,021 (93%)	-	102 (100%)	-	5 (100%)	0	-
Shorebirds	59 (3%)	-	59 (3%)	-	0	-	0	0	-
Loons	0	-	0	-	0	-	0	0	-
<b>Total eggs</b>	<b>2,178</b>	<b>-</b>	<b>2,173</b>	<b>-</b>	<b>102</b>	<b>-</b>	<b>5</b>	<b>0</b>	<b>-</b>

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

-. Region or subregion not surveyed.

Table 30.—Average egg harvest, Gulf of Alaska-Cook Inlet region, 2004–2009.

Egg harvest	Estimated number of eggs		Proportion of harvest	Eggs per capita	
	Average	SD		Average	SD
Gulf of Alaska-Cook Inlet region	2,178	-		3.1	-
Gulf of Alaska subregion	1,137	1,464.4	99.8%	2.1	3.0
Cook Inlet subregion	3	3.8	0.2%	0.0	<0.1

## Kodiak Archipelago

The Kodiak region is surveyed for spring, summer, and fall–winter harvest using the Southern Coastal Form. This region is divided in 2 subregions (Figure 3). This region was surveyed in 2006 only (Appendix A). Fall–winter harvest information is not available for the Kodiak City and Road-connected subregion and therefore regional bird harvest estimates were not calculated. In 2006, regional egg harvest estimates were calculated because eggs are not available for harvest in fall–winter (thus that season’s harvest was assumed to be zero). The text below refers to harvests of birds in the Kodiak Villages subregion and the regional harvest of eggs.

### *Amount, seasonality, and species composition of bird harvests*

In 2006, the estimated bird harvest in the Kodiak Villages subregion was 5,552 birds (Figure 18, Table 31). Of this total, 79% was harvested during fall–winter. The per capita bird harvest was 8.0 birds per person (population estimates are shown in Table 32). Ducks contributed 97% of the bird harvest in the Kodiak Villages subregion, and geese, ptarmigans, and seabirds contributed 1% each (Table 31, Figure 19). Together, mallard, goldeneye, and bufflehead accounted for 57% of the total bird harvest, and other 11 duck species accounted for 40% of the total harvest (Naves 2010a).

Figure 18.—Total estimated bird harvest, Kodiak Archipelago region, 2004–2009.

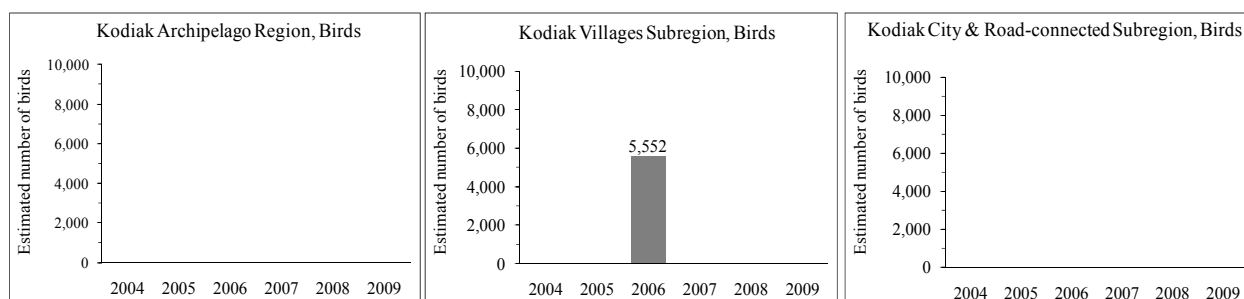


Table 31.—Estimated bird harvest (groups of birds), Kodiak Archipelago region, 2004–2009.

Bird harvest	Kodiak Archipelago region	Kodiak Villages subregion			Kodiak City and Road-connected subregion
	2004–2009	2004–2005	2006	2007–2009	2007–2009
Ducks	-	-	5,390 (97%)	-	-
Geese	-	-	58 (1%)	-	-
Swans	-	-	0	-	-
Cranes	-	-	0	-	-
Ptarmigans	-	-	51 (1%)	-	-
Seabirds	-	-	53 (1%)	-	-
Shorebirds	-	-	0	-	-
Loons	-	-	0	-	-
<b>Total birds</b>	-	-	<b>5,552</b>	-	-

Source 2004–2008 harvests (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

#### *Amount, seasonality, and species composition of egg harvests*

In 2006, the regional estimated egg harvest was 5,222 eggs (Figure 20, Table 33), of which the Kodiak Villages subregion accounted for 4,545 eggs (87%). The per capita egg harvest was 0.4 eggs per person for the whole region, 6.5 eggs per person for the Kodiak Villages subregion, and 0.1 eggs per person for the Kodiak City and Road-connected subregion (Figure 21). All egg harvest at this region occurred during spring. Seabirds (mostly glaucous-winged gull, black-legged kittiwake, and herring gull) accounted for 91% of estimated regional egg harvest, shorebirds (black oystercatcher) accounted for 6%, and ducks (mallard) accounted for 3% (Table 33, Figure 19; Naves 2010a).



Figure 19.—Composition of bird and egg harvest (groups of birds), Kodiak Archipelago region, 2004–2009.

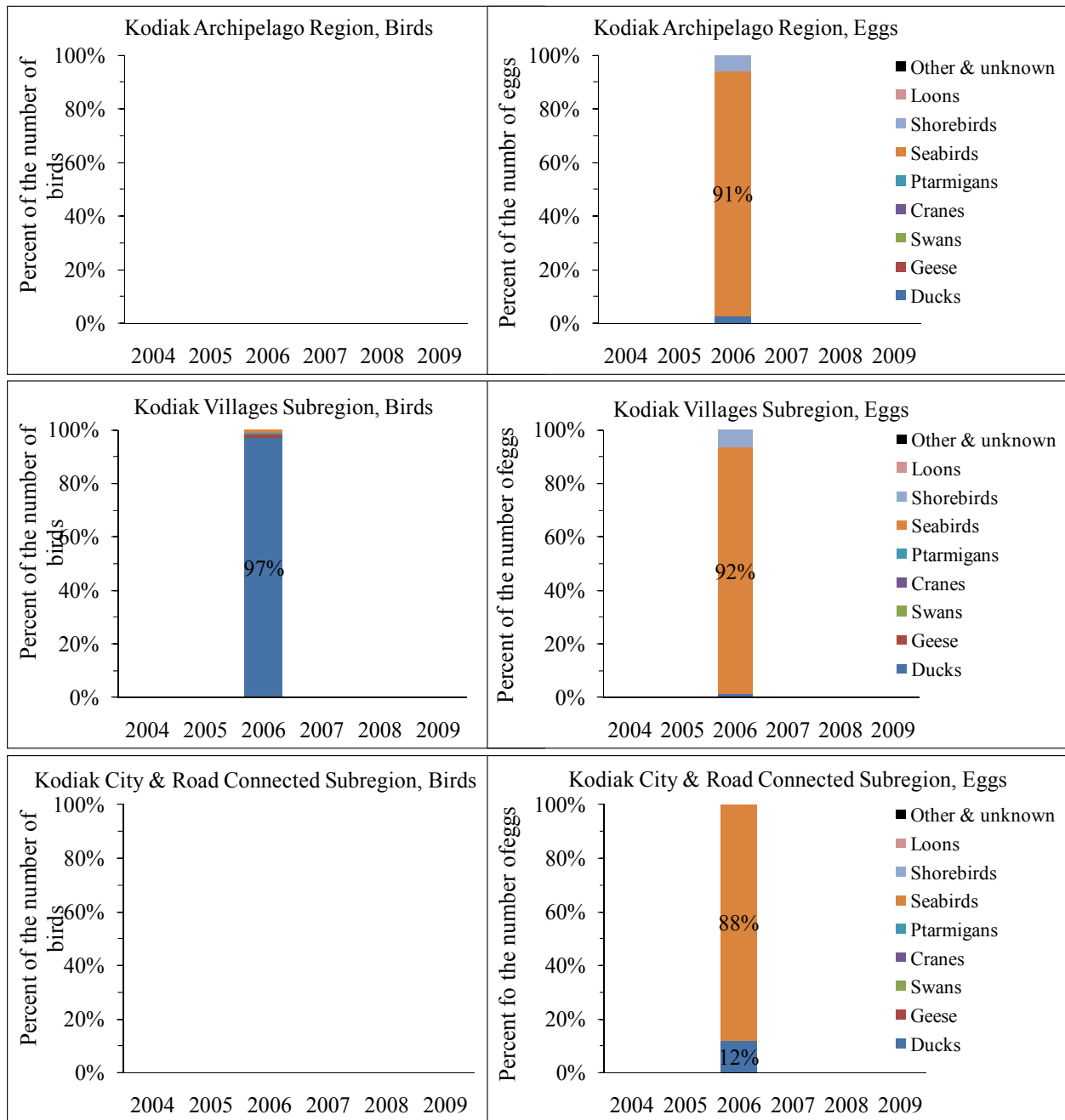


Figure 20.—Total estimated egg harvest, Kodiak Archipelago region, 2004–2009.

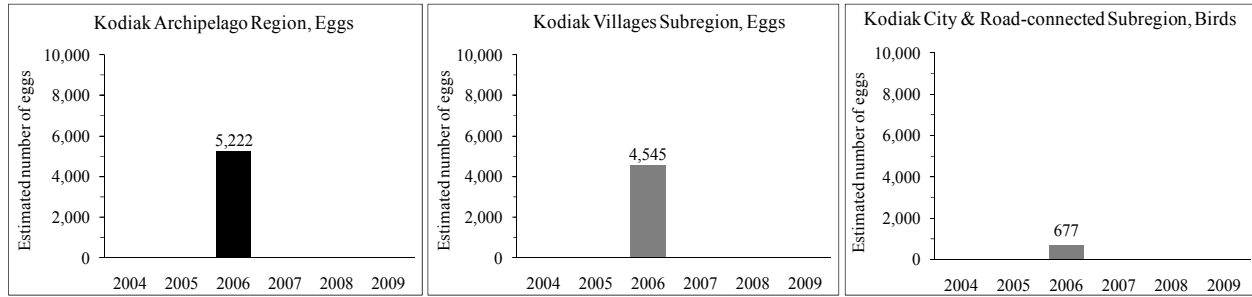


Table 32.—Estimated human population, Kodiak Archipelago region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Kodiak Archipelago region	13,559	13,674	13,435	13,534	13,373	13,860
Kodiak Villages subregion	804	774	696	664	694	731
Kodiak City and Road-connected subregion	12,755	12,900	12,739	12,870	12,679	13,129

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

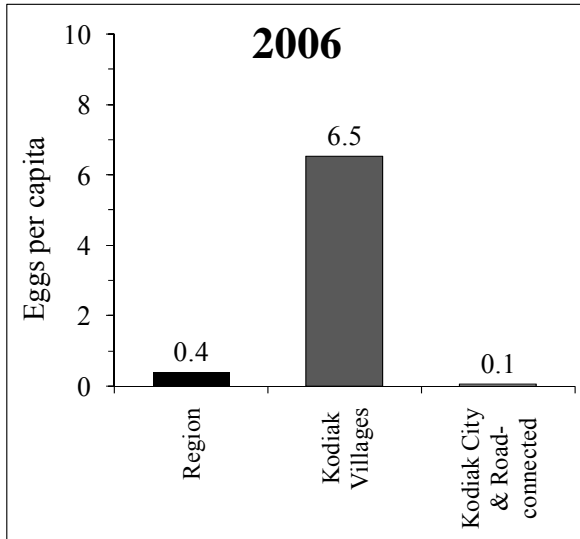
Table 33.—Estimated egg harvest (groups of birds), Kodiak Archipelago region, 2004–2009.

Egg harvest	Kodiak Archipelago region			Kodiak Villages subregion			Kodiak City and Road-connected subregion		
	2004–2005	2006	2007–2009	2004–2005	2006	2007–2009	2004–2005	2006	2007–2009
Ducks	-	148 (3%)	-	-	67 (1%)	-	-	81 (12%)	-
Geese	-	0	-	-	0	-	-	0	-
Swans	-	0	-	-	0	-	-	0	-
Cranes	-	0	-	-	0	-	-	0	-
Ptarmigans	-	0	-	-	0	-	-	0	-
Seabirds	-	4,772 (91%)	-	-	4,176 (92%)	-	-	596 (88%)	-
Shorebirds	-	302 (6%)	-	-	302 (7%)	-	-	0	-
Loons	-	0	-	-	0	-	-	0	-
<b>Total eggs</b>	-	<b>5,222</b>	-	-	<b>4,545</b>	-	-	<b>677</b>	-

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Figure 21.—Eggs per capita, Kodiak Archipelago region, 2004–2009.



### Aleutian-Pribilof Islands

The Aleutian-Pribilof Islands region is surveyed for spring, summer, and fall–winter harvest using the Southern Coastal harvest report form. This region is divided into 2 subregions (Figure 4). The Aleutian-Pribilof Villages subregion was surveyed in 2005, 2007, and 2008 (Appendix A). The Unalaska subregion was surveyed in 2008; regional harvest estimates are also available for 2008.

#### *Amount of bird harvests*

The average yearly bird harvest estimates in the Aleutian-Pribilof Villages subregion from 2004 to 2009 was 10,630 birds (tables 34 and 35). In 2008, the regional estimated harvest was 8,401 birds (Figure 22, Table 34) of which the Kodiak Villages accounted for 7,642 birds (91%).

In 2008, the regional per capita bird harvest was 1.2 birds per person (Figure 23). The average per capita bird harvest in the Aleutian-Pribilof Villages was 3.0 birds per person (Table 35). In 2008, the per capita bird harvest in Unalaska was 0.2 birds per person. On average, the Aleutian-Pribilof Villages accounted for 47% of the region’s population (Table 36).

Figure 22.—Total estimated bird harvest, Aleutian-Pribilof Islands region, 2004–2009.

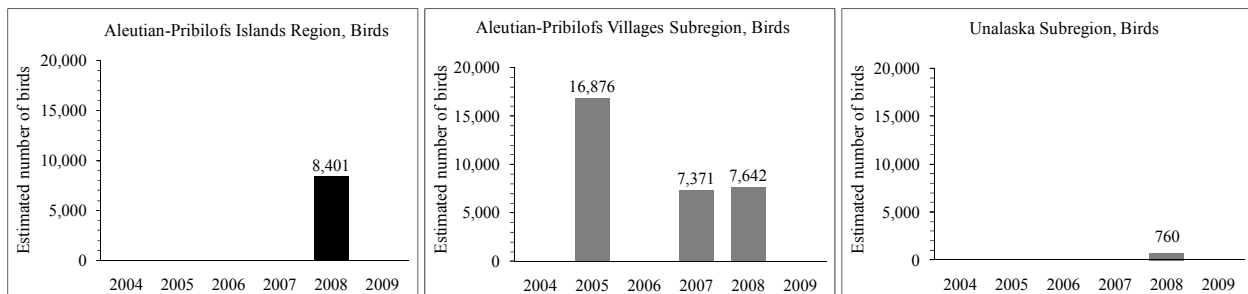
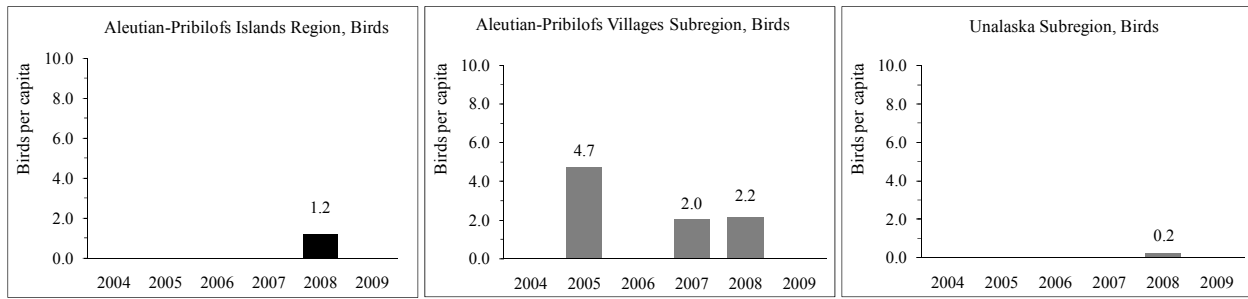


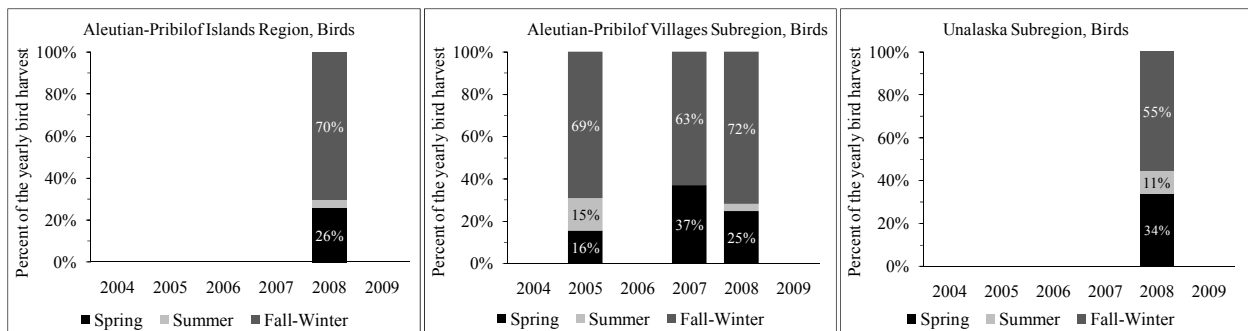
Figure 23.—Birds per capita, Aleutian-Pribilof Islands region, 2004–2009.



### *Seasonality of bird harvests*

In the Aleutian-Pribilof Villages subregion, fall–winter harvest accounted for 63–72% of the yearly harvest (average = 68%), spring harvest accounted for 16–37% (average = 26%), and summer harvest accounted for up to 15% (average = 6%; Figure 24). These proportions are similar to those observed for the whole region as well as for the Unalaska subregion.

Figure 24.—Seasonality of bird harvest, Aleutian-Pribilof Islands region, 2004–2009.



### *Species composition of bird harvests*

In the Aleutian-Pribilof Villages subregion, on average, ducks contributed 53% of the bird harvest, geese 19%, seabirds 15%, ptarmigans 11%, and shorebirds 1% (Table 34, Figure 25). Green-winged teal and mallard were the ducks harvested in the largest numbers in 2005 and 2008 (Naves 2010a, 2010b). In 2007, harlequin duck and white-winged scoter were the ducks harvested in largest numbers (Naves 2010a). A diversity of other duck species was harvested each year in smaller numbers. Canada and cackling geese and black brant were the geese harvested in the largest numbers in 2005 and 2008. Puffin (252–2,744 birds) and glaucous-winged gull (78 birds) were the seabird species harvested in this subregion (Naves 2010a, 2010b).

In the Unalaska subregion, the 2008 bird harvest was composed of 56% ducks, 30% ptarmigans, 13% geese, and 1% seabirds (Table 34, Figure 25). The species mostly harvested were ptarmigan (30%), mallard (14%), green-winged teal (11%), harlequin duck (11%), and emperor goose (9%; Naves 2010b). The 2008 Unalaska bird harvest was composed of fewer species, compared to the Villages subregion.

Figure 25.—Composition of bird and egg harvest (groups of birds), Aleutian-Pribilof Islands region, 2004–2009.

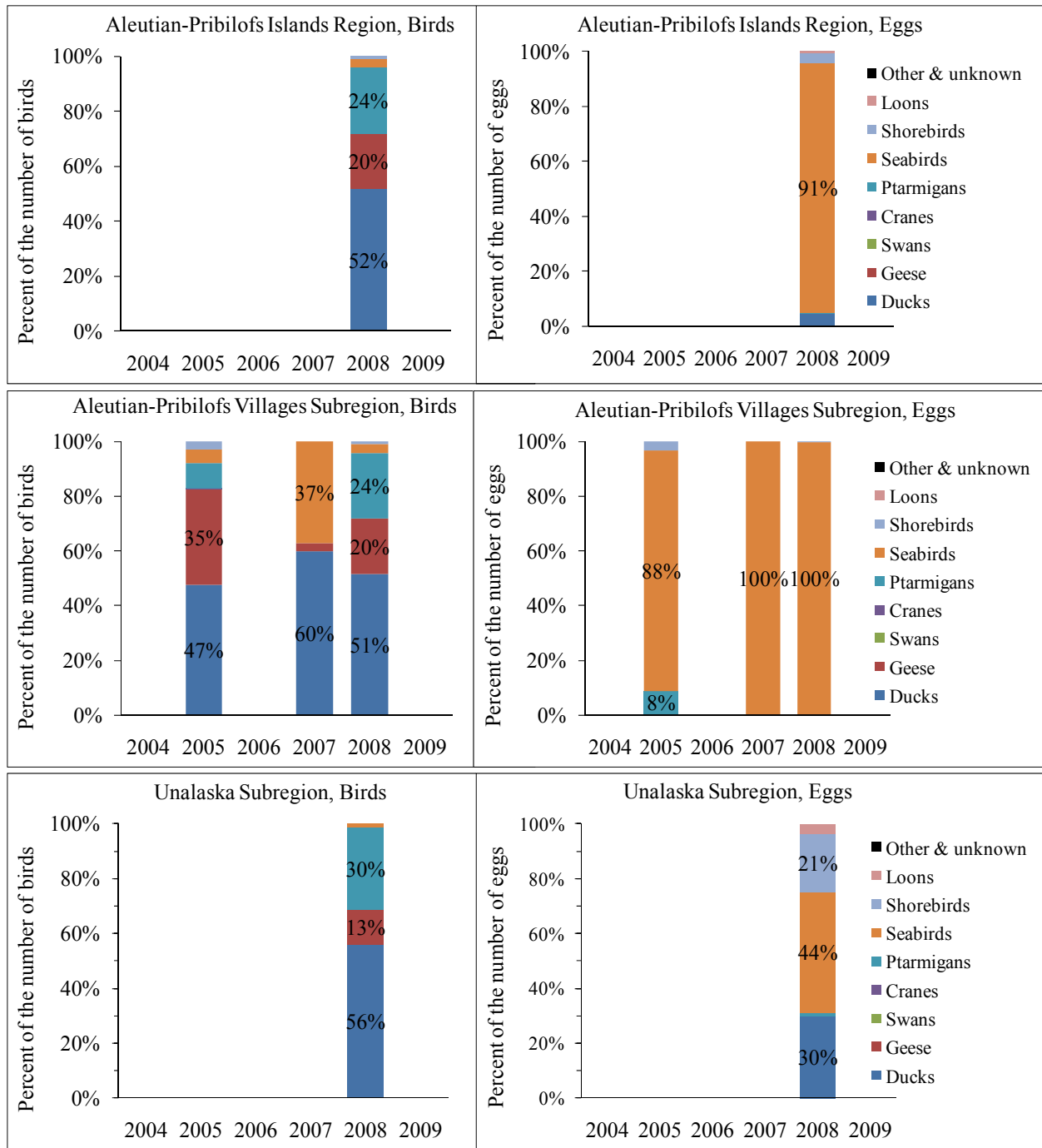


Table 34.—Estimated bird harvest (groups of birds), Aleutian-Pribilof Islands region, 2004–2009.

Bird harvest	Aleutian-Pribilof Islands region			Aleutian-Pribilof Villages subregion						Unalaska subregion		
	2004–2007	2008	2009	2004	2005	2006	2007	2008	2009	2004–2007	2008	2009
Ducks	-	4,359 (52%)	-	-	8,007 (47%)	-	4,404 (60%)	3,933 (51%)	-	-	426 (56%)	-
Geese	-	1,660 (20%)	-	-	5,884 (35%)	-	223 (3%)	1,563 (20%)	-	-	97 (13%)	-
Swans	-	0	-	-	7 (<1%)	-	0	0	-	-	0	-
Cranes	-	0	-	-	59 (<1%)	-	0	0	-	-	0	-
Ptarmigans	-	2,055 (24%)	-	-	1,591 (9%)	-	0	1,829 (24%)	-	-	226 (30%)	-
Seabirds	-	263 (3%)	-	-	809 (5%)	-	2,744 (37%)	252 (3%)	-	-	11 (1%)	-
Shorebirds	-	64 (1%)	-	-	521 (3%)	-	0	64 (1%)	-	-	0	-
Loons	-	0	-	-	0	-	0	0	-	-	0	-
<b>Total birds</b>	-	<b>8,401</b>	-	-	<b>16,876</b>	-	<b>7,371</b>	<b>7,642</b>	-	-	<b>760</b>	-

Source 2004–2008 harvests (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

Table 35.—Average bird harvest, Aleutian-Pribilof Islands region, 2004–2009.

Bird harvest	Estimated number of birds		Proportion of harvest	Birds per capita	
	Average	SD		Average	SD
Aleutian-Pribilof Islands region	8,401	-		1.2	-
Aleutian-Pribilof Villages subregion	10,630	5,411.2	91%	3.0	1.5
Unalaska subregion	760	-	9%	0.2	-

Table 36.—Estimated human population, Aleutian-Pribilof Islands region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Aleutian-Pribilof Islands region	7,850	7,861	7,457	7,275	7,089	7,277
Aleutian-Pribilof Villages subregion	3,487	3,563	3,430	3,598	3,538	3,615
Unalaska subregion	4,363	4,298	4,027	3,677	3,551	3,662

Source Alaska Department of Labor and Workforce Development

<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

### *Amount of egg harvests*

In 2008, the regional estimated egg harvest was 4,778 eggs (Figure 26, Table 37) of which the Villages subregion accounted for 4,018 eggs (84%). In the Villages subregion, the egg harvest decreased from 11,733 eggs in 2005 to 6,127 eggs in 2007 and 4,018 eggs in 2008 (average = 7,293 eggs; Figure 26, Table 38). In 2008, the estimated egg harvest in the Unalaska subregion was 760 eggs.

In the Villages subregion, the per capita egg harvest decreased from 3.3 eggs per person in 2005 to 1.1 eggs per person in 2008 (Figure 27). In 2008, the per capita egg harvest was 0.7 eggs per person for the whole region and 0.2 eggs per person for the Unalaska subregion.

Figure 26.—Total estimated egg harvests, Aleutian-Pribilof Islands region, 2004–2009.

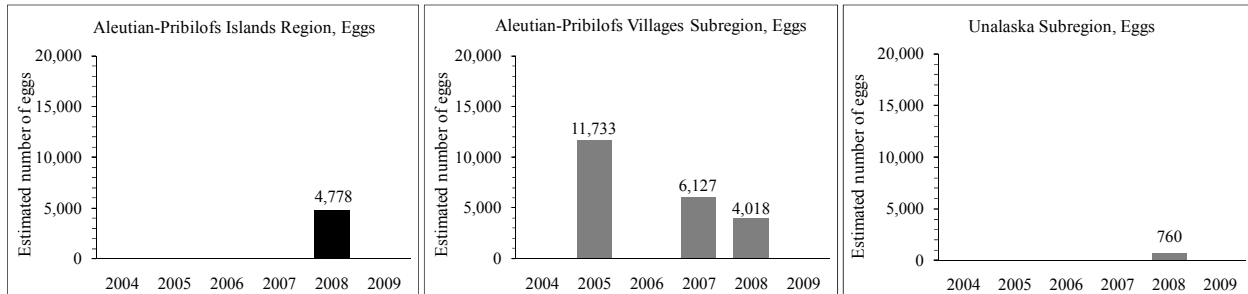


Figure 27.—Eggs per capita, Aleutian-Pribilof Islands region, 2004–2009.

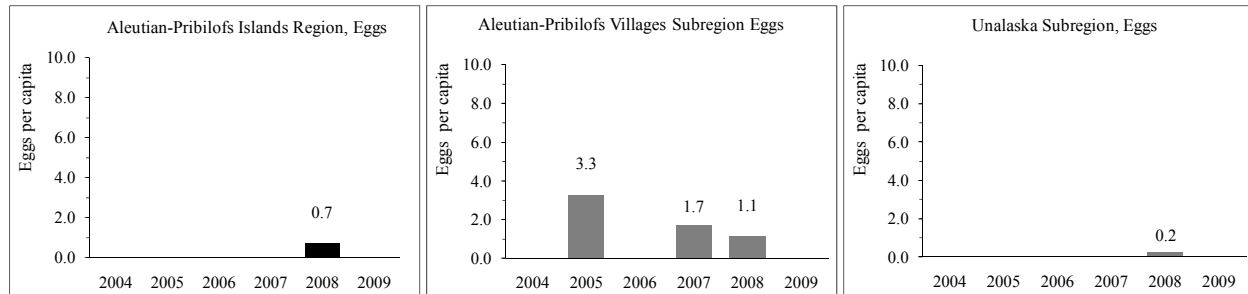


Table 37.—Estimated egg harvest (groups of birds), Aleutian-Pribilof Islands region, 2004–2009.

Egg harvest	Aleutian-Pribilof Islands region			Aleutian-Pribilof Villages subregion						Unalaska subregion		
	2004–2007	2008	2009	2004	2005	2006	2007	2008	2009	2004–2007	2008	2009
Ducks	-	226 (5%)	-	-	51 (<1%)	-	0	0	-	-	226 (30%)	-
Geese	-	0	-	-	0	-	0	0	-	-	0	-
Swans	-	0	-	-	0	-	0	0	-	-	0	-
Cranes	-	0	-	-	0	-	0	0	-	-	0	-
Ptarmigans	-	11 (<1%)	-	-	977 (8%)	-	0	0	-	-	11 (1%)	-
Seabirds	-	4,342 (91%)	-	-	10,311 (88%)	-	6,127 (100%)	4,008 (100%)	-	-	334 (44%)	-
Shorebirds	-	172 (4%)	-	-	395 (3%)	-	0	11 (<1%)	-	-	162 (21%)	-
Loons	-	27 (1%)	-	-	0	-	0	0	-	-	27 (4%)	-
<b>Total eggs</b>	-	<b>4,778</b>	-	-	<b>11,733</b>	-	<b>6,127</b>	<b>4,018</b>	-	-	<b>760</b>	-

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

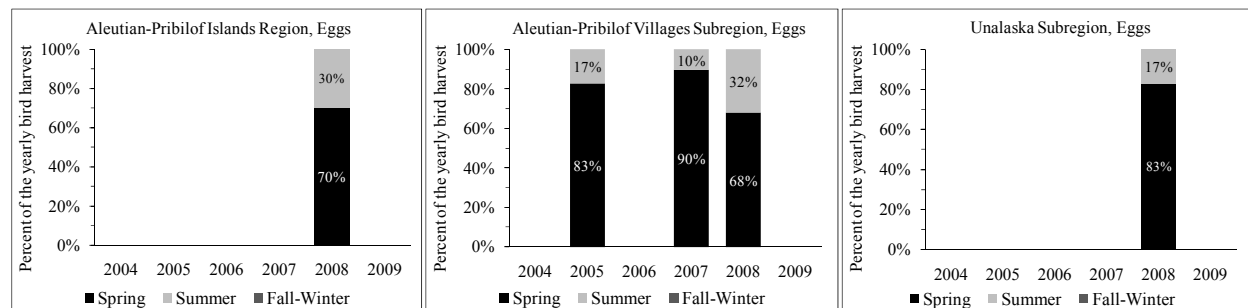
Table 38.—Average egg harvest, Aleutian-Pribilof Islands region, 2004–2009.

Egg harvest	Estimated number of eggs		Proportion of harvest	Eggs per capita	
	Average	SD		Average	SD
Aleutian-Pribilof Islands region	4,778	-		0.7	-
Aleutian-Pribilof Villages subregion	7,293	3,987.0	84%	2.0	1.1
Unalaska subregion	760	-	16%	0.2	-

### *Seasonality of egg harvests*

In the Villages subregion, spring saw 68–90% (average = 80%) of the yearly egg harvest and summer saw 10–32% (average = 20%; Figure 28).

Figure 28.—Seasonality of egg harvest, Aleutian-Pribilof Islands region, 2004–2009.



### *Species composition of egg harvests*

On average, seabirds contributed 96% of the egg harvest in the Aleutian-Pribilof Villages subregion, ptarmigans 3%, and shorebirds 1% (Table 37, Figure 25). Glaucous-winged gull and herring gull were the species harvested in the largest numbers (Naves 2010a, 2010b). Black oystercatcher and golden plover were the shorebird eggs reported as harvested.

In the Unalaska subregion, the 2008 egg harvest was composed of 44% seabirds (herring gull, glaucous-winged gull, and murre), 30% ducks (unknown species and red-breasted merganser), and 21% shorebirds (black oystercatcher; Naves 2010a).

## **Bristol Bay**

The Bristol Bay region is divided into 3 subregions (Figure 5). The Southwest Bristol Bay and Dillingham subregions are surveyed for spring, summer, and fall harvest using the Main harvest report form. The South Alaska Peninsula subregion is surveyed for spring, summer, and fall–winter harvests using the Southern Coastal Form. Harvest estimates are available for the Southwest Bristol Bay subregion for the years 2004–2008 (Appendix A). The South Alaska Peninsula was surveyed in 2004, 2007, and 2008. Dillingham was surveyed in 2005, 2007, and 2008 and regional harvest estimates are also available for these 3 years.



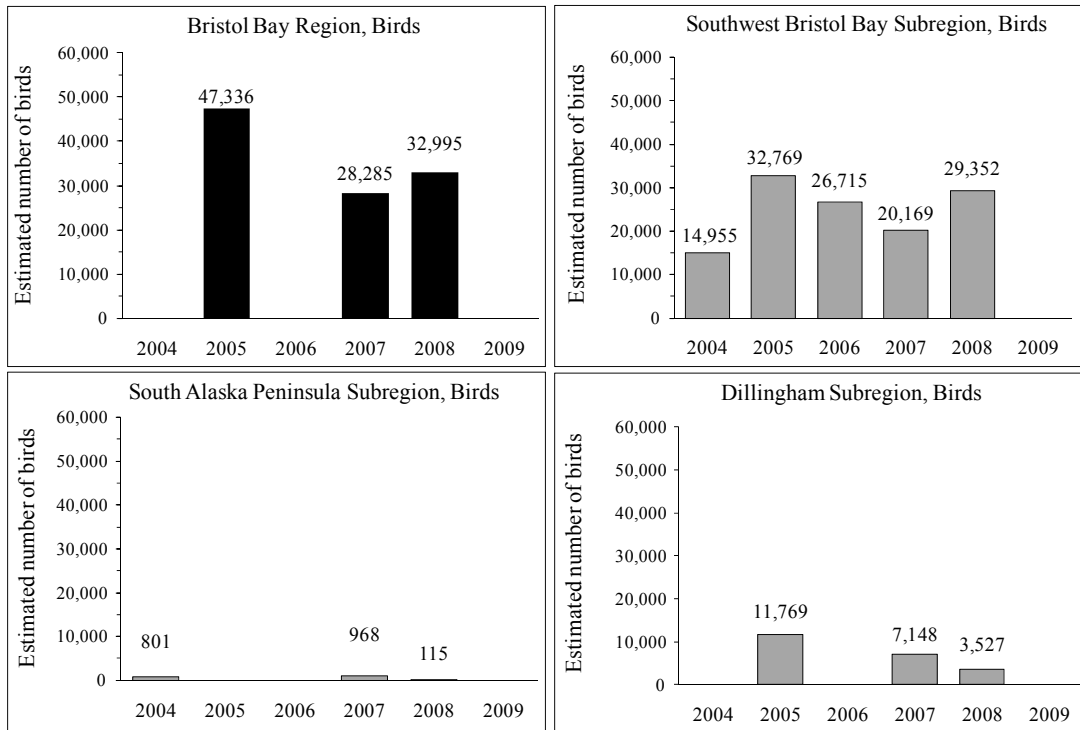
***Amount of bird harvests***

In 2005, 2007, and 2008 the regional yearly bird harvest estimates varied between 28,285 birds (2007) and 47,336 birds (2005; Table 39; Figure 29). The regional yearly average bird harvest was 36,205 birds (SD = 9,922.8; Table 40).

The Southwest Bristol Bay subregion accounted for 69–89% of the yearly bird harvest (average = 76%) followed by Dillingham (range = 11–25%, average = 20%) and the South Alaska Peninsula (range = 0.3–6%, average = 3%; Figure 30; Table 40).

The per capita bird harvest varied among subregions and years; higher amounts occurred in the Southwest Bristol Bay (range = 3.3–7.2 birds per person, average = 5.6 birds per person), compared to the other 2 subregions (Figure 31; Table 40). On average, the Southwest Bristol Bay subregion accounted for 62% of the region’s population (Table 41).

Figure 29.—Total estimated bird harvest, Bristol Bay region, 2004–2009.



***Seasonality of bird harvests***

In 2004–2009, spring harvest accounted for 55–65% of the regional yearly harvest (Figure 32). Among the subregions, the highest proportions of spring harvest occurred in the Southwest Bristol Bay subregion (59–88%). The South Alaska Peninsula showed very little summer harvest (up to 2%) and relatively high proportions of fall–winter harvest (up to 76%).

Figure 30.—Contribution of subregions to the regional bird harvest, Bristol Bay region, 2004–2009.

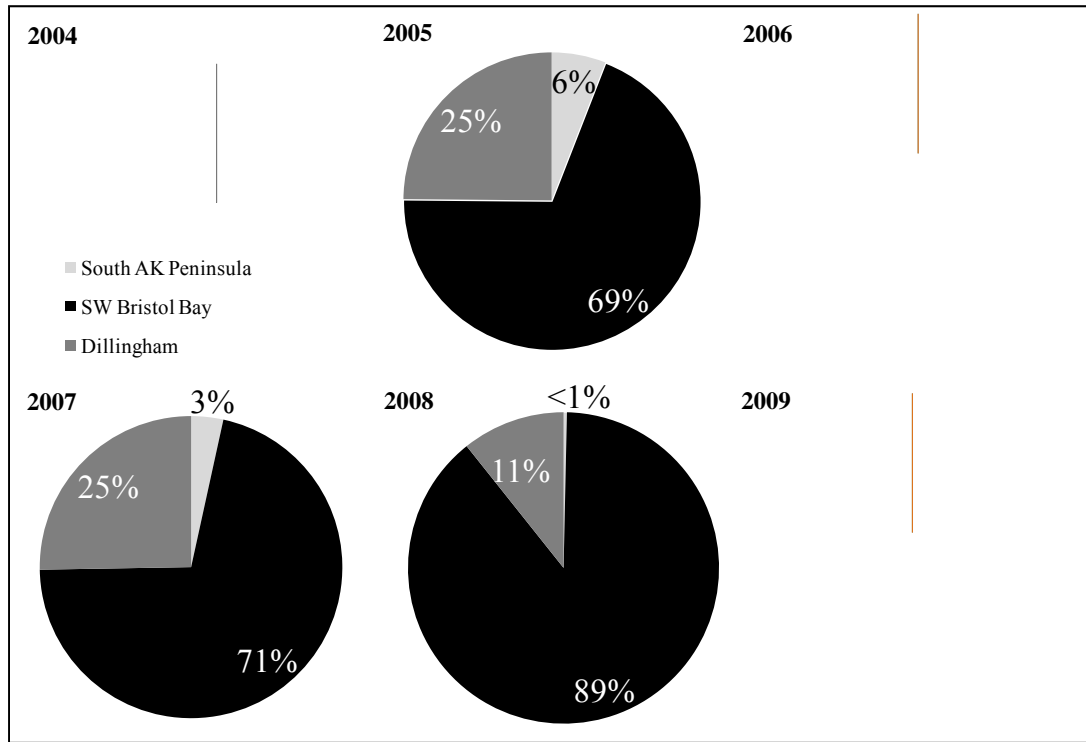


Figure 31.—Birds per capita, Bristol Bay region, 2004–2009.

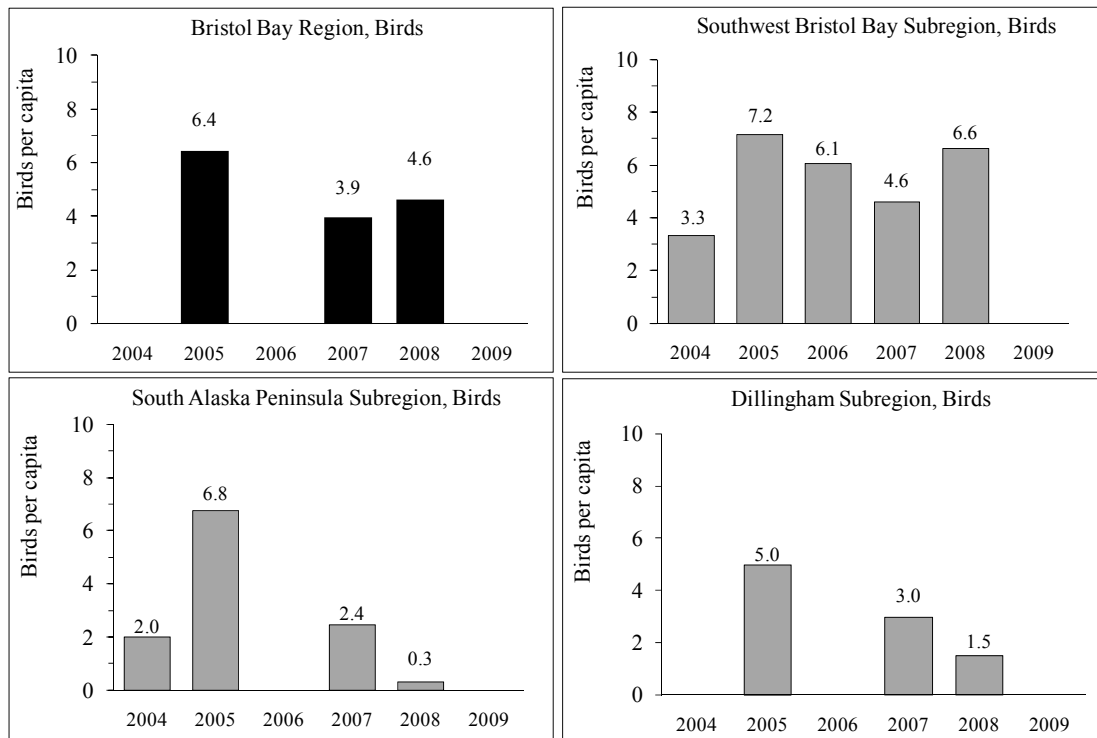
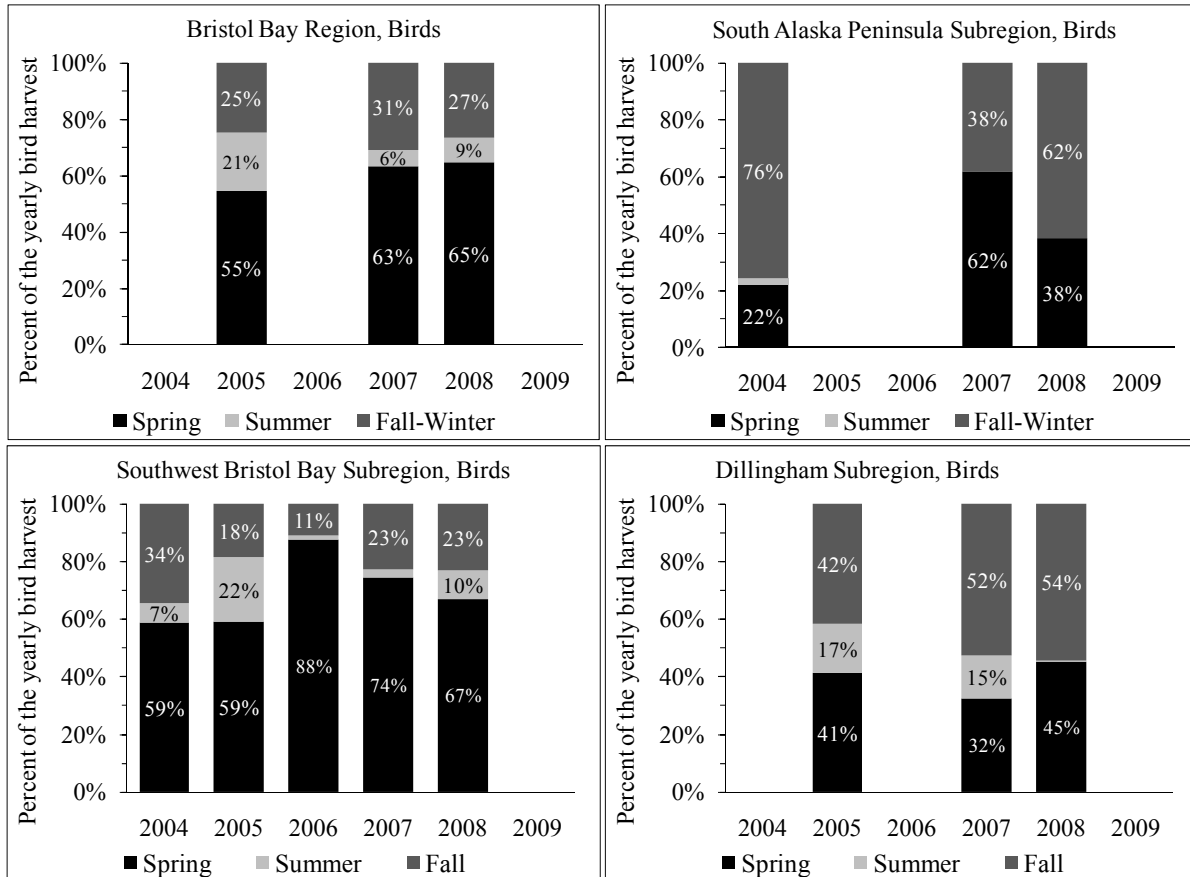


Figure 32.–Seasonality of bird harvests, Bristol Bay region, 2004–2009.



***Species composition of bird harvests***

Ducks contributed 28–48% (average = 38%) of the regional yearly bird estimated harvest, followed by ptarmigans and grouses (range = 24–41%, average = 33%) and geese (range = 12–26%, average = 18% Table 39, Figure 33). A similar species group composition was observed in the Southwest Bristol Bay subregion (average ducks = 42%, ptarmigans and grouses = 28%, and geese = 20%). In the South Alaska Peninsula, ducks (range = 60–77%, average = 70%) and ptarmigans and grouses (range = 16–25%, average = 21%) were the main groups of birds harvested. In the Dillingham subregion, ptarmigans and grouses (range = 44–67%, average = 55%) and ducks (range = 19–45%, average = 31%) were the main groups of birds harvested (Table 39).

The overall contribution of ducks, ptarmigans and grouses, and geese was similar among years both at the regional and subregional levels. The contribution of seabirds to the subregional harvests varied largely among years with higher harvests in 2004 in the South Alaska Peninsula (17% of the yearly bird harvest) and in 2007 in the Southwest Bristol Bay subregion (26% of the yearly harvest).

Mallard, northern pintail, and green-winged teal were the ducks usually harvested in the largest amounts both at the regional and subregional levels (Naves 2010a, 2010b). Geese (Canada, cackling, and white-fronted goose, and black brant) were harvested mostly in the Southwest Bristol Bay subregion. Ptarmigan was harvested in all 3 subregions and spruce grouse was harvested in the Southwest Bristol Bay and Dillingham subregions. Seabirds were harvested in larger amounts in Southwest Bristol Bay; the main species harvested were glaucous gull, mew gull, and murre (Naves 2010a, 2010b).

Figure 33.—Composition of bird and egg harvests (groups of birds), Bristol Bay region, 2004–2009.

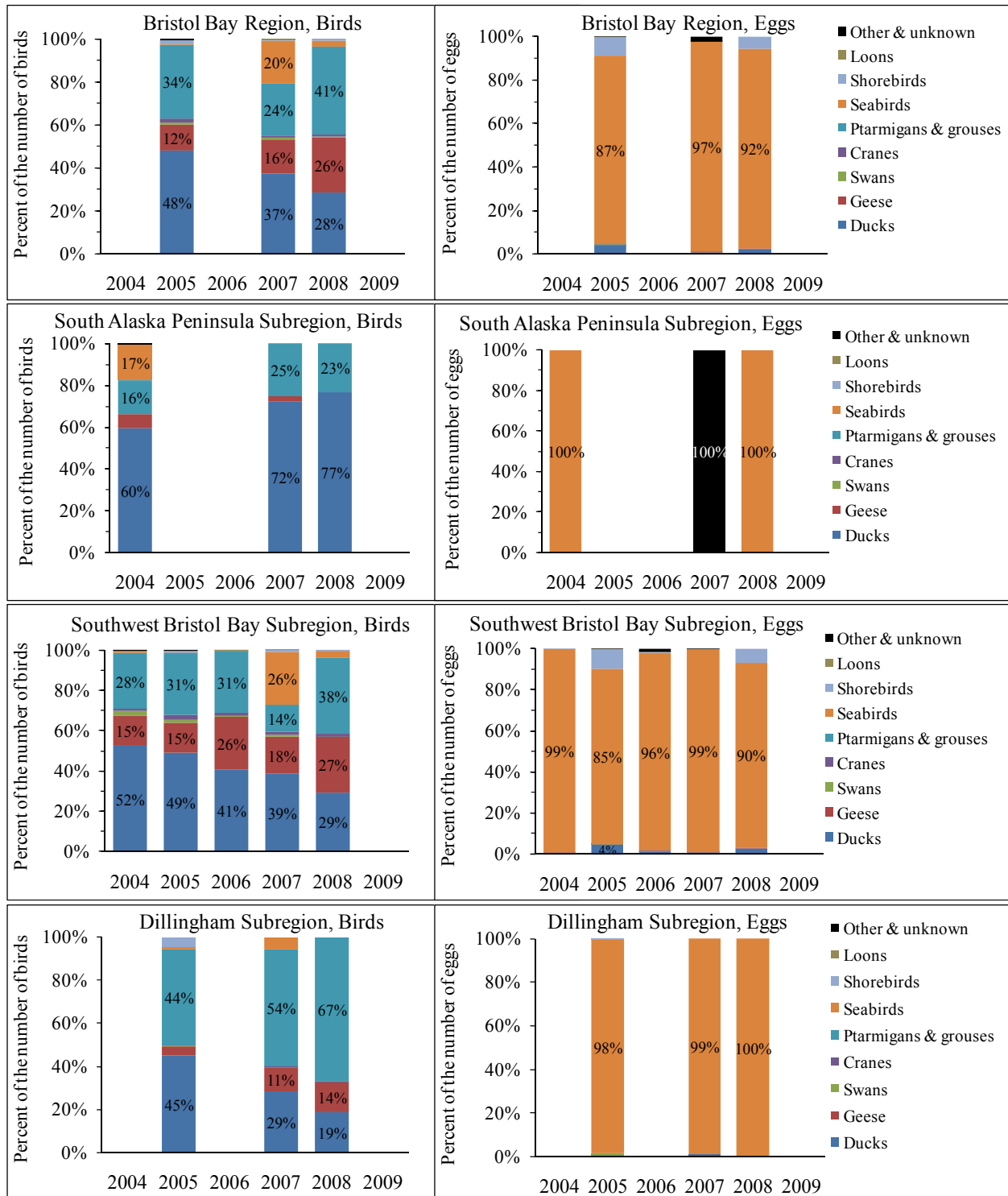


Table 39.—Estimated bird harvest (groups of birds), Bristol Bay region, 2004–2009.

Bird harvest	Bristol Bay region						South Alaska Peninsula subregion						Southwest Bristol Bay subregion						Dillingham subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	-	22,736 (48%)	-	10,530 (37%)	9,392 (28%)	-	477 (60%)	-	-	700 (72%)	88 (77%)	-	7,818 (52%)	16,091 (49%)	10,845 (41%)	7,788 (39%)	8,638 (29%)	-	-	5,301 (45%)	-	2,042 (29%)	665 (19%)	-
Geese	-	5,758 (12%)	-	4,472 (16%)	8,541 (26%)	-	55 (7%)	-	-	23 (2%)	0	-	2,288 (15%)	4,920 (15%)	6,976 (26%)	3,661 (18%)	8,061 (27%)	-	-	498 (4%)	-	788 (11%)	480 (14%)	-
Swans	-	536 (1%)	-	272 (1%)	92 (<1%)	-	0	-	-	0	0	-	314 (2%)	462 (1%)	230 (1%)	270 (1%)	88 (<1%)	-	-	43 (<1%)	-	3 (<1%)	4 (<1%)	-
Cranes	-	794 (2%)	-	292 (1%)	325 (1%)	-	0	-	-	0	0	-	136 (1%)	728 (2%)	301 (1%)	249 (1%)	306 (1%)	-	-	18 (<1%)	-	42 (1%)	19 (1%)	-
Ptarmigans and grouses	-	16,246 (34%)	-	6,854 (24%)	13,471 (41%)	-	127 (16%)	-	-	245 (25%)	27 (23%)	-	4,177 (28%)	10,050 (31%)	8,201 (31%)	2,748 (14%)	11,086 (38%)	-	-	5,235 (44%)	-	3,861 (54%)	2,358 (67%)	-
Seabirds	-	213 (<1%)	-	5,631 (20%)	1,008 (3%)	-	137 (17%)	-	-	0	0	-	142 (1%)	42 (<1%)	108 (<1%)	5,220 (26%)	1,008 (3%)	-	-	158 (1%)	-	412 (6%)	0	-
Shorebirds	-	831 (2%)	-	217 (1%)	165 (<1%)	-	0	-	-	0	0	-	0	282 (1%)	0	217 (1%)	165 (1%)	-	-	500 (4%)	-	0	0	-
Loons	-	0	-	16 (<1%)	0	-	0	-	-	0	0	-	41 (<1%)	0	54 (<1%)	16 (<1%)	0	-	-	0	-	0	0	-
Other and unknown	-	221 (<1%)	-	0	0	-	4 (1%)	-	-	0	0	-	39 (<1%)	193 (1%)	0	0	0	-	-	15 (<1%)	-	0	0	-
<b>Total birds</b>	-	<b>47,336</b>	-	<b>28,285</b>	<b>32,995</b>	-	<b>801</b>	-	-	<b>968</b>	<b>115</b>	-	<b>14,955</b>	<b>32,769</b>	<b>26,715</b>	<b>20,169</b>	<b>29,352</b>	-	-	<b>11,769</b>	-	<b>7,148</b>	<b>3,527</b>	-

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

-: region or subregion not surveyed.

Table 40.—Average bird harvest, Bristol Bay region, 2004–2009.

Bird harvest	Estimated number of birds 2004–2009		Proportion of harvest	Birds per capita	
	Average	SD		Average	SD
Bristol Bay region	36,205	9,922.8		5.0	1.3
South Alaska Peninsula subregion	628	452.1	3%	2.9	2.8
Southwest Bristol Bay subregion	24,792	7,180.9	76%	5.6	1.6
Dillingham subregion	7,481	4,131.0	20%	3.1	1.7

Table 41.—Estimated human population, Bristol Bay region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Bristol Bay region	7,314	7,355	7,204	7,168	7,149	7,238
South Alaska Peninsula subregion	402	414	396	396	368	395
Southwest Bristol Bay subregion	4,505	4,571	4,404	4,368	4,434	4,456
Dillingham subregion	2,407	2,370	2,404	2,404	2,347	2,386

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

***Amount of egg harvests***

Between 2004 and 2009, the regional yearly egg harvest estimates varied between 30,801 eggs (2007) and 47,799 eggs (2005; Figure 34; Table 42). The regional yearly average egg harvest was 42,084 eggs (SD = 9,771.6; Table 43). In the Southwest Bristol Bay subregion, the estimated egg harvest progressively declined from 54,437 eggs in 2004 to 25,118 eggs in 2007, and then rebounded to 37,630 eggs in 2008.

The Southwest Bristol Bay subregion accounted for 79–82% of the regional yearly egg harvest (average = 81%; Table 42; Figure 35). This subregion also showed the highest per capita egg harvest (range = 5.8–12.1 eggs per person, average = 8.4 eggs per person), followed by Dillingham (range = 2.1–4.2 eggs per person, average = 2.9 eggs per person) and the South Alaska Peninsula (range = 0.3–1.6 eggs per person, average = 1.0 eggs per person; Figure 36; Table 43).

Figure 34.—Total estimated egg harvests, Bristol Bay region, 2004–2009.

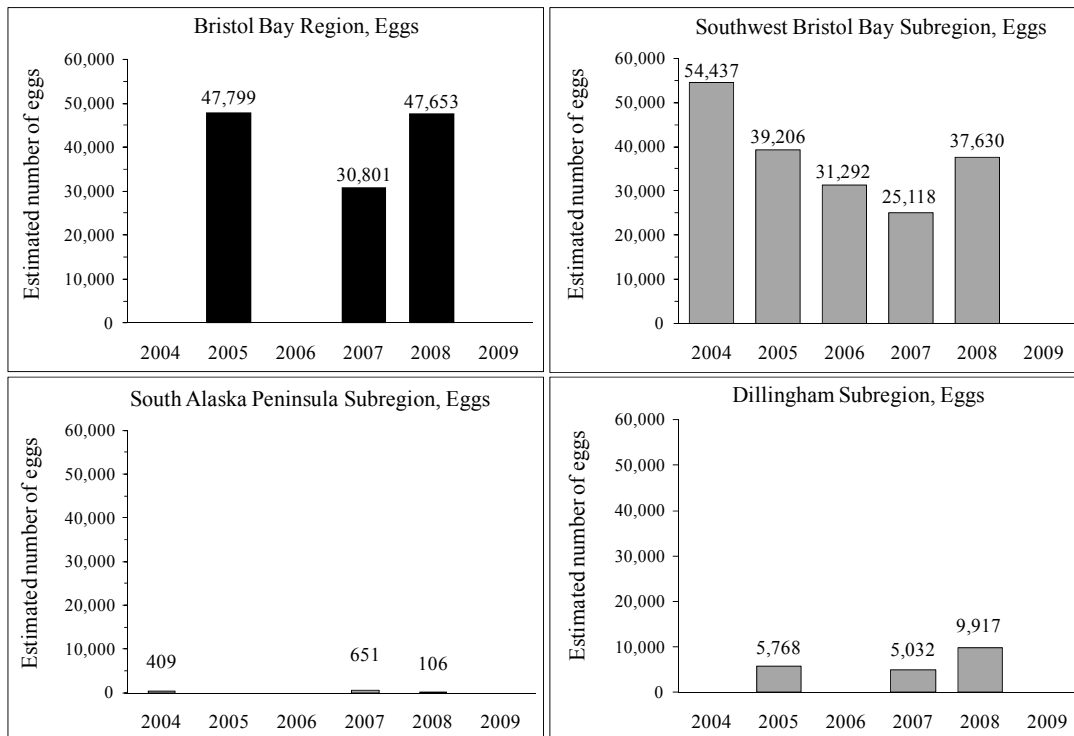


Figure 35.—Contribution of subregions to the regional egg harvest, Bristol Bay region, 2004–2009.

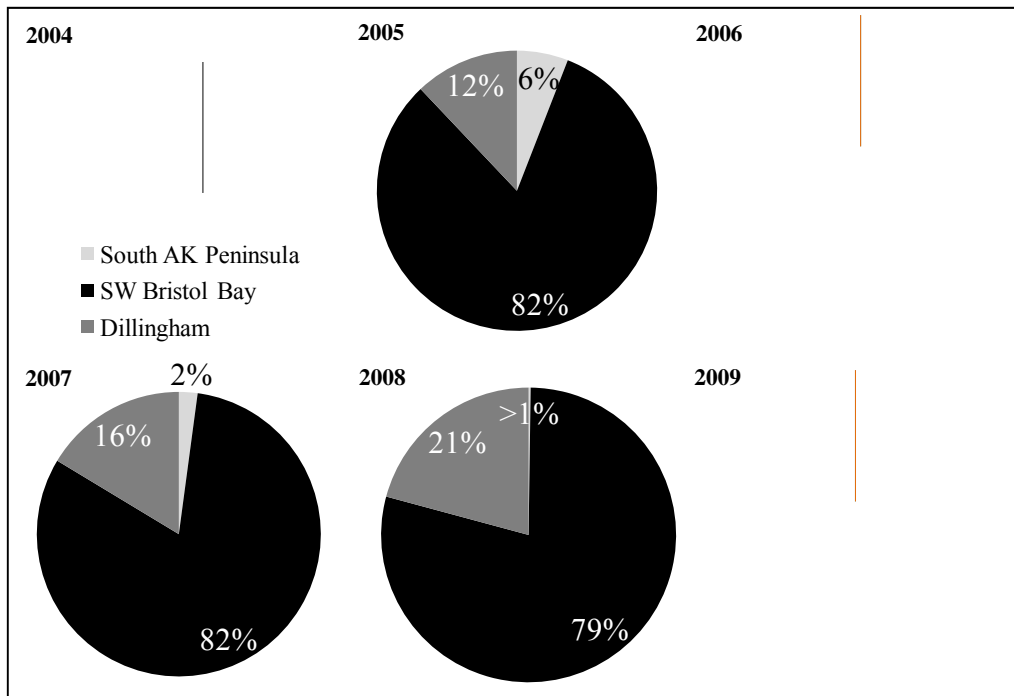
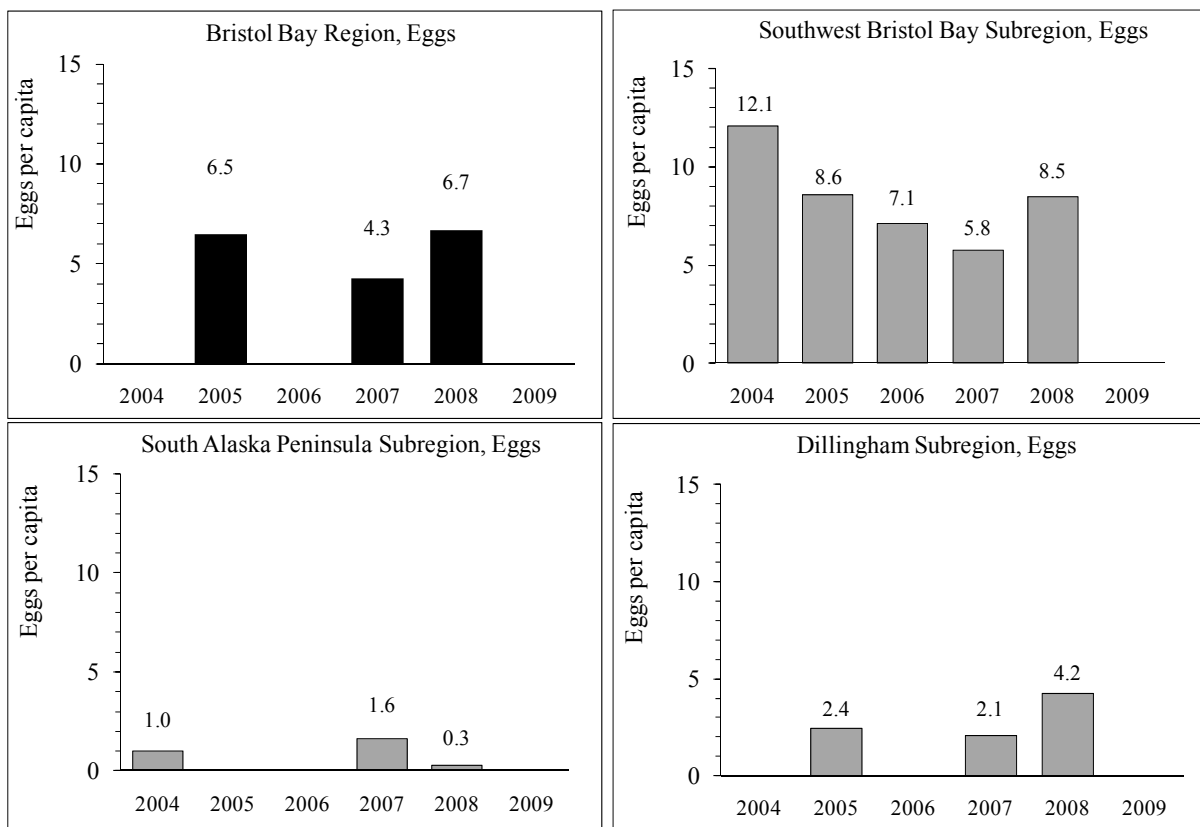


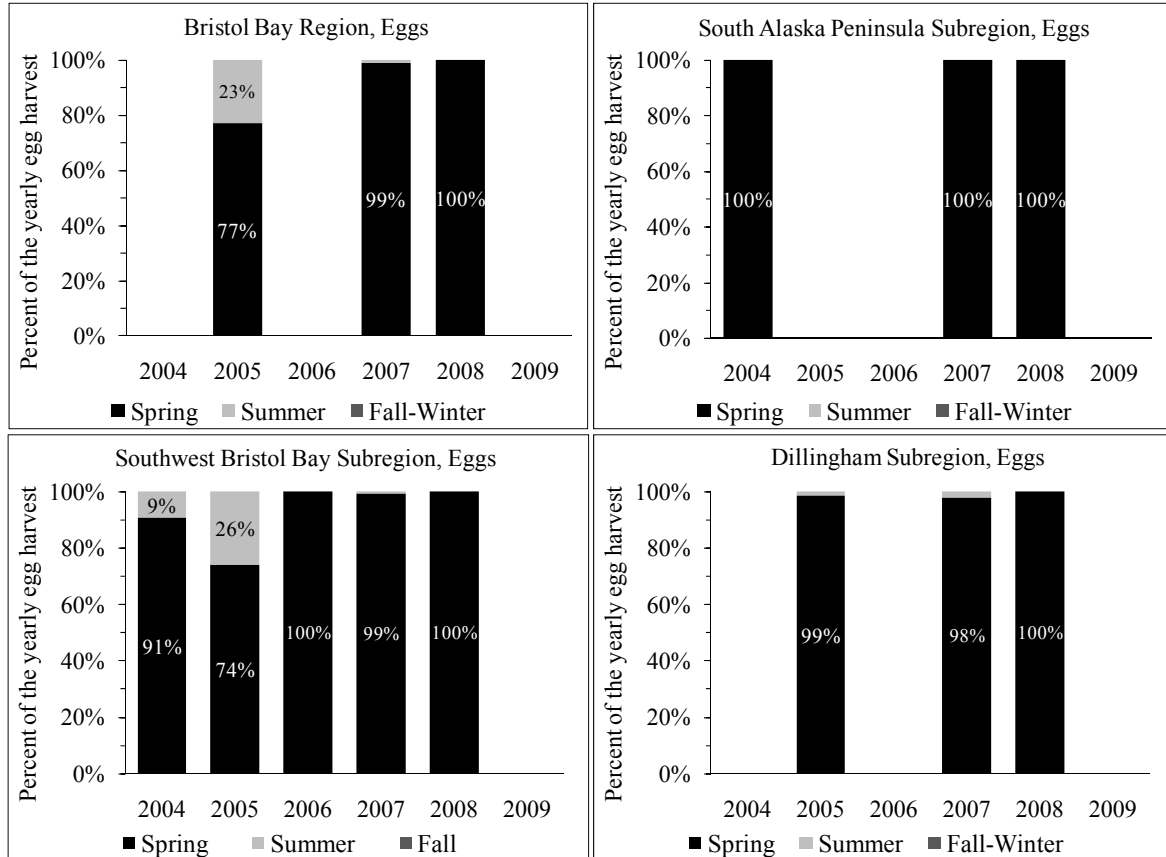
Figure 36.—Eggs per capita, Bristol Bay region, 2004–2009.



### Seasonality of egg harvests

In 2004–2009, spring harvests accounted for at least 77% of the regional yearly egg harvest (Figure 37). In the South Alaska Peninsula and Dillingham subregions, the 2 subregions with relatively low egg harvest, spring accounted for at least 98% of the yearly egg harvest. In Southwest Bristol Bay, the proportion of eggs harvested in spring was relatively low in 2005 (74%), compared to the other years (at least 91%).

Figure 37.–Seasonality of egg harvests, Bristol Bay region, 2004–2009.



### Species composition of egg harvests

Seabirds contributed at least 87% of the regional yearly estimated egg harvest. Shorebirds contributed up to 8% of the yearly harvest and ducks up to 4% (Table 42; Figure 33). All eggs harvested in the South Alaska Peninsula were seabird eggs or unknown eggs. On average, seabirds accounted for 99% of the yearly egg harvest in Dillingham and 94% in Southwest Bristol Bay. Shorebirds and duck eggs were harvested in relatively larger numbers in Southwest Bristol Bay, and, on average, accounted for 3% and 2% of the yearly egg harvest in this subregion, respectively (Table 42; Figure 33). The contribution of shorebird and duck eggs to the yearly harvest in the Southwest Bristol Bay was subject to strong yearly variation.

Eggs of mew gull, glaucous gull, murre, and arctic tern composed the majority of the regional egg harvest (Naves 2010a, 2010b). Among shorebirds, eggs of whimbrel, bristle-thighed curlew, and godwit were the most commonly harvested in Southwest Bristol Bay. Eggs of godwit (n = 30) were harvested in the Dillingham subregion. The South Alaska Peninsula subregion has not reported harvest of shorebird eggs.



Table 42.–Estimated egg harvest (groups of birds), Bristol Bay region, 2004–2009.

Egg harvest	Bristol Bay Region						South Alaska Peninsula subregion						Southwest Bristol Bay subregion						Dillingham subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	-	1,848 (4%)	-	286 (1%)	1,045 (2%)	-	0	-	-	0	0	-	364 (1%)	1,739 (4%)	428 (1%)	222 (1%)	1,045 (3%)	-	-	0	-	0	0	-
Geese	-	91 (<1%)	-	63 (<1%)	176 (<1%)	-	0	-	-	0	0	-	91 (<1%)	37 (<1%)	0	63 (<1%)	176 (<1%)	-	-	49 (1%)	-	65 (1%)	0	-
Swans	-	32 (<1%)	-	29 (<1%)	0 (<1%)	-	0	-	-	0	0	-	0	0	0	29 (<1%)	0	-	-	30 (1%)	-	0	0	-
Cranes	-	7 (<1%)	-	0 (<1%)	0 (<1%)	-	0	-	-	0	0	-	0	7 (<1%)	43 (<1%)	0	0	-	-	0	-	0	0	-
Ptarmigans and grouses	-	109 (<1%)	-	0 (<1%)	0 (<1%)	-	0	-	-	0	0	-	0	102 (<1%)	0	0	0	-	-	0	-	0	0	-
Seabirds	-	41,580 (87%)	-	29,725 (97%)	43,872 (92%)	-	409 (100%)	-	-	0	106 (100%)	-	53,962 (99%)	33,464 (85%)	30,164 (96%)	24,757 (99%)	33,849 (90%)	-	-	5,658 (98%)	-	4,968 (99%)	9,917 (100%)	-
Shorebirds	-	4,025 (8%)	-	33 (<1%)	2,560 (5%)	-	0	-	-	0	0	-	20 (<1%)	3,757 (10%)	108 (<1%)	33 (<1%)	2,560 (7%)	-	-	30 (1%)	-	0	0	-
Loons	-	80 (<1%)	-	11 (<1%)	0	-	0	-	-	0	0	-	0	76 (<1%)	54 (<1%)	11 (<1%)	0	-	-	0	-	0	0	-
Other and unknown	-	26 (<1%)	-	655 (2%)	0	-	0	-	-	651 (100%)	0	-	0	24 (<1%)	495 (2%)	3 (<1%)	0	-	-	0	-	0	0	-
<b>Total eggs</b>	-	<b>47,799</b>	-	<b>30,801</b>	<b>47,653</b>	-	<b>409</b>	-	-	<b>651</b>	<b>106</b>	-	<b>54,437</b>	<b>39,206</b>	<b>31,292</b>	<b>25,118</b>	<b>37,630</b>	-	-	<b>5,768</b>	-	<b>5,032</b>	<b>9,917</b>	-

Source 2004–2008 harvest surveys (Naves 2010a, 2010b).

-: region or subregion not surveyed.

Table 43.–Average egg harvest, Bristol Bay region, 2004–2009.

Egg harvest	Estimated number of eggs		Proportion of harvest	Eggs per capita	
	Average	SD		Average	SD
Bristol Bay region	42,084	9,771.6		5.8	1.3
South Alaska Peninsula subregion	389	273.2	3%	1.0	0.7
Southwest Bristol Bay subregion	37,536	10,973.1	81%	8.4	2.4
Dillingham subregion	6,906	2,633.6	16%	2.9	1.2

## **Yukon-Kuskokwim Delta**

The Yukon-Kuskokwim Delta region is surveyed for spring, summer, and fall harvests using the main harvest report form. This was the only region surveyed in all years between 2004 and 2009 (Appendix A, tables 7–20). This region is divided into 7 subregions (Figure 6). The Central Kuskokwim subregion was surveyed in 2004, 2006, and 2007. Fall bird harvest data were not available for the Bethel subregion in 2007 and for this reason the regional yearly bird harvest estimates were not presented in Naves (2010a). Regional yearly egg harvest estimates were presented for all years between 2004 and 2009 because eggs are not harvested in fall (and the Bethel 2007 egg harvest was assumed to be zero). This report presents 2007 regional yearly bird harvest estimates, which do not include fall harvest for Bethel (Appendix F).

### ***Amount of bird harvests***

In the period 2004–2009, the regional yearly bird harvest estimates varied between 79,088 birds (2008) and 195,082 birds (2009) (Table 44, Figure 38). The regional yearly average bird harvest was 139,933 birds (SD = 41,419.5) (Table 45). The highest regional estimated bird harvest in 2009 was mostly due to high harvest estimate at the Mid Coast subregion (82,654 birds, Figure 38). The 2004–2009 data did not suggest a clear increase or decrease in the amount of birds harvested at the regional or subregional levels over this period.

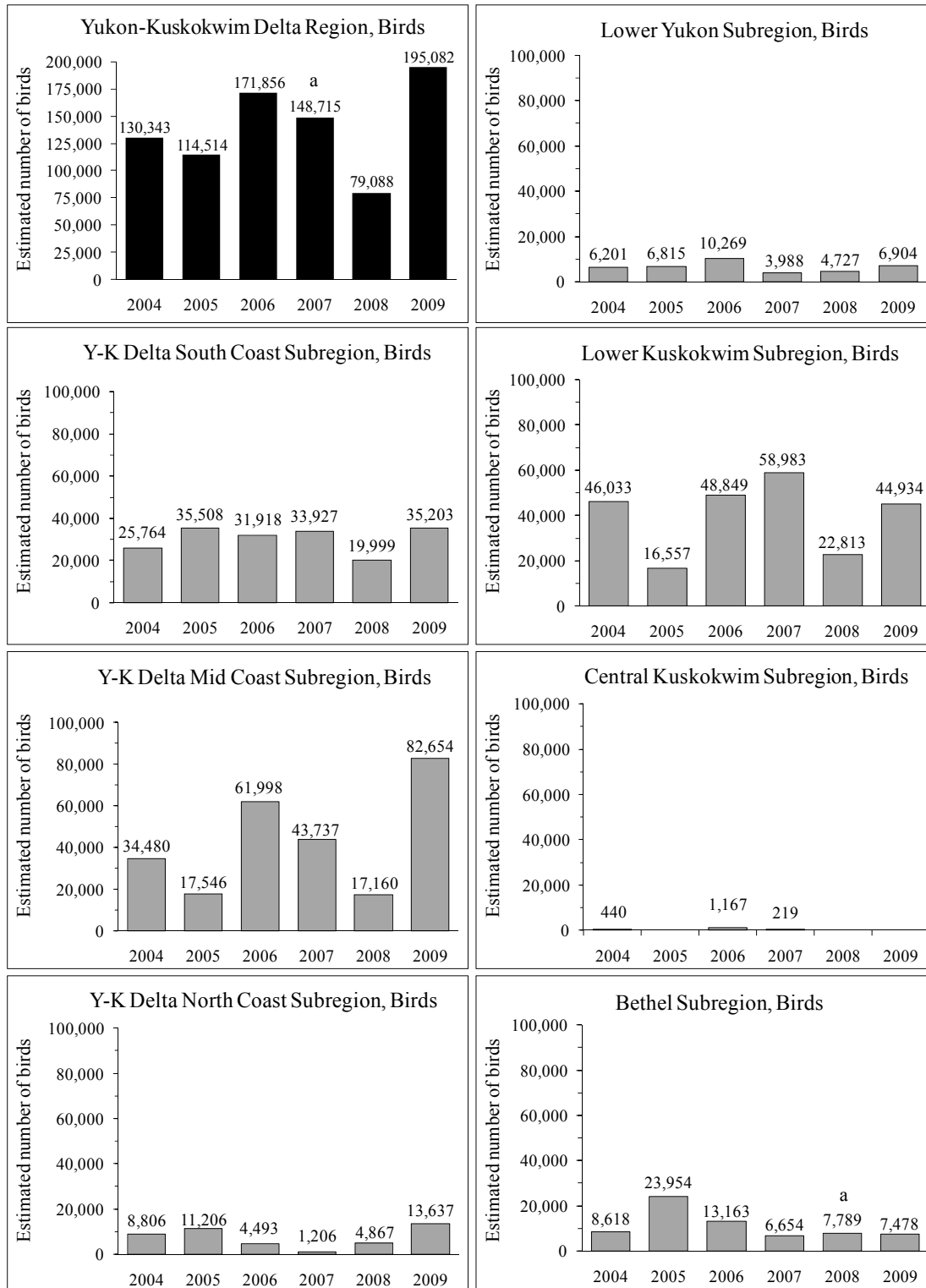
Three subregions together accounted for 61–92% of the yearly bird harvest: South Coast (average = 23%), Mid Coast (average = 28%), and Lower Kuskokwim (average = 26%) (Figure 39, Table 44). The 4 other subregions accounted for 8–39% of the yearly harvests: North Coast (average = 6%), Lower Yukon (average = 5%), Central Kuskokwim (average = 2%), and Bethel (average = 10%).

The South Coast (range = 6.4–11.5 birds per person, average = 9.8 birds per person) and Mid Coast (range = 3.6–17.1 birds per person, average = 9.0 birds per person) had the highest average per capita bird harvest (Figure 40, Table 45). In the Lower Kuskokwim subregion, the average per capita bird harvest was 7.3 birds per person (range = 3.0–10.8 birds per person). The average per capita bird harvest in the Bethel subregion was 2.1 birds per person (range = 1.3–4.0 birds per person) (Figure 40); on a yearly average, Bethel accounted for about one-fourth (24%) of the region's population (Table 46).

### ***Seasonality of bird harvests***

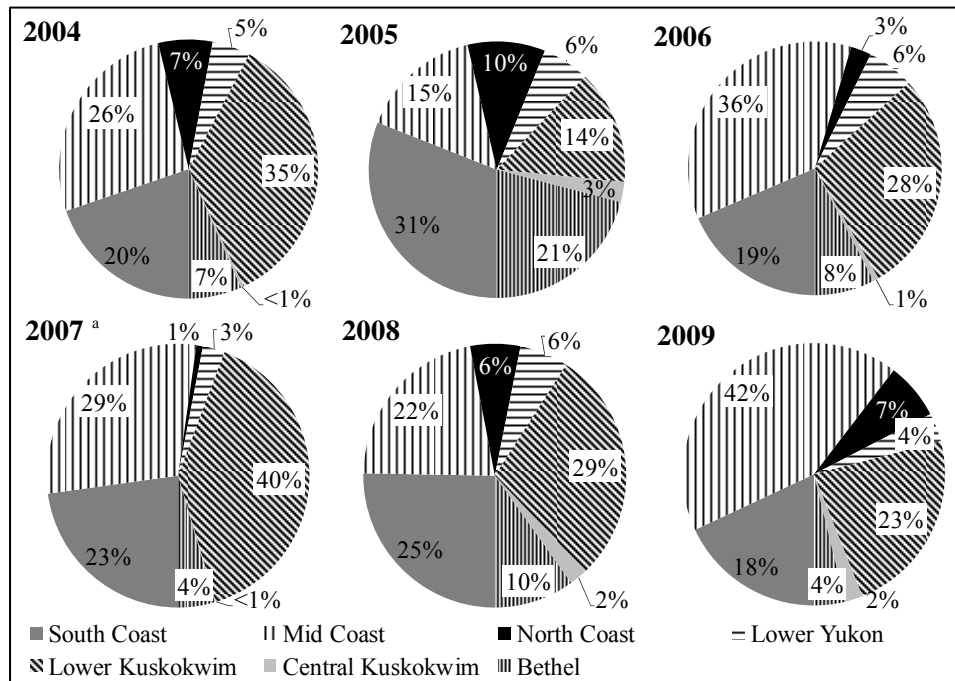
In 2004–2009, the spring harvests accounted for 52–71% of the regional yearly harvests (Figure 41). The highest proportions of spring harvests occurred in the Lower Kuskokwim (61–84%). High proportions of fall harvests occurred in the South Coast subregion (38–53%) and in Central Kuskokwim subregion (51–100%, although the yearly total number of birds harvested in this subregion was low)..

Figure 38.—Total estimated bird harvest, Yukon-Kuskokwim Delta region, 2004–2009.



a. Does not include 2007 Bethel fall bird harvest.

Figure 39.—Contribution of subregions to the regional bird harvest, Yukon-Kuskokwim Delta region, 2004–2009.



a. Does not include 2007 Bethel fall bird harvest.

### *Species composition of bird harvests*

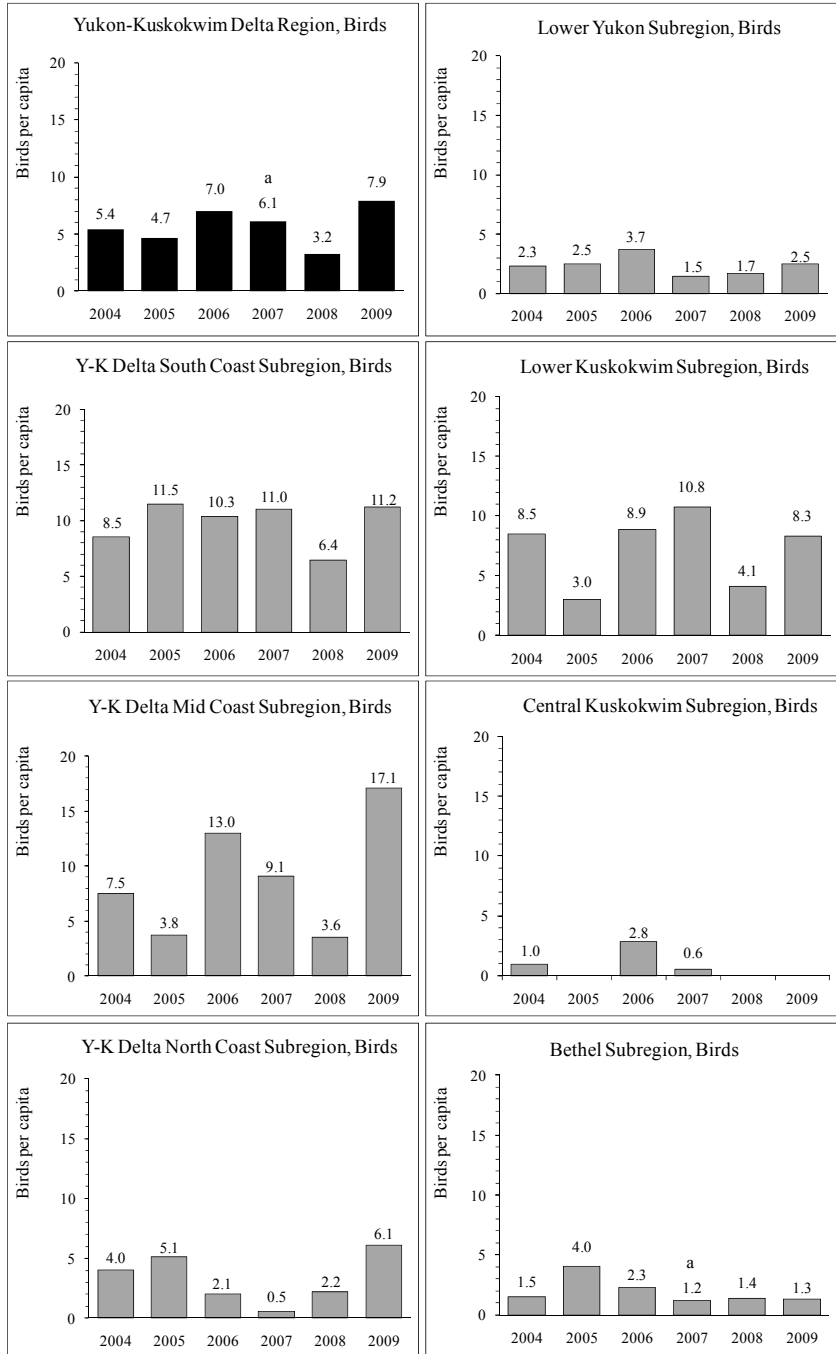
Ducks contributed with 34–49% (average = 39%) of the regional yearly bird estimated harvest and geese contributed 33–49% (average 42%) (Table 44). Ptarmigans and grouses contributed with 4–14% of the yearly bird estimated harvest, swans <5%, shorebirds and cranes <3% each, and seabirds and loons <1% each.

Among the 3 subregions that accounted for most of the yearly harvest, in the South Coast and Mid Coast, geese (37–57% in South Coast, 44–67% in Mid Coast) contributed to a higher proportion of the yearly harvest when compared to ducks (29–41% in South Coast, 14–39% in Mid Coast) (Table 44, Figure 42). In the Lower Kuskokwim subregion, the yearly contribution of ducks (51–71%) was higher than that of geese (13–32%). In these 3 subregions, ptarmigans and grouses was the third-highest group of birds by contribution to the yearly harvest (<19% of the yearly harvest in any of these 3 subregions) (Table 44, Figure 42). In the Bethel subregion, the overall composition of the harvest was similar to that of the Lower Kuskokwim, with ducks ranking first (35–48% of the yearly harvest), geese ranking second (24–55%), and ptarmigans and grouses ranking third (<26%). In the North Coast and Lower Yukon, swans were the third most important species in harvest amounts (2–8% in North Coast, 6–17% in Lower Yukon) after geese and ducks. In the Central Kuskokwim, which contributed the least to the regional yearly harvests, grouse was the main species harvested (48–100%) followed by ducks (34–36%) and geese (3–10%). Shorebirds, mostly godwit, were harvested in relatively larger numbers in the Mid Coast subregion, with a subregional yearly estimated harvest of up to 4,559 birds (2006) (Table 44). The contribution of groups of species to the yearly harvest was fairly similar between years both at the regional and subregional levels (Figure 42).

Mallard, northern pintail, black scoter, scaup, and king eider were the ducks usually harvested in larger amounts both at the regional and subregional levels (Naves 2010a, 2010b). Cackling goose, Canada goose, and white-fronted goose were the geese usually harvested in larger amounts. Black brant was also

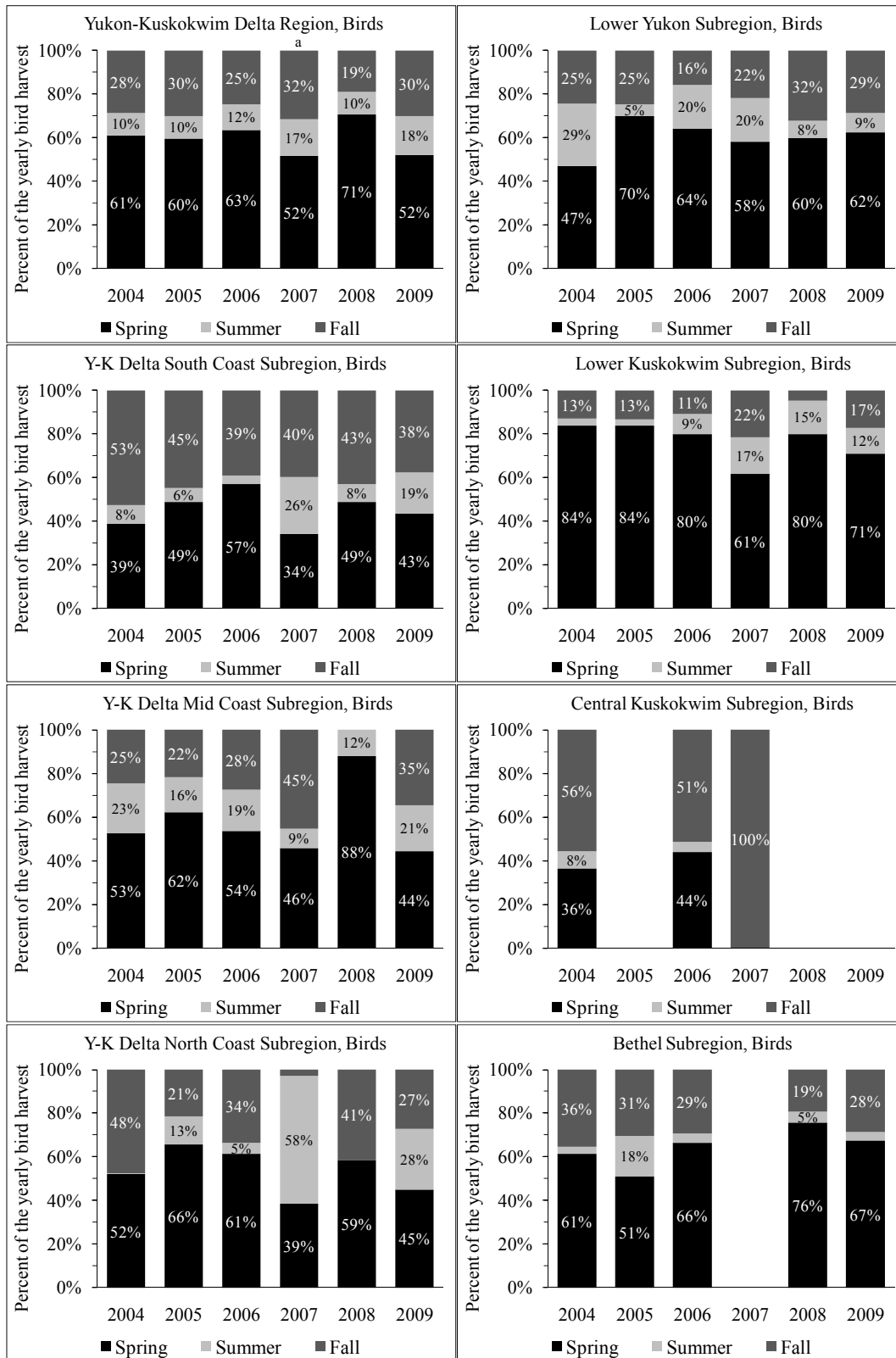
an important geese species but it was harvested in relatively lower numbers. Ptarmigan was the upland game bird most commonly harvested in all subregions, except in the Central Kuskokwim where spruce grouse was harvested (Naves 2010a, 2010b).

Figure 40.—Birds per capita, Yukon-Kuskokwim Delta region, 2004–2009.



a. Does not include 2007 Bethel fall bird harvest.

Figure 41.—Seasonality of bird harvests, Yukon-Kuskokwim Delta region, 2004–2009.



a. Does not include 2007 Bethel fall bird harvest.

Table 44.–Estimated bird harvest (groups of birds), Yukon-Kuskokwim Delta region, 2004–2009.

Bird harvest	Yukon-Kuskokwim Delta region						South Coast subregion						Mid Coast subregion					
	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	63,411 (49%)	41,645 (36%)	64,707 (38%)	72,810 (49%)	29,044 (37%)	66,303 (34%)	9,487 (37%)	11,207 (32%)	9,154 (29%)	13,988 (41%)	6,641 (33%)	11,842 (34%)	11,006 (32%)	2,972 (17%)	16,564 (27%)	17,191 (39%)	2,442 (14%)	20,547 (25%)
Geese	42,392 (33%)	49,240 (43%)	69,029 (40%)	59,143 (40%)	38,586 (49%)	92,837 (48%)	9,611 (37%)	18,591 (52%)	16,784 (53%)	17,805 (52%)	10,130 (51%)	19,891 (57%)	18,094 (52%)	10,140 (58%)	27,729 (45%)	19,232 (44%)	11,518 (67%)	43,673 (53%)
Swans	6,866 (5%)	4,554 (4%)	6,099 (4%)	3,364 (2%)	3,851 (5%)	5,064 (3%)	2,689 (10%)	1,271 (4%)	979 (3%)	711 (2%)	919 (5%)	262 (1%)	779 (2%)	249 (1%)	1,442 (2%)	90 (<1%)	783 (5%)	1,729 (2%)
Cranes	3,166 (2%)	2,637 (2%)	4,501 (3%)	2,499 (2%)	2,199 (3%)	5,620 (3%)	1,129 (4%)	1,473 (4%)	1,653 (5%)	832 (2%)	558 (3%)	1,345 (4%)	418 (1%)	357 (2%)	1,772 (3%)	321 (1%)	1,170 (7%)	2,714 (3%)
Ptarmigans and grouses	11,102 (9%)	15,487 (14%)	21,923 (13%)	5,530 (4%)	4,667 (6%)	23,033 (12%)	2,362 (9%)	2,857 (8%)	3,149 (10%)	142 (<1%)	1,463 (7%)	1,730 (5%)	2,402 (7%)	3,343 (19%)	9,351 (15%)	2,218 (5%)	1,099 (6%)	12,110 (15%)
Seabirds	920 (1%)	269 (<1%)	128 (<1%)	751 (1%)	150 (<1%)	375 (<1%)	95 (<1%)	0	82 (<1%)	382 (1%)	37 (<1%)	112 (<1%)	16 (<1%)	210 (1%)	17 (<1%)	363 (1%)	110 (1%)	211 (<1%)
Shorebirds	2,006 (2%)	117 (<1%)	4,769 (3%)	4,398 (3%)	240 (<1%)	1,688 (1%)	338 (1%)	86 (<1%)	117 (<1%)	12 (<1%)	228 (1%)	20 (<1%)	1,627 (5%)	16 (<1%)	4,559 (7%)	4,322 (10%)	8 (<1%)	1,592 (2%)
Loons	419 (<1%)	309 (<1%)	572 (<1%)	154 (<1%)	350 (<1%)	118 (<1%)	53 (<1%)	23 (<1%)	0	13 (<1%)	23 (<1%)	0	138 (<1%)	171 (1%)	564 (1%)	0	32 (<1%)	76 (<1%)
Other and unknown	61 (<1%)	256 (<1%)	127 (<1%)	66 (<1%)	0	44 (<1%)	0	0	0	42 (<1%)	0	0	0	89 (1%)	0	0	0	0
<b>Total birds</b>	<b>130,343</b>	<b>114,514</b>	<b>171,856</b>	<b>148,715</b>	<b>79,088</b>	<b>195,082</b>	<b>25,764</b>	<b>35,508</b>	<b>31,918</b>	<b>33,927</b>	<b>19,999</b>	<b>35,203</b>	<b>34,480</b>	<b>17,546</b>	<b>61,998</b>	<b>43,737</b>	<b>17,160</b>	<b>82,654</b>

Source 2004–2008 harvests (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

a. Does not include 2007 Bethel fall bird harvest.

Table 44.–Page 2 of 3.

Bird harvest	North Coast subregion						Lower Yukon subregion						Lower Kuskokwim					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	3,461 (39%)	3,489 (31%)	1,353 (30%)	413 (34%)	2,093 (43%)	4,972 (36%)	2,648 (43%)	2,820 (41%)	3,153 (31%)	898 (23%)	2,062 (44%)	1,973 (29%)	32,471 (71%)	8,580 (52%)	27,922 (57%)	37,877 (64%)	12,465 (55%)	22,858 (51%)
Geese	3,419 (39%)	5,847 (52%)	2,248 (50%)	771 (64%)	2,436 (50%)	6,845 (50%)	2,349 (38%)	2,625 (39%)	5,131 (50%)	2,509 (63%)	2,365 (50%)	4,012 (58%)	6,209 (13%)	4,975 (30%)	11,116 (23%)	15,189 (26%)	7,384 (32%)	12,943 (29%)
Swans	486 (6%)	737 (7%)	353 (8%)	22 (2%)	215 (4%)	939 (7%)	536 (9%)	1,151 (17%)	1,525 (15%)	498 (12%)	272 (6%)	647 (9%)	1,172 (3%)	713 (4%)	1,388 (3%)	1,747 (3%)	1,474 (6%)	1,323 (3%)
Cranes	417 (5%)	370 (3%)	210 (5%)	0	123 (3%)	500 (4%)	84 (1%)	28 (<1%)	55 (1%)	77 (2%)	29 (1%)	21 (<1%)	577 (1%)	192 (1%)	616 (1%)	1,048 (2%)	205 (1%)	838 (2%)
Ptarmigans and grouses	164 (2%)	717 (6%)	323 (7%)	0	0	368 (3%)	584 (9%)	145 (2%)	348 (3%)	0	0	227 (3%)	5,324 (12%)	1,856 (11%)	7,703 (16%)	2,903 (5%)	997 (4%)	6,852 (15%)
Seabirds	794 (9%)	37 (<1%)	0	0	0	13 (<1%)	0	15 (<1%)	23 (<1%)	0	0	20 (<1%)	15 (<1%)	0	6 (<1%)	5 (<1%)	0	11 (<1%)
Shorebirds	41 (<1%)	5 (<1%)	0	0	0	0	0	8 (<1%)	0	0	0	0	0	0	93 (<1%)	64 (<1%)	0	38 (<1%)
Loons	12 (<1%)	3 (<1%)	0	0	0	0	0	23 (<1%)	0	0	0	4 (<1%)	217 (<1%)	81 (<1%)	5 (<1%)	132 (<1%)	288 (1%)	28 (<1%)
Other and unknown	12 (<1%)	0	6 (<1%)	0	0	0	0	0	33 (<1%)	5 (<1%)	0	0	49 (<1%)	161 (1%)	0	19 (<1%)	0	43 (<1%)
<b>Total birds</b>	<b>8,806</b>	<b>11,206</b>	<b>4,493</b>	<b>1,206</b>	<b>4,867</b>	<b>13,637</b>	<b>6,201</b>	<b>6,815</b>	<b>10,269</b>	<b>3,988</b>	<b>4,727</b>	<b>6,904</b>	<b>46,033</b>	<b>16,557</b>	<b>48,849</b>	<b>58,983</b>	<b>22,813</b>	<b>44,934</b>

Source 2004–2008 harvests (Naves 2010a, 2010b).

–: Region or subregion not surveyed.



Table 44.–Page 3 of 3.

Bird harvest	Central Kuskokwim subregion						Bethel subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007 <sup>a</sup>	2008	2009
Ducks	159 (36%)	-	392 (34%)	0	-	-	4,179 (48%)	11,513 (48%)	6,169 (47%)	2,442 (37%)	2,704 (35%)	2,659 (36%)
Geese	14 (3%)	-	116 (10%)	0	-	-	2,696 (31%)	5,803 (24%)	5,906 (45%)	3,637 (55%)	3,907 (50%)	3,441 (46%)
Swans	0	-	0	0	-	-	1,203 (14%)	316 (1%)	412 (3%)	295 (4%)	105 (1%)	52 (1%)
Cranes	0	-	15 (1%)	0	-	-	539 (6%)	149 (1%)	180 (1%)	220 (3%)	67 (1%)	78 (1%)
Ptarmigans and grouses	267 (61%)	-	556 (48%)	219 (100%)	-	-	0	6,173 (26%)	492 (4%)	49 (1%)	1,006 (13%)	1,242 (17%)
Seabirds	0	-	0	0	-	-	0	0	0	0	0	0
Shorebirds	0	-	0	0	-	-	0	0	0	0	0	0
Loons	0	-	0	0	-	-	0	0	3 (<1%)	10 (<1%)	0	7 (<1%)
Other and unknown	0	-	88 (8%)	0	-	-	0	0	0	0	0	0
<b>Total birds</b>	<b>440</b>	<b>-</b>	<b>1,167</b>	<b>219</b>	<b>-</b>	<b>-</b>	<b>8,618</b>	<b>23,954</b>	<b>13,163</b>	<b>6,654</b>	<b>7,789</b>	<b>7,478</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

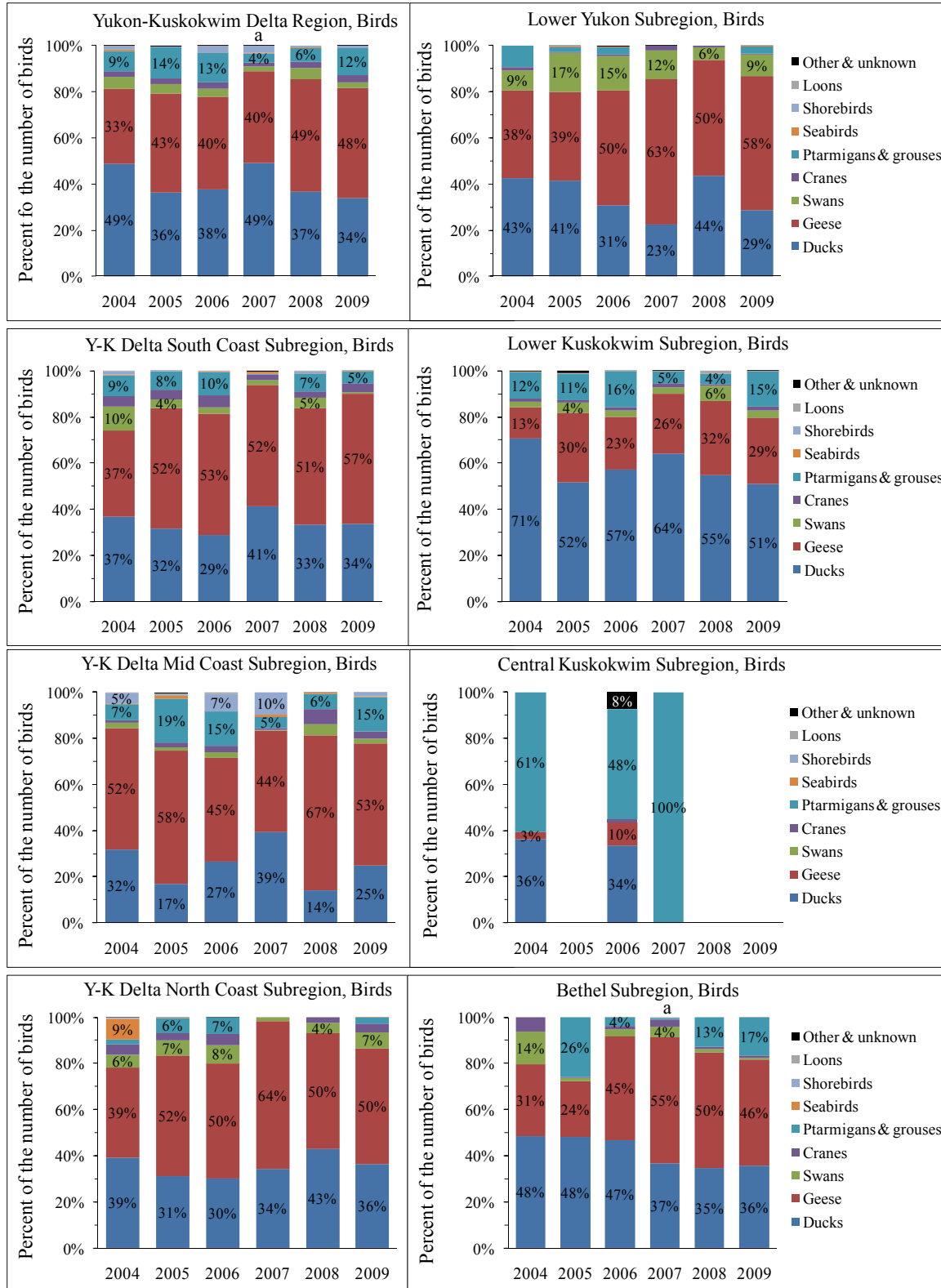
a. Does not include 2007 Bethel fall bird harvest.

Table 45.–Average bird harvest, Yukon-Kuskokwim Delta region, 2004–2009.

Bird harvest	Estimated number of birds 2004–2009		Proportion of harvest	Birds per capita	
	Average	SD		Average	SD
Yukon-Kuskokwim Delta region	139,933	41,419.5		5.7	1.7
South Coast subregion	30,387	6,222.2	23%	9.8	2.0
Mid Coast subregion	42,929	25,776.0	28%	9.0	5.3
North Coast subregion	7,369	4,660.1	6%	3.3	2.1
Lower Yukon subregion	6,484	2,191.2	5%	2.4	0.8
Lower Kuskokwim subregion	39,695	16,393.9	26%	7.3	3.0
Central Kuskokwim subregion	609	496.1	2%	1.5	1.2
Bethel subregion <sup>a</sup>	12,200	6,958.3	10%	2.1	1.2

a. Does not include 2007 Bethel fall bird harvest.

Figure 42.—Composition of bird harvests (groups of birds), Yukon-Kuskokwim Delta region, 2004–2009.



a. Does not include 2007 Bethel fall bird harvest.

Table 46.—Estimated human population, Yukon-Kuskokwim Delta region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Yukon-Kuskokwim Delta region	24,227	24,530	24,532	24,366	24,563	24,636
South Coast subregion	3,020	3,084	3,084	3,080	3,115	3,141
Mid Coast subregion	4,593	4,678	4,776	4,812	4,823	4,825
North Coast subregion	2,189	2,178	2,188	2,208	2,230	2,234
Lower Yukon subregion	2,679	2,734	2,747	2,744	2,798	2,802
Lower Kuskokwim subregion	5,420	5,456	5,517	5,476	5,528	5,420
Central Kuskokwim subregion	455	439	412	396	404	411
Bethel subregion	5,871	5,961	5,808	5,650	5,665	5,803

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

### *Amount of egg harvests*

Between 2004 and 2009, the regional yearly egg harvest estimates varied between 19,153 eggs (2007) and 58,995 eggs (2009) (Figure 43, Table 47). The regional yearly average egg harvest was 31,604 eggs (SD = 14,226.7) (Table 48). The highest regional egg harvest in 2009 was mostly associated to the high harvest estimate from the South Coast subregion (29,065 eggs, Figure 43). The 2004–2009 data did not suggest a clear increase or decrease in the amount of eggs harvested at the regional or subregional levels over this period of time.

Two subregions together accounted for 70–94% of the yearly egg harvest: South Coast (average = 33%) and Mid Coast (average = 48%). The Lower Kuskokwim (average = 11%) ranked a distant third (Figure 44, Table 48). The 4 other subregions accounted for 6–30% of the yearly egg harvests: North Coast (average = 5%), Lower Yukon (average = 1%), Central Kuskokwim (average = 1%), and Bethel (average = <1%) (Figure 44, Table 48).

The South Coast (range = 0.6–9.3 eggs per person, average = 3.6 eggs per person) and Mid Coast (range = 0.5–5.1 eggs per person, average = 3.2 eggs per person) had the highest average per capita egg harvest. The other 5 subregions had average per capita egg harvests of less than 1.0 eggs per person (Figure 45, Table 48).

### *Seasonality of egg harvests*

In the 2004–2009 period, spring harvests accounted for at least 80% of the regional yearly egg harvests and of the yearly egg harvests of the 2 subregions that contributed the most to the regional egg harvests, the Mid Coast and the South Coast (Figure 46). In the 5 subregions with relatively small egg harvests, in most years, spring accounted for 100% of the yearly egg harvest. At the regional level, the proportion of eggs harvested in summer seems to have increased between 2004 and 2009.

### *Species composition of egg harvests*

Geese contributed with 39–76% (average = 54%) of the regional yearly egg estimated harvest, followed by seabirds (range = 11–28%, average = 19%) and ducks (range = 4–21%, average = 12%) (Figure 47).

Geese accounted for 37–94% (average = 70%) of the yearly egg harvest in the Mid Coast subregion whereas in the South Coast the egg harvest was more distributed among groups of birds (Figure 47). In subregions with relatively low egg harvest, the composition of the harvest varied between years.

Eggs of cackling goose, Canada goose, white-fronted goose, and black brant composed the majority of the regional egg harvest (Naves 2010a, 2010b). Duck eggs usually harvested in the largest amounts were of mallard and northern pintail. The majority of seabird eggs harvested in the region were of mew gull and glaucous gull.

Table 47.–Estimated egg harvest (groups of birds), Yukon-Kuskokwim Delta region, 2004–2009.

Egg harvest	Yukon-Kuskokwim Delta region						South Coast subregion						Mid Coast subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	2,065 (8%)	3,316 (15%)	1,350 (4%)	2,660 (14%)	6,448 (21%)	7,598 (13%)	804 (10%)	2,232 (17%)	615 (8%)	227 (13%)	2,490 (29%)	5,996 (21%)	513 (4%)	71 (3%)	93 (<1%)	345 (3%)	1,262 (8%)	797 (3%)
Geese	15,271 (56%)	8,698 (39%)	23,403 (76%)	10,538 (55%)	15,004 (48%)	31,032 (53%)	2,348 (30%)	4,874 (36%)	2,790 (38%)	754 (43%)	2,470 (29%)	10,464 (36%)	11,103 (76%)	788 (37%)	19,974 (94%)	8,949 (75%)	10,640 (66%)	18,561 (75%)
Swans	2,141 (8%)	1,002 (5%)	681 (2%)	485 (3%)	1,421 (5%)	1,931 (3%)	802 (10%)	759 (6%)	376 (5%)	93 (5%)	493 (6%)	0	805 (6%)	15 (1%)	81 (<1%)	0	605 (4%)	1,530 (6%)
Cranes	652 (2%)	816 (4%)	345 (1%)	168 (1%)	1,228 (4%)	2,673 (5%)	435 (6%)	621 (5%)	195 (3%)	51 (3%)	144 (2%)	697 (2%)	65 (<1%)	56 (3%)	111 (1%)	21 (<1%)	672 (4%)	1,679 (7%)
Ptarmigans and grouses	585 (2%)	475 (2%)	189 (1%)	252 (1%)	455 (1%)	2,087 (4%)	273 (4%)	86 (1%)	48 (1%)	0	88 (1%)	1,752 (6%)	67 (<1%)	304 (14%)	0	0	99 (1%)	0
Seabirds	5,815 (21%)	6,269 (28%)	3,823 (12%)	4,088 (21%)	3,345 (11%)	11,727 (20%)	2,840 (37%)	3,516 (26%)	2,622 (35%)	546 (31%)	1,807 (21%)	8,901 (31%)	1,809 (12%)	876 (41%)	1,097 (5%)	2,579 (22%)	913 (6%)	1,847 (7%)
Shorebirds	649 (2%)	1,401 (6%)	896 (3%)	947 (5%)	3,121 (10%)	1,835 (3%)	189 (2%)	1,112 (8%)	723 (10%)	70 (4%)	908 (11%)	1,165 (4%)	218 (1%)	0	0	36 (<1%)	1,889 (12%)	227 (1%)
Loons	90 (<1%)	280 (1%)	33 (<1%)	16 (<1%)	173 (1%)	112 (<1%)	78 (1%)	221 (2%)	33 (<1%)	4 (<1%)	42 (<1%)	90 (<1%)	4 (<1%)	29 (1%)	0	0	115 (1%)	0
Other and unknown	20 (<1%)	11 (<1%)	4 (<1%)	0	0	0	0	3 (<1%)	4 (<1%)	0	0	0	14 (<1%)	0	0	0	0	0
<b>Total eggs</b>	<b>27,288</b>	<b>22,268</b>	<b>30,723</b>	<b>19,153</b>	<b>31,195</b>	<b>58,995</b>	<b>7,768</b>	<b>13,424</b>	<b>7,406</b>	<b>1,746</b>	<b>8,442</b>	<b>29,065</b>	<b>14,598</b>	<b>2,140</b>	<b>21,354</b>	<b>11,930</b>	<b>16,195</b>	<b>24,640</b>

Source 2004–2008 harvests (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Table 47.–Page 2 of 3.

Egg harvest	North Coast subregion						Lower Yukon subregion						Lower Kuskokwim subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	143 (6%)	316 (8%)	64 (34%)	0	0	80 (23%)	0	271 (42%)	215 (93%)	60 (11%)	0	53 (14%)	606 (27%)	281 (22%)	347 (23%)	2,028 (41%)	2,531 (48%)	505 (16%)
Geese	1,298 (53%)	2,587 (66%)	97 (51%)	0	508 (92%)	125 (36%)	89 (47%)	44 (7%)	0	422 (75%)	0	251 (65%)	433 (19%)	177 (14%)	523 (35%)	412 (8%)	1,058 (20%)	920 (30%)
Swans	166 (7%)	69 (2%)	6 (3%)	22 (100%)	46 (8%)	22 (6%)	0	29 (5%)	17 (7%)	83 (15%)	0	74 (19%)	368 (16%)	104 (8%)	202 (14%)	287 (6%)	246 (5%)	253 (8%)
Cranes	62 (2%)	108 (3%)	6 (3%)	0	0	51 (15%)	0	0	0	0	0	8 (2%)	90 (4%)	10 (1%)	33 (2%)	96 (2%)	384 (7%)	174 (6%)
Ptarmigans and grouses	0	18 (<1%)	0	0	0	0	0	0	0	0	0	0	245 (11%)	54 (4%)	141 (9%)	252 (5%)	258 (5%)	250 (8%)
Seabirds	798 (32%)	748 (19%)	0	0	0	28 (8%)	102 (53%)	283 (43%)	0	0	0	0	266 (12%)	656 (50%)	94 (6%)	962 (20%)	552 (10%)	604 (20%)
Shorebirds	0	67 (2%)	16 (8%)	0	0	40 (12%)	0	0	0	0	0	0	243 (11%)	20 (2%)	157 (10%)	840 (17%)	255 (5%)	363 (12%)
Loons	0	0	0	0	0	0	0	23 (4%)	0	0	0	0	8 (<1%)	0	0	12 (<1%)	12 (<1%)	19 (1%)
Other and unknown	0	7 (<1%)	0	0	0	0	0	0	0	0	0	0	6 (<1%)	0	0	0	0	0
<b>Total eggs</b>	<b>2,466</b>	<b>3,921</b>	<b>188</b>	<b>22</b>	<b>554</b>	<b>345</b>	<b>191</b>	<b>652</b>	<b>232</b>	<b>565</b>	<b>0</b>	<b>386</b>	<b>2,265</b>	<b>1,302</b>	<b>1,498</b>	<b>4,891</b>	<b>5,298</b>	<b>3,087</b>

Source 2004–2008 harvests (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Table 47.–Page 3 of 3.

Egg harvest	Central Kuskokwim subregion						Bethel subregion					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
Ducks	0	-	15 (100%)	0	-	-	0	59 (23%)	0	0	23 (100%)	0
Geese	0	-	0	0	-	-	0	6 (2%)	20 (67%)	0	0	33 (18%)
Swans	0	-	0	0	-	-	0	0	0	0	0	10 (5%)
Cranes	0	-	0	0	-	-	0	0	0	0	0	7 (4%)
Ptarmigans and grouses	0	-	0	0	-	-	0	0	0	0	0	39 (22%)
Seabirds	0	-	0	0	-	-	0	30 (11%)	10 (33%)	0	0	91 (51%)
Shorebirds	0	-	0	0	-	-	0	166 (64%)	0	0	0	0
Loons	0	-	0	0	-	-	0	0	0	0	0	0
Other and unknown	0	-	0	0	-	-	0	0	0	0	0	0
<b>Total eggs</b>	<b>0</b>	<b>-</b>	<b>15</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>261</b>	<b>30</b>	<b>0</b>	<b>23</b>	<b>179</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Figure 43.—Total estimated egg harvest, Yukon-Kuskokwim Delta region, 2004–2009.

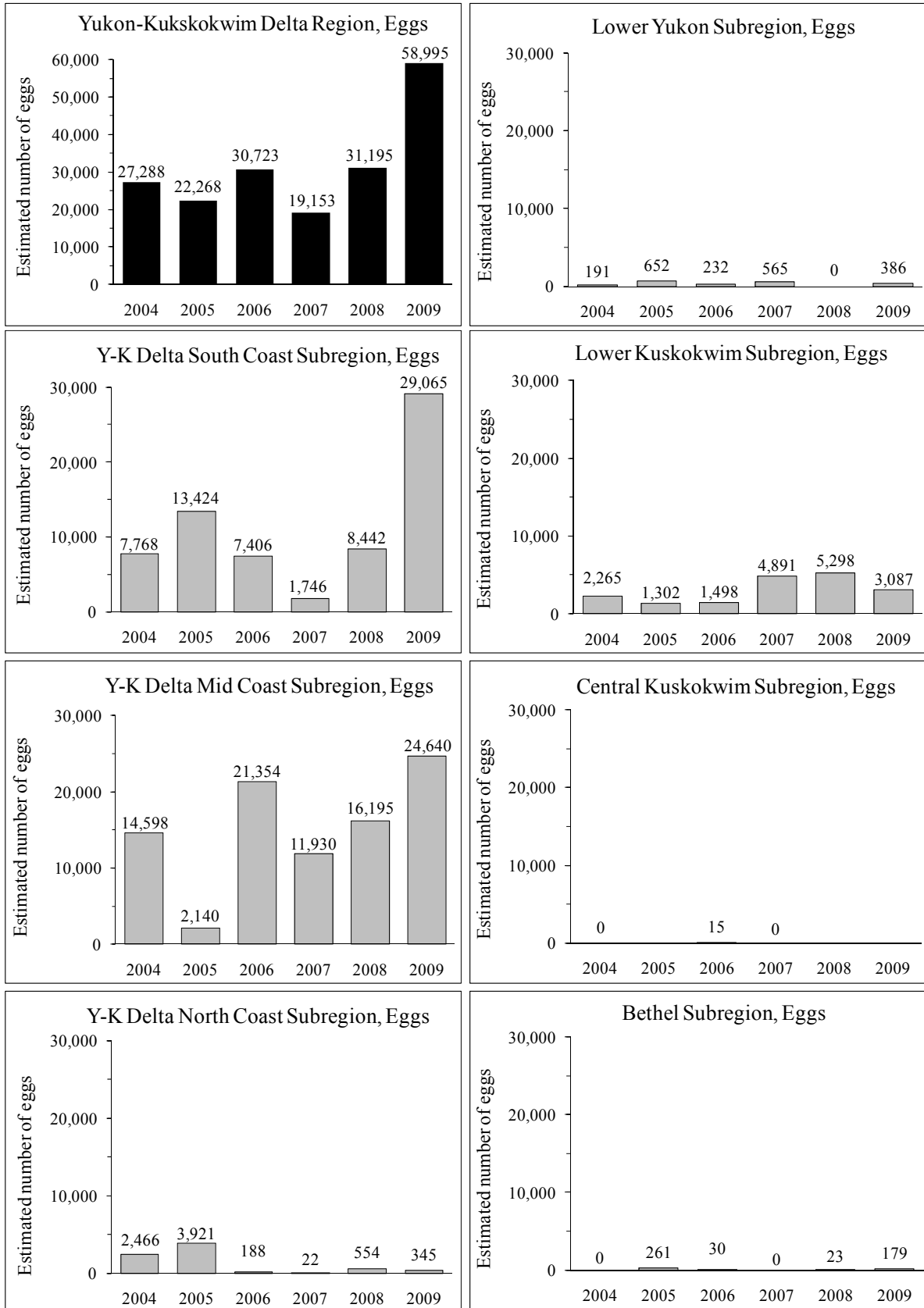


Figure 44.—Contribution of subregions to the regional egg harvest, Yukon-Kuskokwim Delta region, 2004–2009.

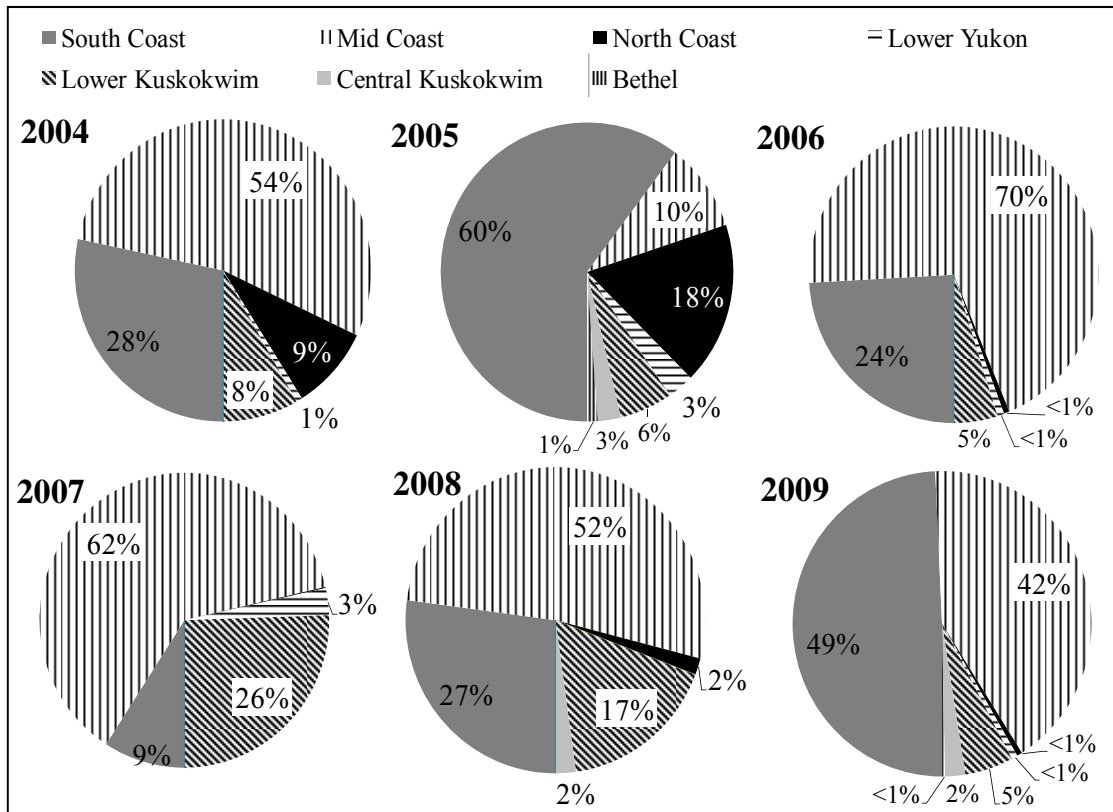


Table 48.—Average egg harvest, Yukon-Kuskokwim Delta region, 2004–2009.

Egg harvest	Estimated number of eggs		Proportion of harvest	Eggs per capita	
	Average	SD		Average	SD
Yukon-Kuskokwim Delta Region	31,604	14,226.7		1.4	0.6
South Coast	11,308	9,457.3	33%	3.6	2.9
Mid Coast	15,143	7,868.7	48%	3.2	1.8
North Coast	1,249	1,584.6	5%	0.6	0.8
Lower Yukon	338	244.7	1%	0.1	0.1
Lower Kuskokwim	3,057	1,704.4	11%	0.6	0.3
Central Kuskokwim	5	8.9	1%	0.0	<0.1
Bethel	82	110.5	0.3%	0.0	<0.1



Figure 45.—Eggs per capita, Yukon-Kuskokwim Delta region, 2004–2009.

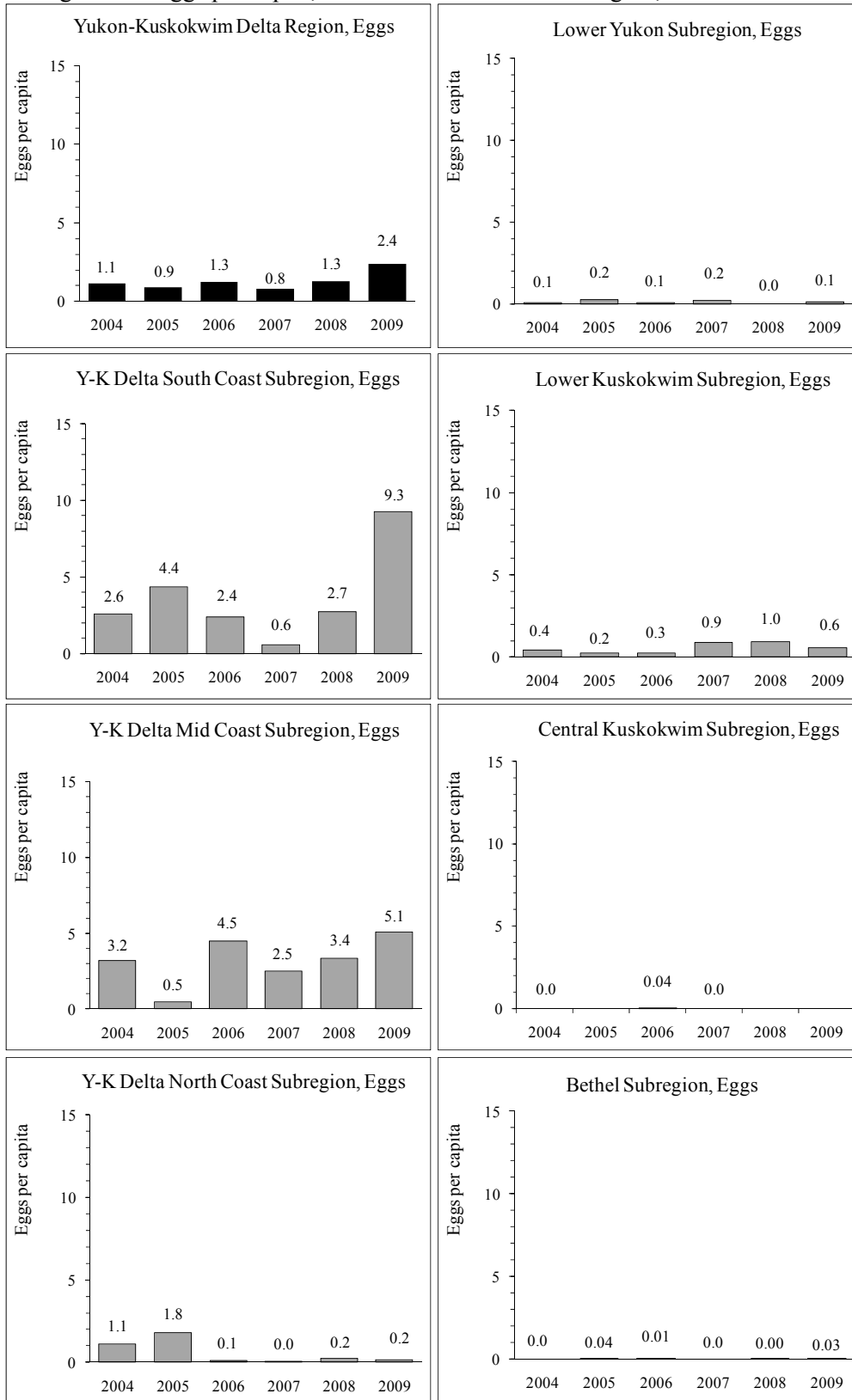


Figure 46.—Seasonality of egg harvests, Yukon-Kuskokwim Delta region, 2004–2009.

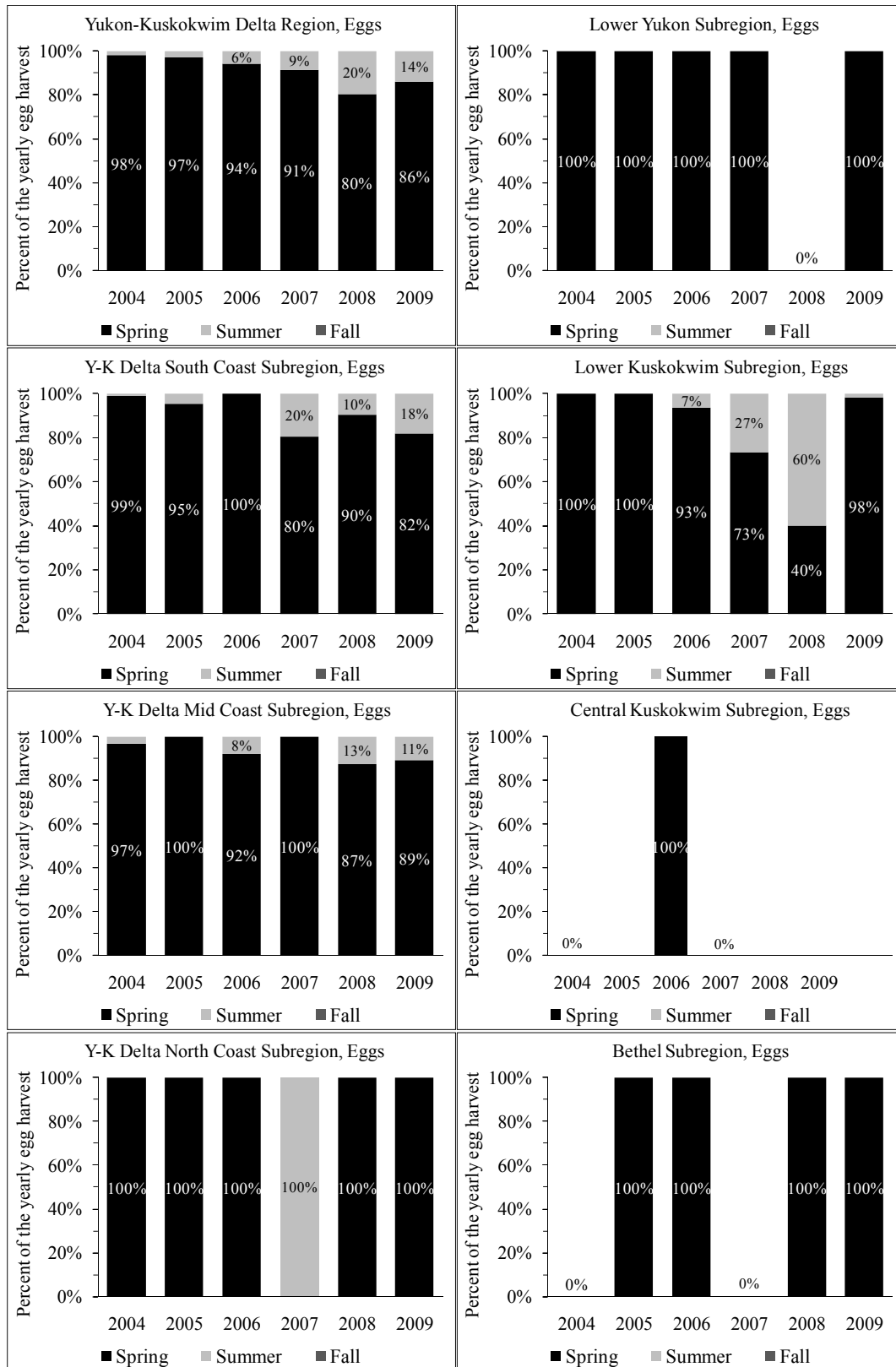
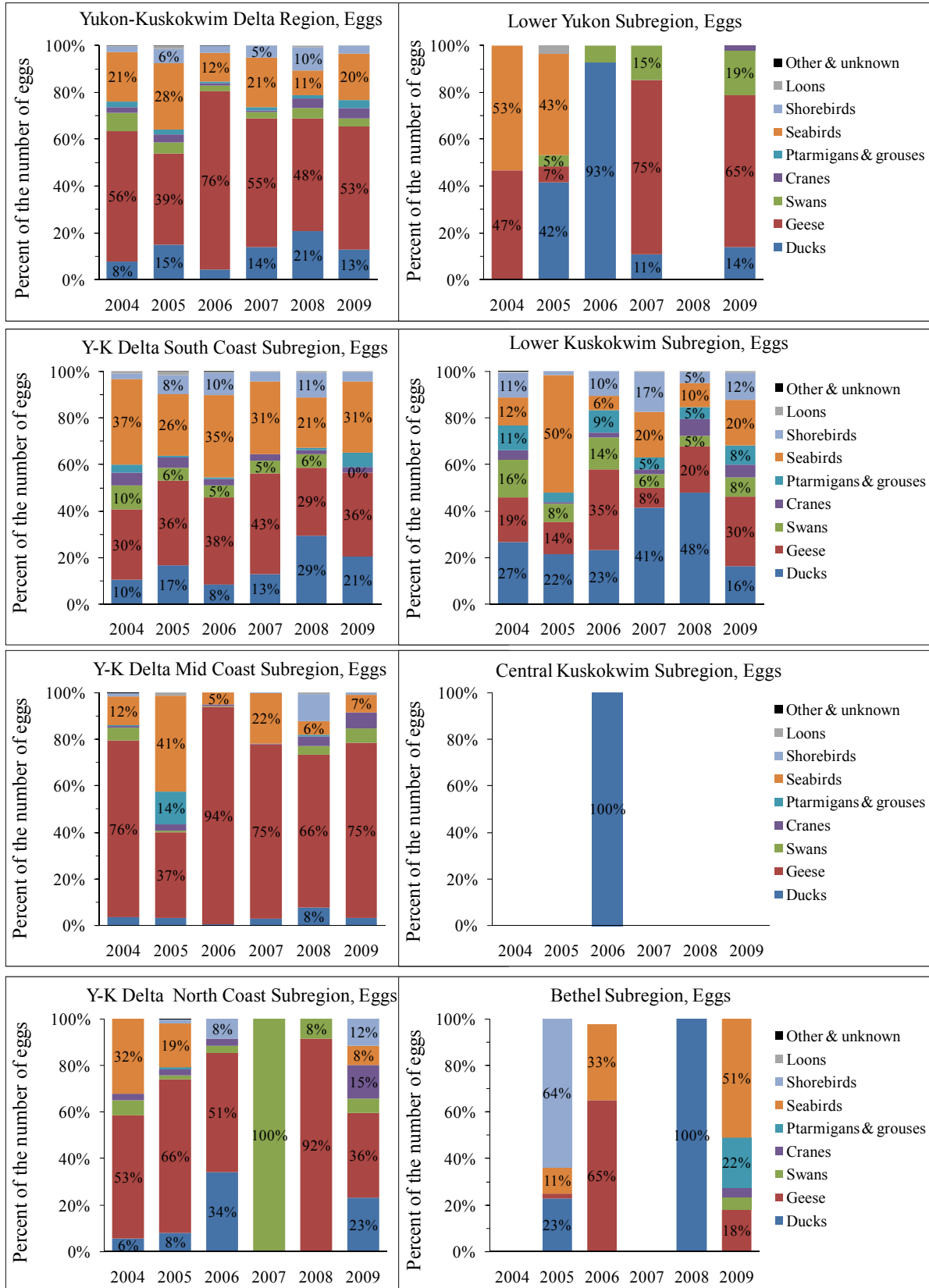


Figure 47.—Composition of egg harvests (groups of birds), Yukon-Kuskokwim Delta region, 2004–2009.



## Bering Strait-Norton Sound

The Bering Strait-Norton Sound region is surveyed for spring, summer, and fall harvests using the main harvest report form. This region is divided into 3 subregions: St. Lawrence-Diomedes Islands, Mainland Villages, and Nome (Figure 7). This region was surveyed in 2004, 2005, and 2007 and the St. Lawrence-Diomedes Islands subregion was also surveyed in 2009 (Appendix A, tables 21 and 22). Because of issues related to species of conservation concern, the Bering Strait-Norton Sound region has requested that only regional harvest estimates be presented, given that at least 75% of the households within the region are represented in the sample. The text below refers to regional data.

### *Amount, seasonality, and species composition of bird harvests*

The regional yearly bird harvest estimates varied between 53,576 birds (2004) and 123,257 birds in 2007 (Figure 48, Table 49). The regional yearly average bird harvest was 83,649 birds (SD = 35,805.3). The regional per capita bird harvests varied between 5.8–13.2 birds per person (Figure 49) with yearly average harvests of 9.0 birds per person (SD = 3.8). The estimated human population in this region is presented in Table 50. Spring harvests accounted for about half of the yearly harvests (range = 46–66%, average = 55%), fall harvests accounted for 27–30% (average = 28%), and summer harvests were variable between years (range = 7–24%, average = 17%) (Figure 50). On average, seabirds contributed 45% of the bird harvest, ducks 23%, and geese 22% (Figure 51). Ptarmigans and grouses contributed on average 4% of the yearly harvest at the regional level and the other groups of birds contributed up to 2% each. In the Bering Strait-Norton Sound region, the composition of the bird harvest differs greatly between the island villages and the mainland villages (Paige et al. 1996; Kawerak Inc. 2004; Ahmasuk and Trigg 2007). Although seabirds usually constitute the large majority of birds harvest on the islands, they represent a small proportion of the harvest by mainland villages. Ptarmigans and grouses usually are not available for harvest on the islands, although harvest has been reported in the mainland villages.

Figure 48.—Total estimated bird harvest, Bering Strait-Norton Sound region, 2004–2009.

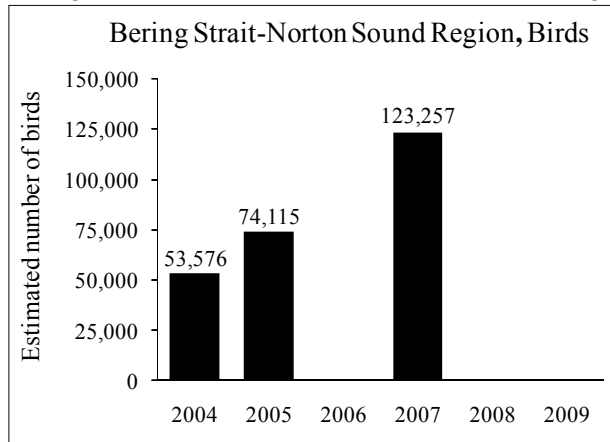


Figure 49.–Birds per capita, Bering Strait-Norton Sound region, 2004–2009.

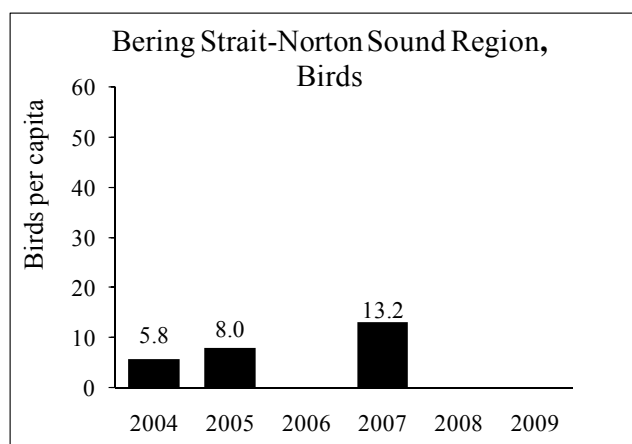


Table 49.–Estimated bird harvest (groups of birds), Bering Strait-Norton Sound region, 2004–2009.

Bird harvest	Bering Strait-Norton Sound Region				
	2004	2005	2006	2007	2008–2009
Ducks	9,978 (19%)	25,317 (34%)	-	20,404 (17%)	-
Geese	12,190 (23%)	17,706 (24%)	-	24,865 (20%)	-
Swans	676 (1%)	891 (1%)	-	1,334 (1%)	-
Cranes	686 (1%)	1,214 (2%)	-	2,674 (2%)	-
Ptarmigans and grouses	3,381 (6%)	4,158 (6%)	-	861 (1%)	-
Seabirds	25,366 (47%)	23,676 (32%)	-	69,076 (56%)	-
Shorebirds	59 (<1%)	155 (<1%)	-	0 (<1%)	-
Loons	1,240 (2%)	981 (1%)	-	4,042 (3%)	-
Other and unknown	0	18 (<1%)	-	0	-
<b>Total birds</b>	<b>53,576</b>	<b>74,115</b>	<b>-</b>	<b>123,257</b>	<b>-</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Table 50.—Estimated human population, Bering Strait-Norton Sound region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Bering Strait-Norton Sound region	9,274	9,308	9,386	9,359	9,349	9,354
St. Lawrence-Diomede Is. subregion	1,505	1,488	1,467	1,518	1,523	1,504
Mainland Villages subregion	4,288	4,310	4,380	4,346	4,256	4,382
Nome subregion	3,481	3,510	3,539	3,495	3,570	3,468

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

Figure 50.—Seasonality of bird harvests, Bering Strait-Norton Sound region, 2004–2009.

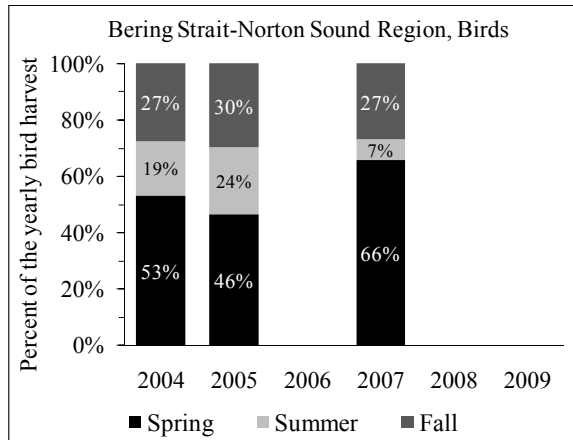
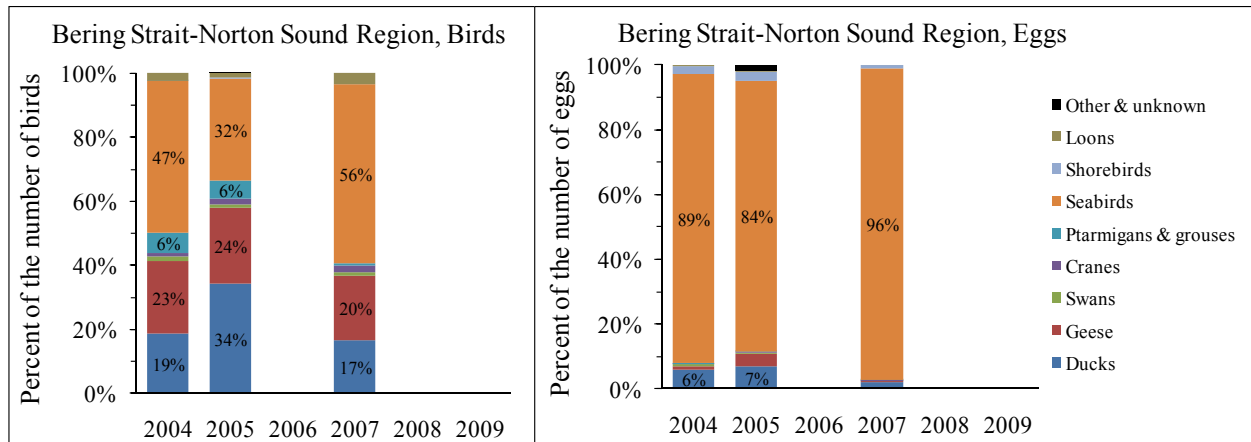


Figure 51.—Composition of bird and egg harvests (groups of birds), Bering Strait-Norton Sound region, 2004–2009.



***Amount, seasonality, and species composition of egg harvests***

The yearly regional bird harvest estimates varied between 99,494 eggs (2004) and 146,557 eggs (2007) (Figure 52). The regional yearly average egg harvest was 119,711 eggs (SD = 34,221.9) (Table 51). The regional per capita egg harvest varied between 10.7–15.7 eggs per person (Figure 53) with a yearly average of 12.8 eggs per person (SD = 2.5). Spring harvest accounted for 44% of the yearly egg harvest in 2004 and 92% of the yearly harvest in 2005 and 2007 (Figure 54). On average, seabirds contributed 90% of the egg harvest, ducks 5%, and geese and shorebirds 2% (Table 51, Figure 51).

Figure 52.—Total estimated egg harvests, Bering Strait-Norton Sound region, 2004–2009.

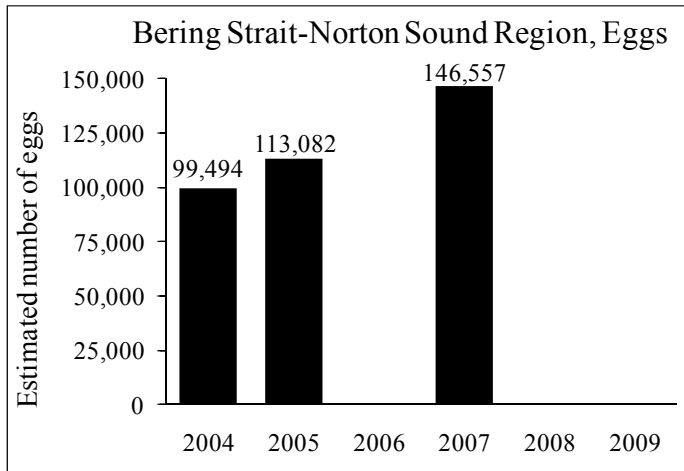


Figure 53.—Eggs per capita, Bering Strait-Norton Sound region, 2004–2009.

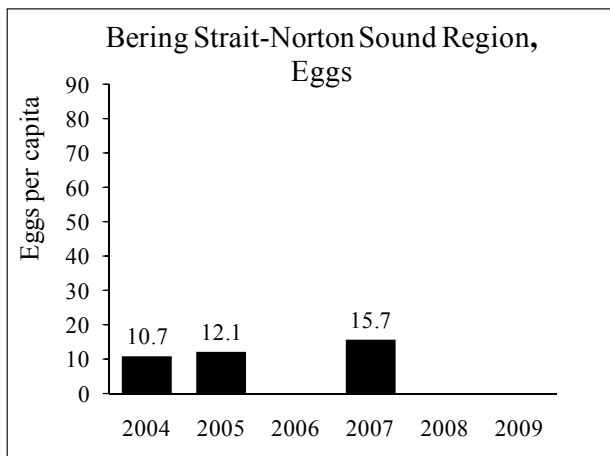


Figure 54.—Seasonality of egg harvests, Bering Strait-Norton Sound region, 2004–2009

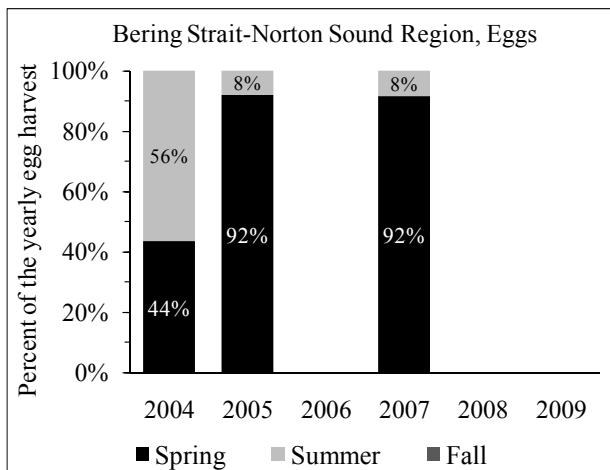


Table 51.—Estimated egg harvest (groups of birds), Bering Strait-Norton Sound region, 2004–2009.

Bird harvest	Bering Strait-Norton Sound Region				
	2004	2005	2006	2007	2008–2009
Ducks	6,003 (6%)	7,669 (7%)	-	2,801 (2%)	-
Geese	981 (1%)	4,632 (4%)	-	462 (<1%)	-
Swans	466 (<1%)	403 (<1%)	-	411 (<1%)	-
Cranes	173 (<1%)	171 (<1%)	-	345 (<1%)	-
Ptarmigans and grouses	168 (<1%)	38 (<1%)	-	164 (<1%)	-
Seabirds	88,871 (89%)	94,768 (84%)	-	140,823 (96%)	-
Shorebirds	2,358 (2%)	2,856 (3%)	-	1,368 (1%)	-
Loons	474 (<1%)	421 (<1%)	-	183 (<1%)	-
Other and unknown	0	2,123 (2%)	-	0	-
<b>Total eggs</b>	<b>99,494</b>	<b>113,082</b>	<b>-</b>	<b>146,557</b>	<b>-</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

## Northwest Arctic

The Northwest Arctic region is surveyed for spring, summer, and fall harvests using the main harvest form. The region is divided into 2 subregions: the Northwest Arctic Villages and Kotzebue (Figure 8). The Northwest Arctic Villages subregion was surveyed in 2006 and the Kotzebue subregion has not yet been surveyed in the context of this program (Appendix A).

### *Amount, seasonality, and species composition of bird harvests*

In the Northwest Arctic Villages subregion, the 2006 bird harvest estimate was 9,676 birds (Table 52) and the per capita bird harvest was 2.4 birds per person. On average, the Villages subregion accounted for 56% of the region's total population (Table 53). Spring harvest accounted for 70% of the yearly harvest in 2006, summer harvest accounted for 19%, and fall harvest accounted for 11%. Ducks contributed 59% of the 2006 subregional bird harvest, followed by geese (39%) and ptarmigans and grouses (1%) (Table 52, Figure 55). Mallard (16% of all birds) and northern pintail (16% of all birds) were the duck species harvested in the largest amounts (Naves 2010a). Lesser Canada goose (20% of all birds) and white-fronted goose (12% of all birds) were the goose species harvested the most. Ptarmigan (1% of all birds) was the species reported as harvested under the ptarmigans and grouses category.



Table 52.—Estimated bird harvest (groups of birds), Northwest Arctic region, 2004–2009.

Bird harvest	Northwest Arctic region	Northwest Arctic Villages subregion			Kotzebue subregion
	2004–2009	2004–2005	2006	2007–2009	2004–2009
Ducks	-	-	5,720 (59%)	-	-
Geese	-	-	3,811 (39%)	-	-
Swans	-	-	12 (<1%)	-	-
Cranes	-	-	0	-	-
Ptarmigans and grouses	-	-	123 (1%)	-	-
Seabirds	-	-	10 (<1%)	-	-
Shorebirds	-	-	0	-	-
Loons	-	-	0	-	-
<b>Total birds</b>	-	-	<b>9,676</b>	-	-

Source 2004–2008 harvest (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

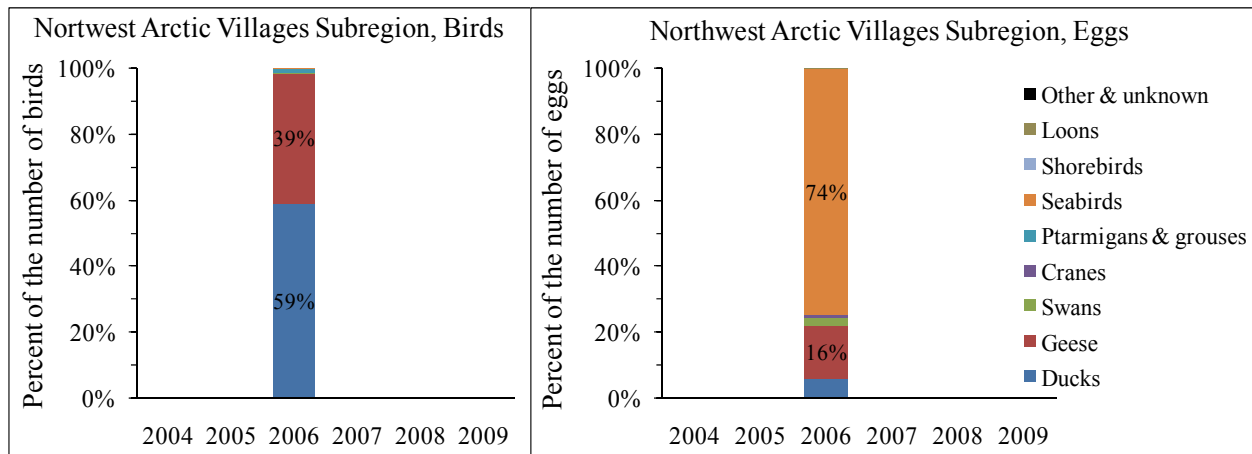
Table 53.—Estimated human population, Northwest Arctic region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Northwest Arctic region	7,058	7,083	7,061	7,134	7,146	7,104
Northwest Arctic Villages subregion	3,917	3,961	3,959	4,001	4,020	3,950
Kotzebue subregion	3,141	3,122	3,102	3,133	3,126	3,154

Source Alaska Department of Labor and Workforce Development

<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

Figure 55.—Composition of bird and egg harvests (groups of birds), Northwest Arctic Villages subregion, 2006.



***Amount, seasonality, and species composition of egg harvests***

In 2006, the estimated egg harvest in the Northwest Arctic Villages subregion was 10,081 eggs (Table 54) and the per capita egg harvest was 2.5 eggs per person. Spring harvest accounted for 60% of the yearly egg harvest and summer accounted for 40%. Seabirds contributed with 74% of the subregional egg harvest followed by geese (16%), ducks (6%), swans (2%), and cranes (1%) (Table 54, Figure 55). Eggs of murre (28% of all eggs), puffin (22% of all eggs), glaucous gull (20% of all eggs), and lesser Canada goose (14% of all eggs) were the eggs harvested in the largest amounts (Naves 2010a).

Table 54.–Estimated egg harvest (groups of birds), Northwest Arctic region, 2004–2009.

Egg harvest	Northwest Arctic region	Northwest Arctic Villages subregion			Kotzebue subregion
	2004–2009	2004–2005	2006	2007–2009	2004–2009
Ducks	-	-	583 (6%)	-	-
Geese	-	-	1,634 (16%)	-	-
Swans	-	-	218 (2%)	-	-
Cranes	-	-	125 (1%)	-	-
Ptarmigans and grouses	-	-	0	-	-
Seabirds	-	-	7,508 (74%)	-	-
Shorebirds	-	-	0	-	-
Loons	-	-	12 (>1%)	-	-
<b>Total eggs</b>	-	-	<b>10,081</b>	-	-

Source 2004–2008 harvest (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

## North Slope

The North Slope region is surveyed for spring and summer harvests only. This region is divided into 2 subregions: North Slope Villages and Barrow (Figure 9). Between 2004 and 2009, this region was surveyed in 2005, 2007, 2008, and 2009 (Appendix A, tables 23 and 24) using the main harvest report form. Because of issues related to species of conservation concern, the North Slope region requested reporting of regional harvest estimates only, given that at least 75% of the households within the region are represented in the sample. The text below refers to regional harvest estimates.

***Amount, seasonality, and species composition of bird harvests***

Regional bird harvest estimates were lower in 2005 (15,615 birds) and 2009 (19,075 birds) as compared to 2007 (44,270 birds) and 2008 (45,123 birds) (average = 31,021, SD = 15,858.3) (Figure 56, Table 55). The regional per capita bird harvest varied between 2.3–6.7 birds per person (average = 4.6, SD = 2.4) (Figure 57). The estimated human population in this region is presented in Table 56. Spring harvest accounted for 64–89% (average = 74%) of the regional yearly harvest (Figure 58). Geese accounted for 50–57% (average = 54%) of the regional yearly bird estimated harvest, ducks accounted for 35–42% (average = 39%), and ptarmigans and grouses accounted for 3–7% (average = 5%) (Table 55, Figure 59). Swan, crane, seabirds, shorebirds, and loons each accounted for up to 1% of the regional yearly harvest. The contribution of groups of species to the yearly harvest was similar between years (Figure 59).

In the North Slope Region, the survey asked about 49 bird species or sets of species. The number of species reported as harvested in the region was 20 (2005), 24 (2007), 19 (2008), and 18 (2009) (Naves 2010a, 2010b). Five species accounted for at least 91% of the estimated bird harvest in the 4 years surveyed: white-fronted goose, king eider, black brant, common eider, and ptarmigan. King eider and white-fronted goose were the species harvested in the largest amounts in 4 out of the 4 years.

Figure 56.—Total estimated bird harvest, North Slope region, 2004–209.

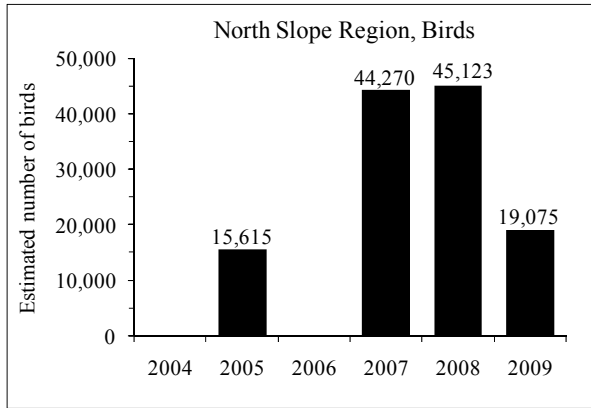


Figure 57.—Birds per capita, North Slope region, 2004–2009.

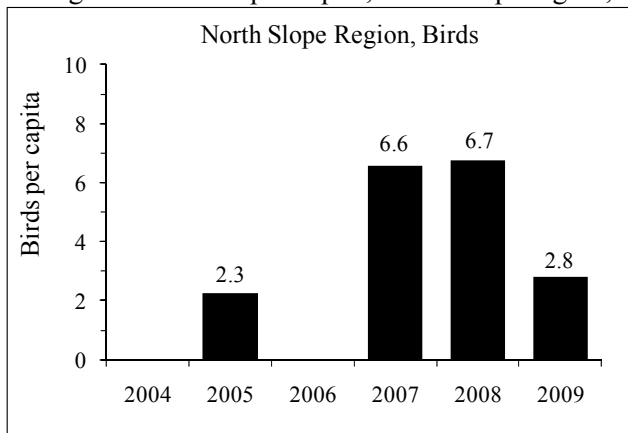
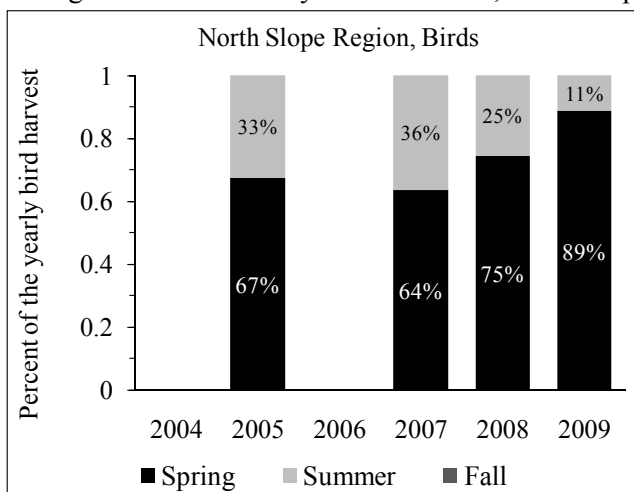


Figure 58.—Seasonality of bird harvest, North Slope region, 2004–2009.



Note Fall survey not conducted in the North Slope region.

Table 55.—Estimated bird harvest (groups of birds), North Slope region, 2004–2009.

Bird harvest	North Slope Region			
	2005	2007	2008	2009
Ducks	6,435 (41%)	18,449 (42%)	17,482 (39%)	6,748 (35%)
Geese	8,165 (52%)	22,066 (50%)	25,714 (57%)	10,942 (53%)
Swans	18 (<1%)	73 (<1%)	47 (<1%)	9 (<1%)
Cranes	13 (<1%)	5 (<1%)	35 (<1%)	4 (<1%)
Ptarmigans and grouses	759 (5%)	2,833 (6%)	1,556 (3%)	1,267 (7%)
Seabirds	40 (<1%)	183 (<1%)	129 (<1%)	0
Shorebirds	119 (1%)	505 (1%)	0	46 (<1%)
Loons	2 (<1%)	125 (<1%)	158 (<1%)	59 (<1%)
Other and unknown bird	63 (<1%)	31 (<1%)	2 (<1%)	0
<b>Total birds</b>	<b>15,615</b>	<b>44,270</b>	<b>45,123</b>	<b>19,075</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

Figure 59.—Composition of bird and egg harvest (groups of birds), North Slope region, 2004–2009.

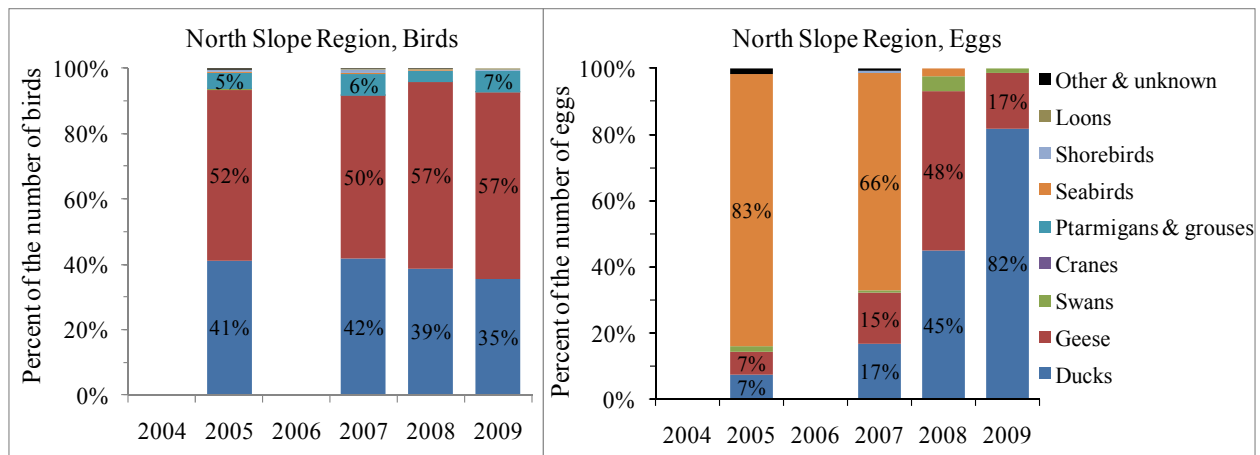


Table 56.—Estimated human population, North Slope region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
North Slope region	7,118	6,883	6,797	6,735	6,692	6,785
North Slope Villages subregion	2,751	2,705	2,729	2,683	2,638	2,666
Barrow subregion	4,367	4,178	4,068	4,052	4,054	4,119

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

### ***Species Identification Issues in Bird Harvest Surveys in the North Slope***

Of the species represented on the survey form used in the North Slope region in the 2004–2009 survey, 14 species are of uncommon occurrence or likely do not occur on the North Slope region (goldeneye, bufflehead, canvasback, harlequin duck, common merganser, lesser Canada goose, emperor goose, cormorant, kittiwake, mew gull, auklet, puffin, bristle-thighed curlew, and common loon). Of these 14 species, 10 have never been reported as harvested. A few emperor geese, puffins, and common loons have been occasionally reported as harvested. Lesser Canada goose has been reported as harvested every survey year and likely refers to cackling Canada goose. Snowy owl has been occasionally harvested for subsistence uses (Fuller and George 1997, Bacon et al. 2009), but was not included in the AMBCC survey form, therefore this survey does not represent harvests of this species. Starting in 2010, bird harvest data collection in the North Slope has used a revised survey form, in which these issues have been addressed.

King, spectacled, and common eiders, especially females, are sometimes mistaken for one another (Bacon et al. 2009). White-fronted goose is sometimes called “Canada goose” by North Slope residents because they breed in Canada; therefore some white-fronted goose may have been reported as Canada goose (Bacon et al. 2009). The long-tailed duck is called “pintail” by some hunters, which may lead to some errors in reported numbers of this species. In the Barrow area, hunters seem to avoid taking long-tailed ducks because the ducks use the sewage lagoon (Taquilik Hepa, North Slope Borough, Deputy Director, Department of Wildlife Management, personal communication).

### ***Amount, seasonality, and species composition of egg harvests***

The regional yearly estimated egg harvest varied largely between years. Regional egg harvest estimates varied between 858 eggs (2008) and 4,705 eggs (2005) (Figure 60). The regional per capita egg harvest varied between 0.1 and 0.7 eggs per person (Figure 61). Spring harvest accounted for 27–100% of the yearly egg harvest and summer accounted for 19–73% of the yearly egg harvest (Figure 62). In 2005 and 2007, the majority of the regional estimated egg harvest (83% and 66%, respectively) was composed of seabirds (Table 57, Figure 59). In 2008 and 2009, seabird eggs represented up to 3% of the estimated egg harvest, which was composed mostly of duck and goose eggs. Murre eggs were the eggs harvested in the largest amounts in 2005 and 2007, although no murre egg harvest was reported in 2008 and 2009 (Naves 2010a, 2010b). Eggs of white-fronted goose and common eider were harvested in relatively large numbers.

Figure 60.—Total estimated egg harvest, North Slope region, 2004–209.

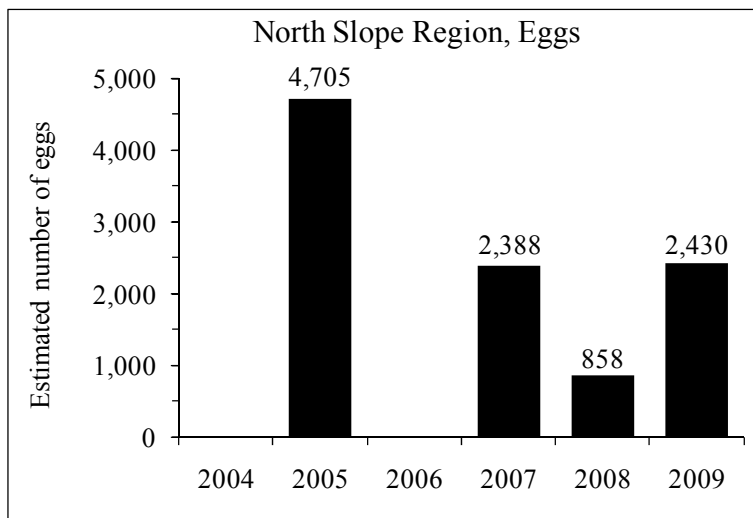


Figure 61.—Eggs per capita, North Slope region, 2004–2009.

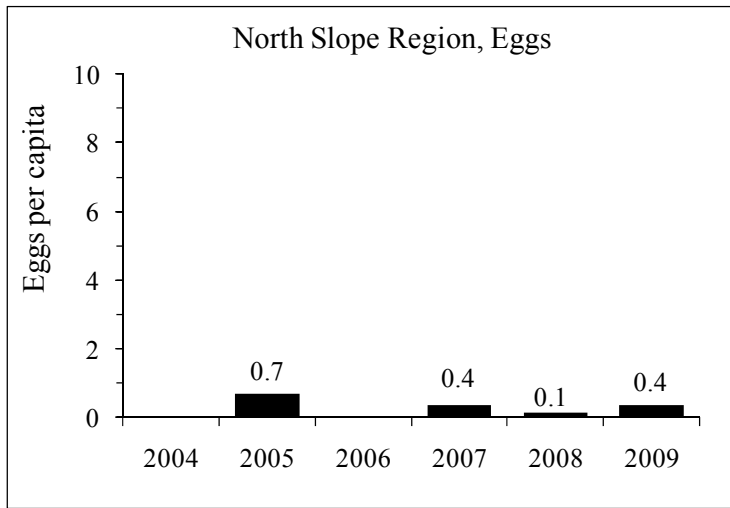
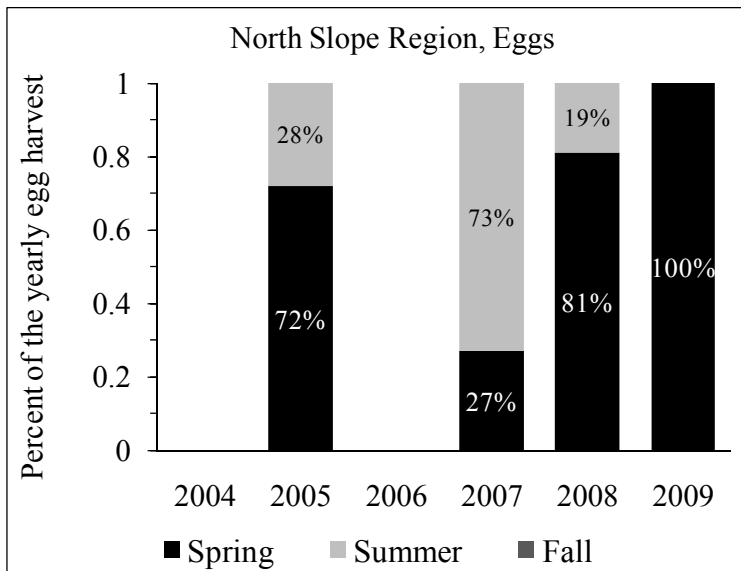


Figure 62.—Seasonality of egg harvest, North Slope region, 2004–2009.



Note Fall survey not conducted in the North Slope region.

Table 57–Estimated egg harvest (groups of birds), North Slope region, 2004–2009.

Egg harvest	North Slope Region			
	2005	2007	2008	2009
Ducks	339 (7%)	394 (17%)	385 (45%)	1,987 (82%)
Geese	324 (7%)	370 (15%)	413 (48%)	404 (17%)
Swans	83 (2%)	19 (<1%)	38 (4%)	38 (2%)
Cranes	0	0	0	0
Ptarmigans and grouses	0	0	0	0
Seabirds	3,882 (83%)	1,569 (66%)	22 (3%)	0
Shorebirds	0	16 (<1%)	0	0
Loons	0	0	0	0
Other and unknown bird	76 (2%)	21 (<1%)	0	0
<b>Total eggs</b>	<b>4,705</b>	<b>2,388</b>	<b>858</b>	<b>2,430</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

-. Region or subregion not surveyed.

## Interior Alaska

The Interior Alaska region is surveyed for spring, summer, and fall harvests using the Interior Alaska harvest report form. This region is divided into 5 subregions (Figure 10). It was surveyed in 2004 and 2006 and regional yearly harvest estimates are available for these 2 years (Appendix A). The survey was also conducted in some subregions in 2005, 2007, and 2008; for these years, only subregional estimates are available.

### *Amount of bird harvests*

The regional yearly bird harvest estimate was 50,995 birds in 2004 and 37,068 birds in 2006 (average = 44,031 birds, SD = 9,848.1) (Figure 63, Table 58). The Tanana Villages and the Upper Yukon subregions together accounted for 68–76% of the yearly bird harvest (yearly averages for these 2 subregions are 43% and 29%, respectively) (Figure 64, Table 59). In 2006, the Tok subregion accounted for 17% of the regional yearly bird harvest. The other 2 subregions together accounted for 8–11% of the yearly harvests: Yukon-Koyukuk (average = 5%) and Mid Yukon-Upper Kuskokwim (average = 4%) (Table 59).

The regional per capita bird harvest was 6.5 birds per person in 2004 and 5.0 birds per person in 2006 (Figure 65). The Tanana Villages subregion (range = 11.8–13.4 birds per person, average = 12.6 birds per person) and the Upper Yukon subregion (range = 8.0–13.5 birds per person, average = 10.6 birds per person) had the highest average per capita bird harvests (Figure 65, Table 59). In 2006, the per capita bird harvest in the Tok subregion was 4.8 birds per person. The average per capita bird harvest in the Mid Yukon-Upper Kuskokwim subregion was 1.5 birds per person (range = 0.5–2.1 birds per person) and in the Yukon-Koyukuk subregion the average per capita harvest was 1.6 birds per person (range = 0.5–3.7 birds per person) (Figure 65, Table 59). In the Interior Alaska region, the population was evenly

distributed among the subregions and each region accounted for 18–26% of the region’s population (26%) (Table 60).

Figure 63.—Total estimated bird harvest, Interior Alaska region, 2004–2009.

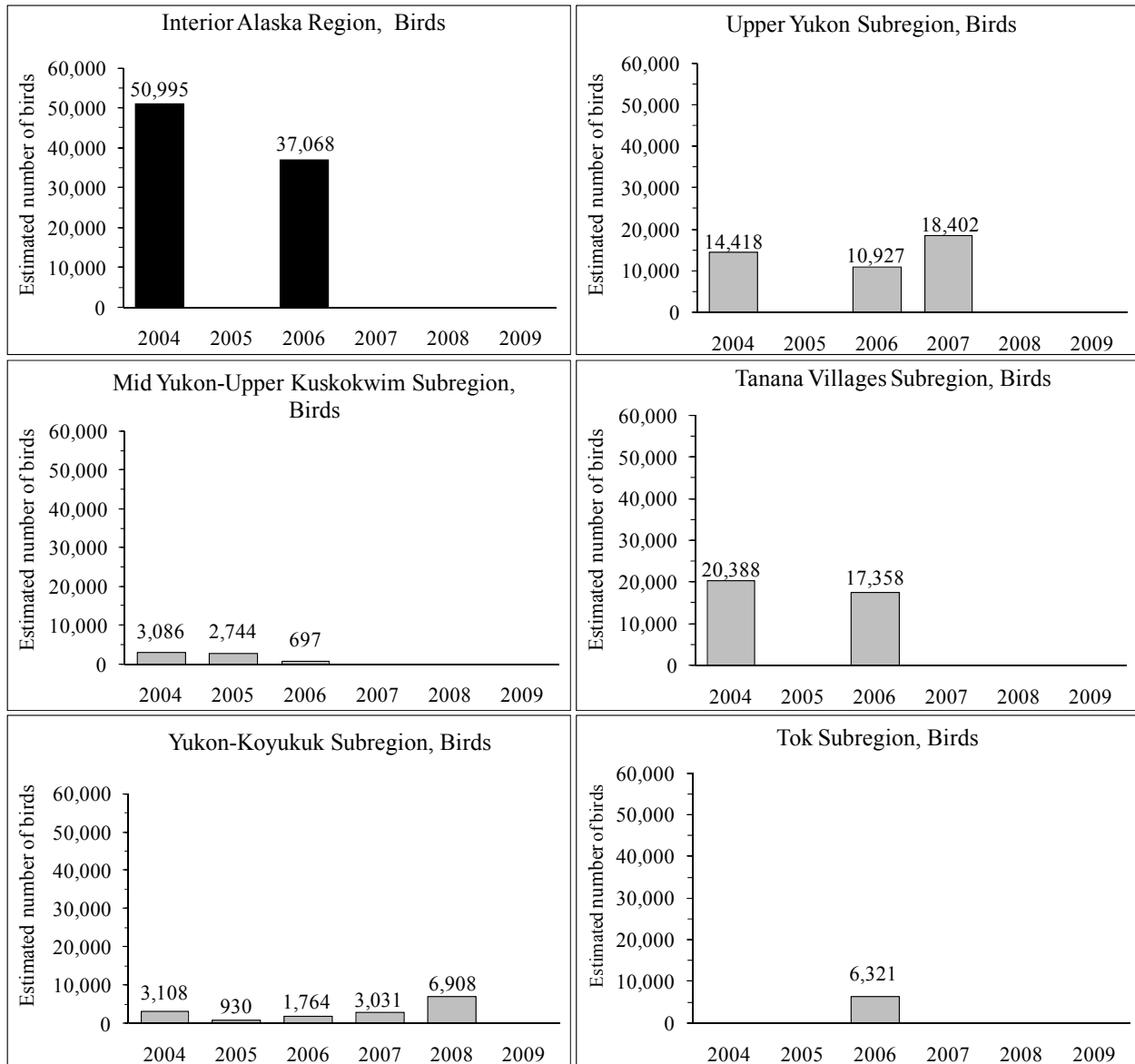




Table 58.—Estimated bird harvest (groups of birds), Interior Alaska region, 2004–2009.

Bird harvest	Interior Alaska region				Mid Yukon-Upper Kuskokwim subregion				Yukon-Koyukuk subregion					
	2004	2005	2006	2007–2009	2004	2005	2006	2007–2009	2004	2005	2006	2007	2008	2009
Ducks	30,531 (60%)	-	24,901 (67%)	-	1,840 (60%)	1,167 (43%)	351 (50%)	-	1,386 (45%)	365 (39%)	799 (45%)	2,235 (74%)	5,014 (73%)	-
Geese	12,657 (25%)	-	8,157 (22%)	-	975 (32%)	652 (24%)	250 (36%)	-	1,212 (39%)	560 (60%)	871 (49%)	797 (26%)	1,810 (26%)	-
Swans	170 (<1%)	-	76 (<1%)	-	4 (<1%)	17 (1%)	0	-	6 (<1%)	4 (<1%)	0	0	0	-
Cranes	296 (1%)	-	214 (1%)	-	44 (1%)	2 (<1%)	0	-	26 (1%)	0	94 (5%)	0	83 (1%)	-
Ptarmigans and grouses	7,219 (14%)	-	3,695 (10%)	-	224 (7%)	891 (32%)	78 (11%)	-	478 (15%)	0	0	0	0	-
Seabirds	0	-	0	-	0	0	0	-	0	0	0	0	0	-
Shorebirds	21 (<1%)	-	6 (<1%)	-	0	0	6 (1%)	-	0	0	0	0	0	-
Loons and grebes	0	-	6 (<1%)	-	0	0	0	-	0	0	0	0	0	-
Other and unknown	100 (<1%)	-	13 (<1%)	-	0	14 (1%)	12 (2%)	-	0	0	0	0	0	-
<b>Total birds</b>	<b>50,995</b>	<b>-</b>	<b>37,068</b>	<b>-</b>	<b>3,086</b>	<b>2,744</b>	<b>697</b>	<b>-</b>	<b>3,108</b>	<b>930</b>	<b>1,764</b>	<b>3,031</b>	<b>6,908</b>	<b>-</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

Table 58.—continued.

Bird harvest	Upper Yukon subregion					Tanana Villages subregion				Tok subregion			
	2004	2005	2006	2007	2008–2009	2004	2005	2006	2007–2009	2004	2005	2006	2007–2009
Ducks	8,614 (60%)	-	6,626 (61%)	8,738 (47%)	-	12,709 (62%)	-	11,802 (68%)	-	-	-	5,324 (84%)	-
Geese	5,571 (39%)	-	4,075 (37%)	9,587 (52%)	-	2,419 (12%)	-	2,848 (16%)	-	-	-	112 (2%)	-
Swans	0	-	10 (<1%)	0	-	126 (1%)	-	60 (<1%)	-	-	-	6 (<1%)	-
Cranes	0	-	9 (<1%)	3 (<1%)	-	168 (1%)	-	110 (1%)	-	-	-	0	-
Ptarmigans and grouses	234 (2%)	-	199 (2%)	46 (<1%)	-	4,869 (24%)	-	2,538 (15%)	-	-	-	880 (14%)	-
Seabirds	0	-	0	0	-	0	-	0	-	-	-	0	-
Shorebirds	0	-	0	11 (<1%)	-	17 (<1%)	-	0	-	-	-	0	-
Loons and grebes	0	-	6 (<1%)	6 (<1%)	-	0	-	0	-	-	-	0	-
Other and unknown	0	-	1 (<1%)	11 (<1%)	-	80 (<1%)	-	0	-	-	-	0	-
<b>Total birds</b>	<b>14,418</b>	<b>-</b>	<b>10,927</b>	<b>18,402</b>	<b>-</b>	<b>20,388</b>	<b>-</b>	<b>17,358</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>6,321</b>	<b>-</b>

Source 2004–2008 harvest (Naves 2010a, 2010b).

-: Region or subregion not surveyed.

Table 59.—Average bird harvest, Interior Alaska region, 2004–2009.

Bird harvest	Estimated number of birds 2004–2009		Proportion of harvest	Birds per capita	
	Average	SD		Average	SD
Interior Alaska region	44,031	9,848.1		5.7	1.0
Mid Yukon-Upper Kuskokwim subregion	2,176	1,291.7	4%	1.5	0.9
Yukon- Koyukuk subregion	3,148	2,290.7	5%	1.6	1.2
Upper Yukon subregion	14,582	3,740.5	29%	10.6	2.8
Tanana Villages subregion	18,873	2,142.4	43%	12.6	1.1
Tok subregion	6,321	-	17%	4.8	-

Figure 64.—Contribution of subregions to the regional bird harvest, Interior Alaska region, 2004–2009.

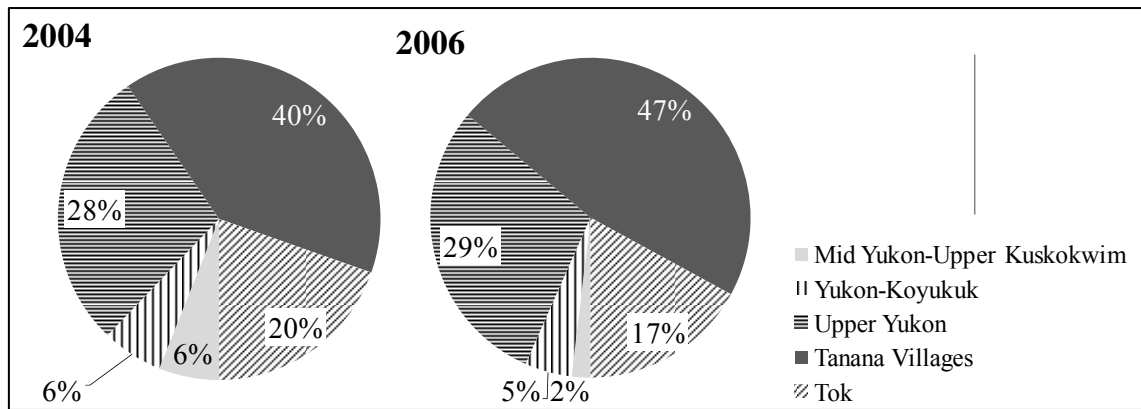
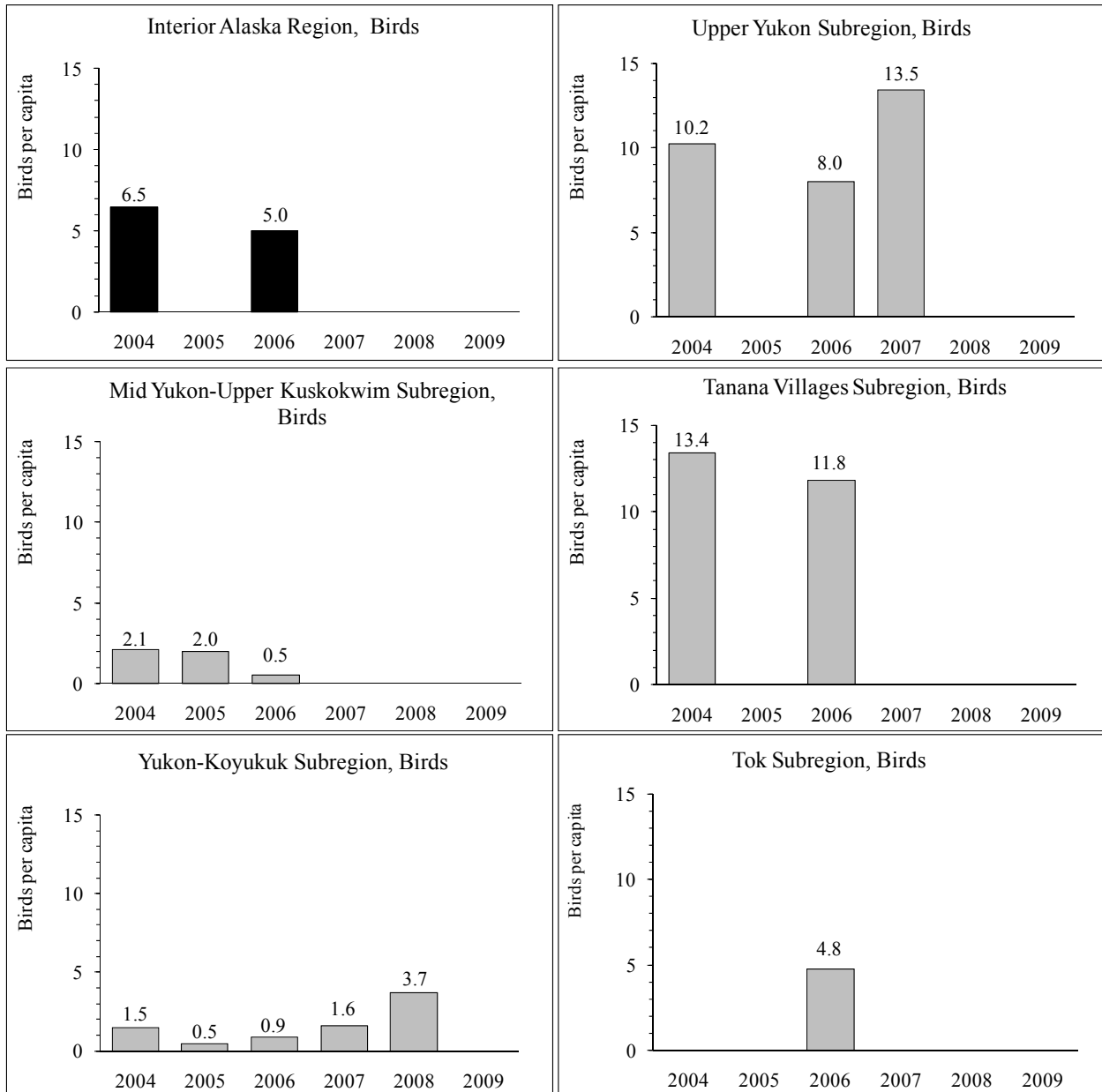


Table 60.—Estimated human population, Interior Alaska region, 2004–2009.

Estimated human population	2004	2005	2006	2007	2008	2009
Interior Alaska region	7,905	7,737	7,451	7,467	7,389	7,388
Mid Yukon-Upper Kuskokwim subregion	1,470	1,401	1,334	1,306	1,254	1,266
Yukon-Koyukuk subregion	2,105	2,040	1,954	1,891	1,871	1,794
Upper Yukon subregion	1,408	1,352	1,368	1,375	1,342	1,329
Tanana Villages subregion	1,520	1,536	1,469	1,542	1,540	1,570
Tok subregion	1,402	1,408	1,326	1,353	1,382	1,429

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

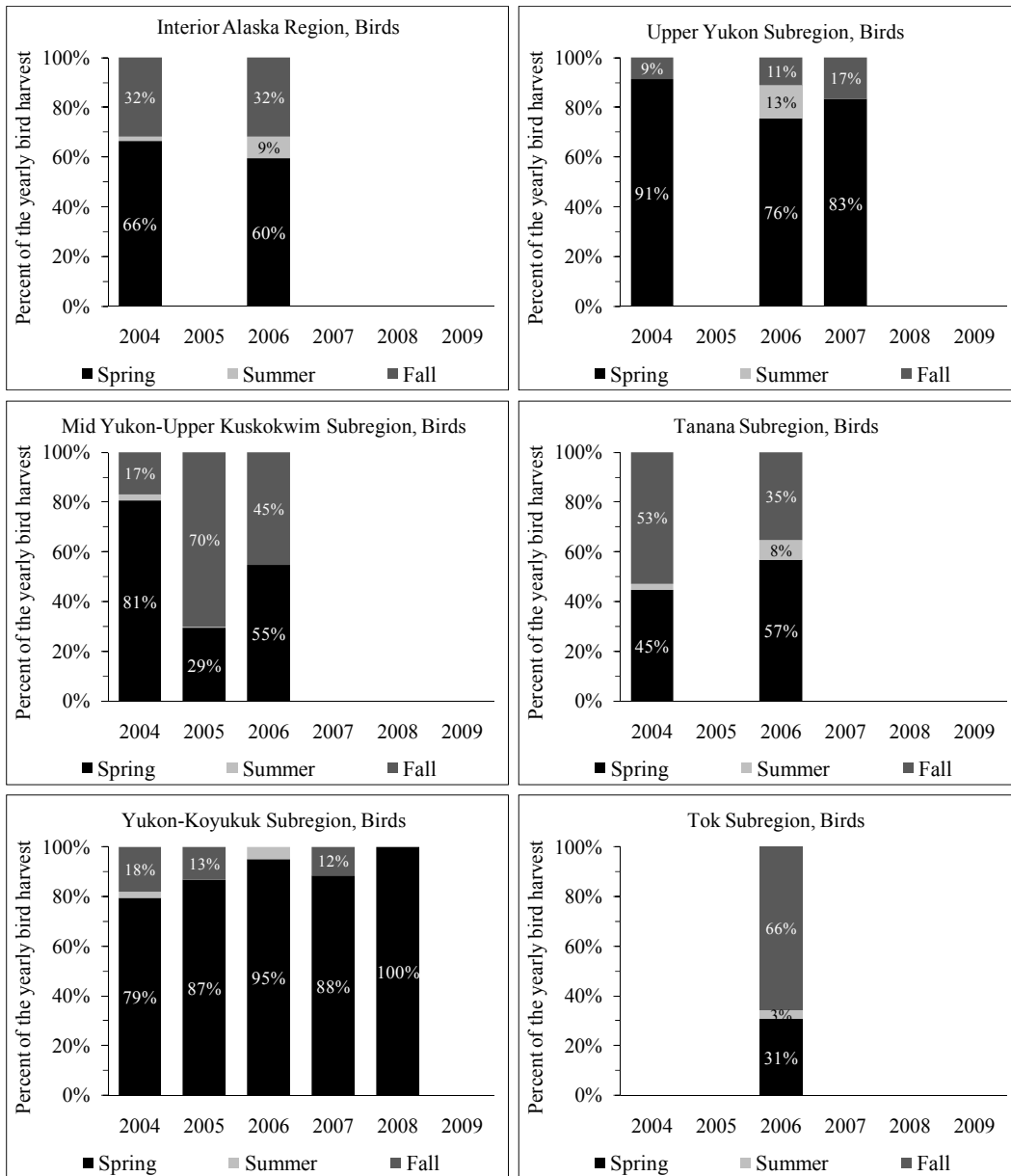
Figure 65.—Birds per capita, Interior Alaska region, 2004–2009.



### Seasonality of bird harvests

In 2004 and 2006, on average, the spring harvest accounted for 63% of the regional yearly harvest (Figure 66). Among the 3 subregions with higher harvests, the proportion of spring harvest was higher in the Upper Yukon subregion (76–91% of the yearly harvest), whereas fall harvest proportions were relatively high in the Tanana Villages (35–53% of the yearly harvest) and Tok subregion (66% of the 2006 yearly harvest) (Figure 66). The spring harvest consistently accounted for most of the yearly harvest in the Yukon-Koyukuk subregion (79–100%). In the Mid Yukon-Upper Kuskokwim subregion, the seasonal distributions of harvests varied between survey years.

Figure 66.–Seasonality of bird harvests, Interior Alaska region, 2004–2009.



### ***Species composition of bird harvests***

Ducks contributed 60–67% (average = 64%) of the total regional yearly estimated bird harvest and geese contributed 22–25% (average = 23%) (Table 58). Ptarmigans and grouses contributed 10–14% (average = 12%) of the yearly total estimated bird harvest and sandhill cranes contributed 1%. Swans, shorebirds, and loons and grebes each contributed <1% of the yearly total harvest.

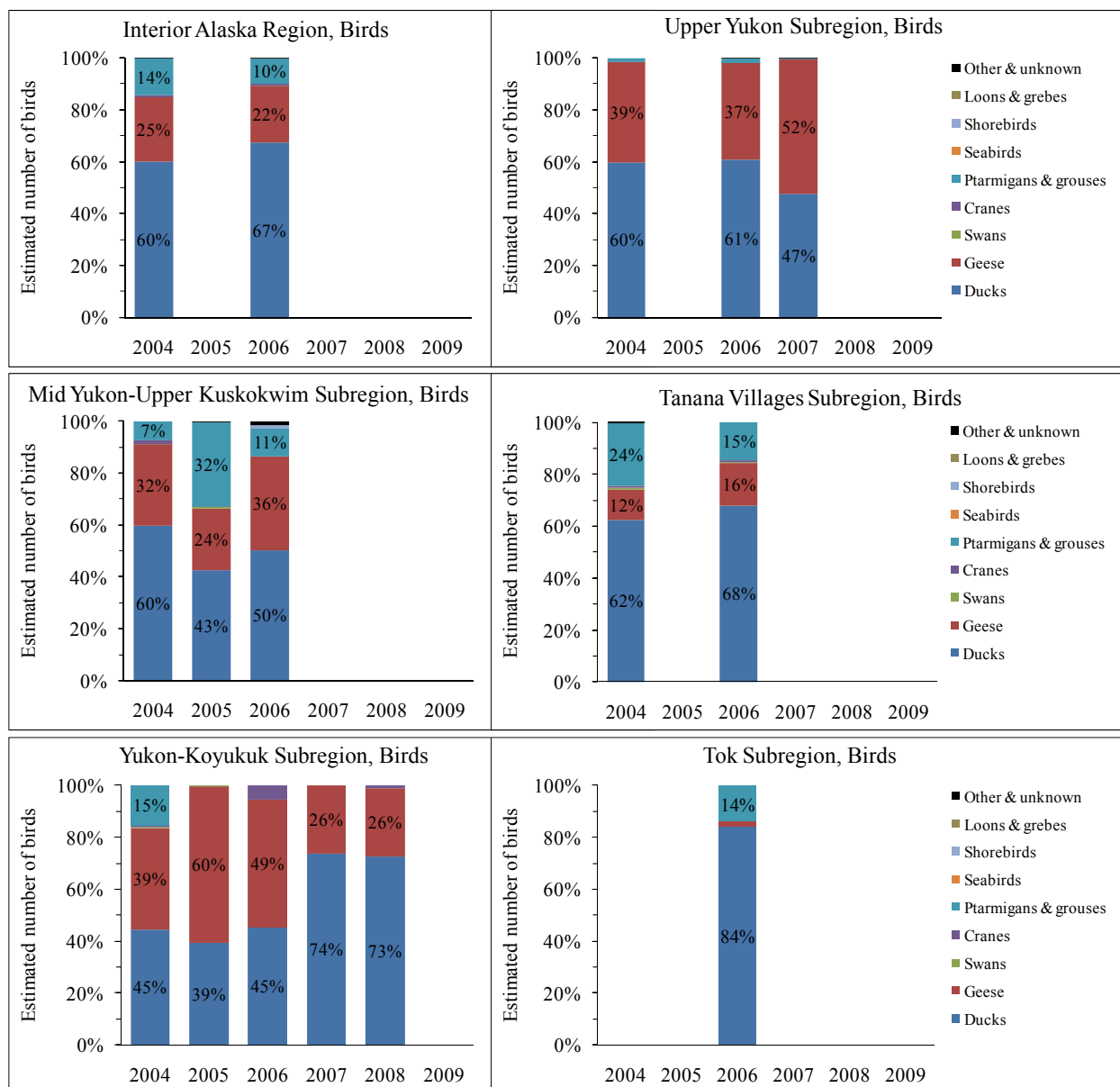
Among the 3 subregions that contributed the most to the yearly total harvest, in the Tanana Villages and Tok, ducks contributed the highest proportion of the yearly harvest (62–68% in Tanana Villages and 84% in Tok) (Table 58, Figure 67). In the Upper Yukon subregion, ducks (47–61%) and geese (37–52%) were the 2 species groups that most contributed to the yearly harvest. Ptarmigans and grouses was the second-ranked group of species by contribution to the yearly harvest in the Tanana Villages (15–24%) and Tok (14%) (Table 58, Figure 67).

The harvest composition in the Mid Yukon-Upper Kuskokwim was similar to that of the Tanana Villages and Tok, where ptarmigans and grouses was the second most important group of species harvested. In the Yukon-Koyukuk subregion, ducks (39–74%) and geese (26–60%) were the main groups of species harvested.

The contribution of groups of species to each yearly harvest was fairly similar between years both at the regional and subregional levels, although the contribution of ptarmigans and grouses to the yearly harvest has varied between years (Figure 67).

Mallard, northern pintail, and American wigeon were the ducks usually harvested in the largest amounts in most subregions, except in the Upper Yukon subregion where white-winged scoter was the duck species harvested in the largest numbers (Naves 2010a, 2010b). Lesser Canada goose and white-fronted goose were the geese usually harvested in the largest amounts in all 5 subregions. The survey does not specifically ask about the 3 species of grouse that occur in Interior Alaska (Appendix C). Ptarmigan was reported as harvested in the largest numbers in the Tanana Villages subregion.

Figure 67.—Composition of bird harvests (groups of birds), Interior Alaska region, 2004–2009.



**Amount of egg harvests**

The regional yearly egg harvest estimate was 1,009 eggs in 2004 and 911 eggs in 2006 (Figure 68, Table 61) (average = 960 eggs, SD = 69.1; Table 62). The Tanana Villages accounted for 75–96% of the yearly egg harvests (average = 86%). The other subregions accounted for up to 4% of the yearly egg harvests (Figure 69, Table 62).

Tanana Villages (range = 0.5–0.6 eggs per person, average = 0.6 eggs per person) had the highest average per capita egg harvest. The other 4 subregions had average per capita egg harvest of up to 0.1 eggs per person (Figure 70, Table 62).

Figure 68.—Total estimated egg harvests, Interior Alaska region, 2004–2009.

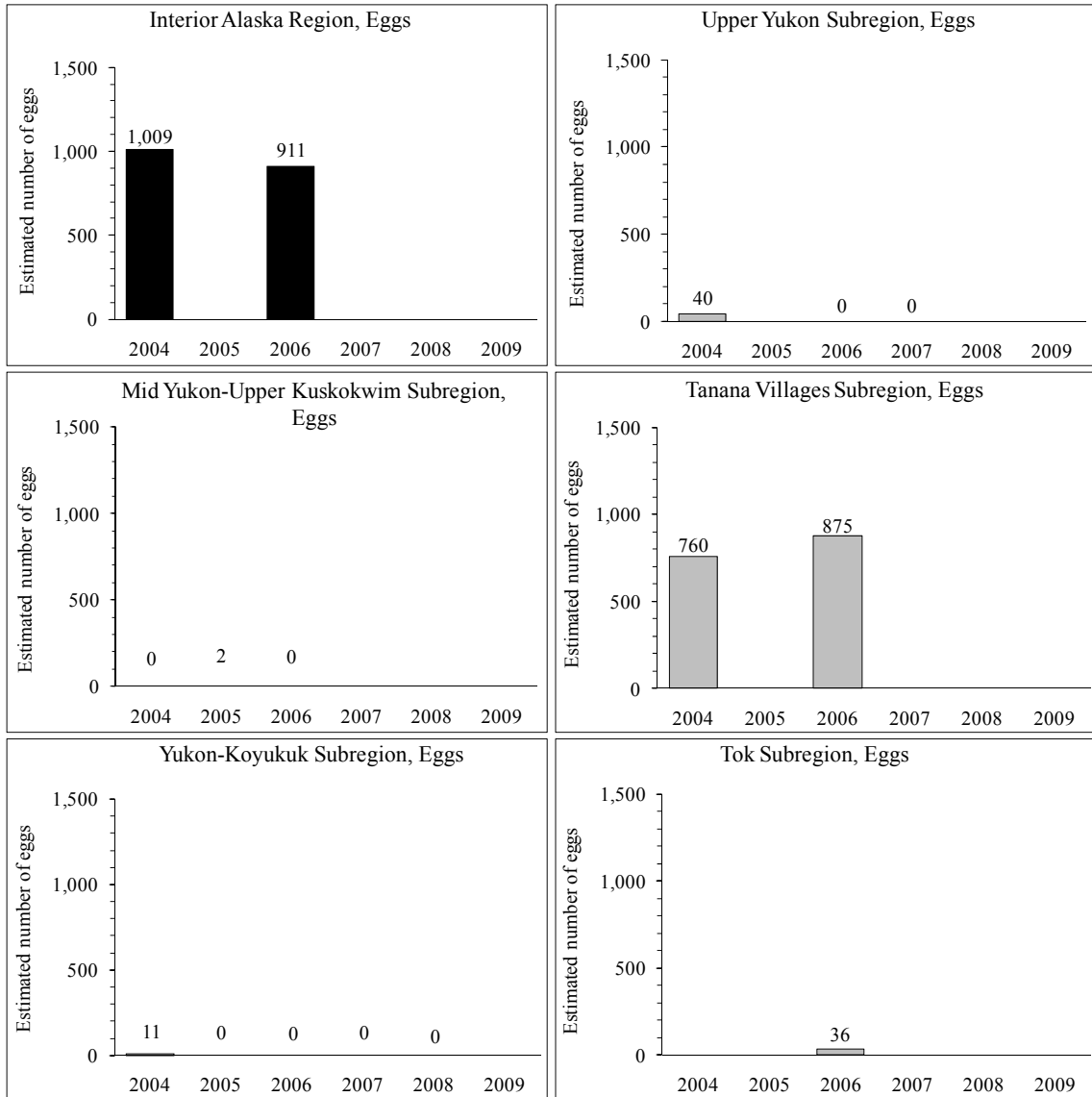


Figure 69.—Contribution of subregions to the regional egg harvest, Interior Alaska region, 2004–2009.

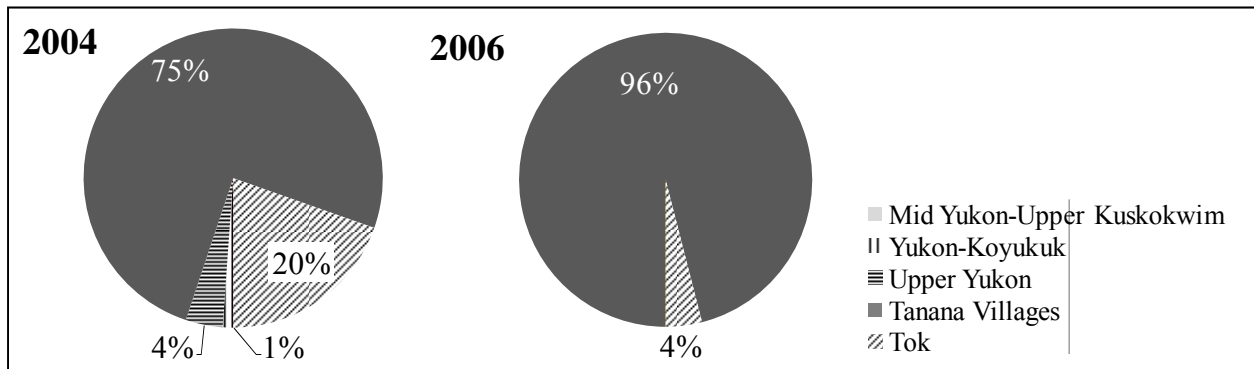


Table 61.–Estimated egg harvest (groups of birds), Interior Alaska region, 2004–2009.

Egg harvest	Interior Alaska region				Mid Yukon-Upper Kuskokwim subregion				Yukon-Koyukuk subregion					
	2004	2005	2006	2007–2009	2004	2005	2006	2007–2009	2004	2005	2006	2007	2008	2009
Ducks	470 (47%)	-	717 (79%)	-	0	2 (100%)	0	-	0	0	0	0	0	-
Geese	194 (19%)	-	58 (6%)	-	0	0	0	-	0	0	0	0	0	-
Swans	49 (5%)	-	0	-	0	0	0	-	0	0	0	0	0	-
Cranes	198 (20%)	-	0	-	0	0	0	-	0	0	0	0	0	-
Ptarmigans and grouses	0	-	115 (13%)	-	0	0	0	-	0	0	0	0	0	-
Seabirds	98 (10%)	-	0	-	0	0	0	-	11 (100%)	0	0	0	0	-
Shorebirds	0	-	22 (2%)	-	0	0	0	-	0	0	0	0	0	-
Loons and grebes	0	-	0	-	0	0	0	-	0	0	0	0	0	-
Other and unknown	0	-	0	-	0	0	0	-	0	0	0	0	0	-
<b>Total eggs</b>	<b>1,009</b>	-	<b>911</b>	-	<b>0</b>	<b>2</b>	<b>0</b>	-	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	-

Source 2004–2008 harvest (Naves 2010a, 2010b).

–: Region or subregion not surveyed.

Table 61.–continued.

Egg harvest	Upper Yukon subregion					Tanana Villages subregion				Tok subregion		
	2004	2005	2006	2007	2008–2009	2004	2005	2006	2007–2009	2004–2005	2006	2007–2009
Ducks	0	-	0	0	-	378 (50%)	-	680 (78%)	-	-	36 (100%)	-
Geese	0	-	0	0	-	156 (21%)	-	58 (7%)	-	-	0	-
Swans	0	-	0	0	-	40 (5%)	-	0	-	-	0	-
Cranes	0	-	0	0	-	159 (21%)	-	0	-	-	0	-
Ptarmigans and grouses	0	-	0	0	-	0	-	115 (13%)	-	-	0	-
Seabirds	40 (100%)	-	0	0	-	27 (4%)	-	0	-	-	0	-
Shorebirds	0	-	0	0	-	0	-	22 (2%)	-	-	0	-
Loons and grebes	0	-	0	0	-	0	-	0	-	-	0	-
Other and unknown	0	-	0	0	-	0	-	0	-	-	0	-
<b>Total eggs</b>	<b>40</b>	-	<b>0</b>	<b>0</b>	-	<b>760</b>	-	<b>875</b>	-	-	<b>36</b>	-

Source 2004–2008 harvest (Naves 2010a, 2010b).

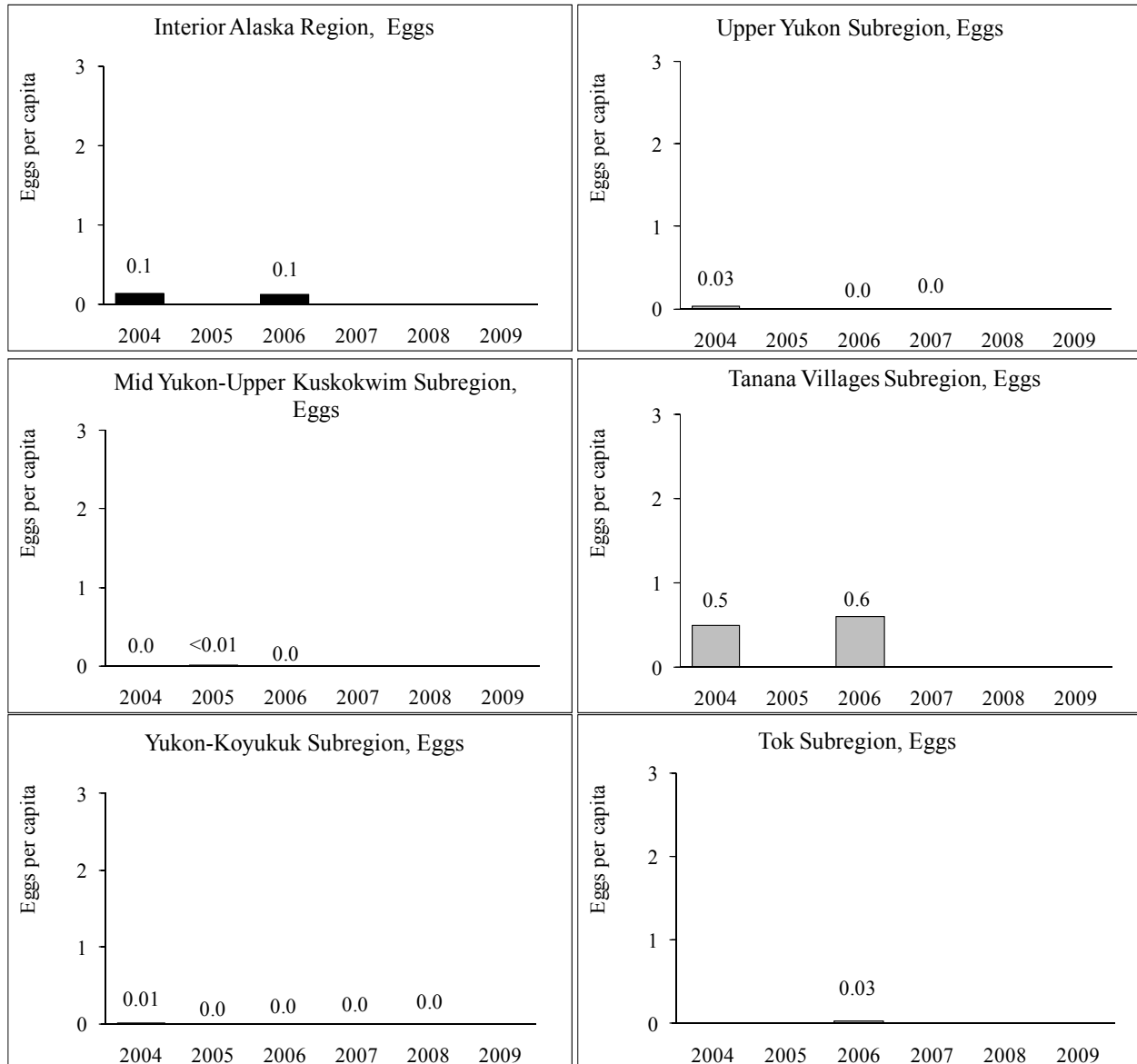
–: Region or subregion not surveyed.



Table 62.—Average egg harvest, Interior Alaska regions, 2004–2009.

Egg harvest	Estimated number of eggs		Proportion of harvest	Eggs per capita	
	Average	SD		Average	SD
Interior Alaska region	960	69.1		0.1	<0.1
Mid Yukon-Upper Kuskokwim subregion	1	1.4	<1%	<0.1	<0.1
Yukon-Koyukuk subregion	2	5.1	1%	<0.1	<0.1
Upper Yukon subregion	13	23.3	2%	<0.1	<0.1
Tanana Villages subregion	817	81.6	86%	0.6	<0.1
Tok subregion	36	-	4%	<0.1	-

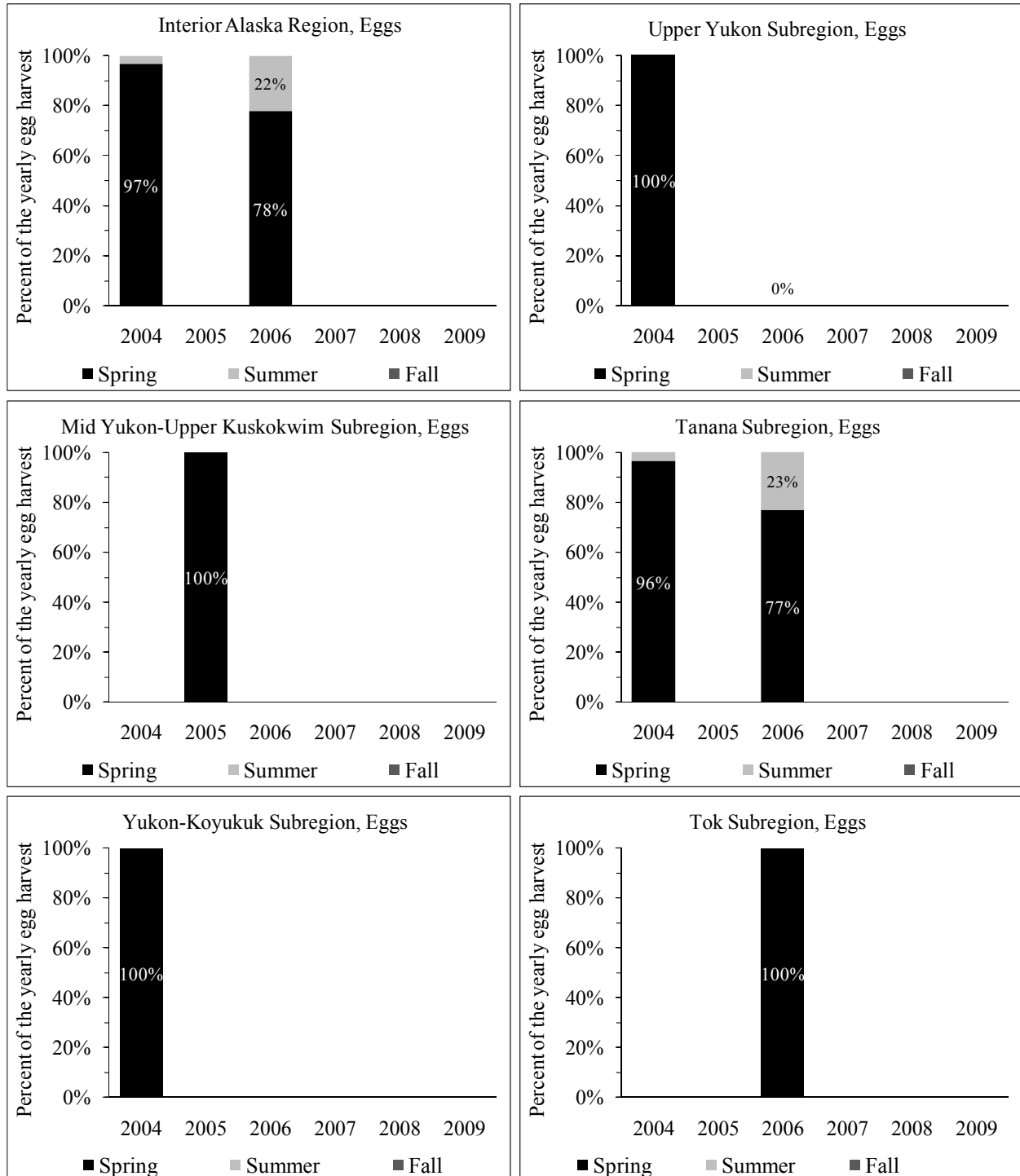
Figure 70.—Eggs per capita, Interior Alaska region, 2004–2009.



### Seasonality of egg harvests

During 2004–2009, spring harvests accounted for at least 78% of the regional yearly egg harvests. Spring harvests accounted for at least 77% of the regional yearly egg harvests in Tanana Villages, which was the subregion that contributed the most to the regional egg harvest (Figure 71). In the 4 subregions with small egg harvests (Upper Yukon, Yukon-Koyukuk, Mid Yukon-Upper Kuskokwim, and Tok), spring accounted for 96–100% of the yearly egg harvest.

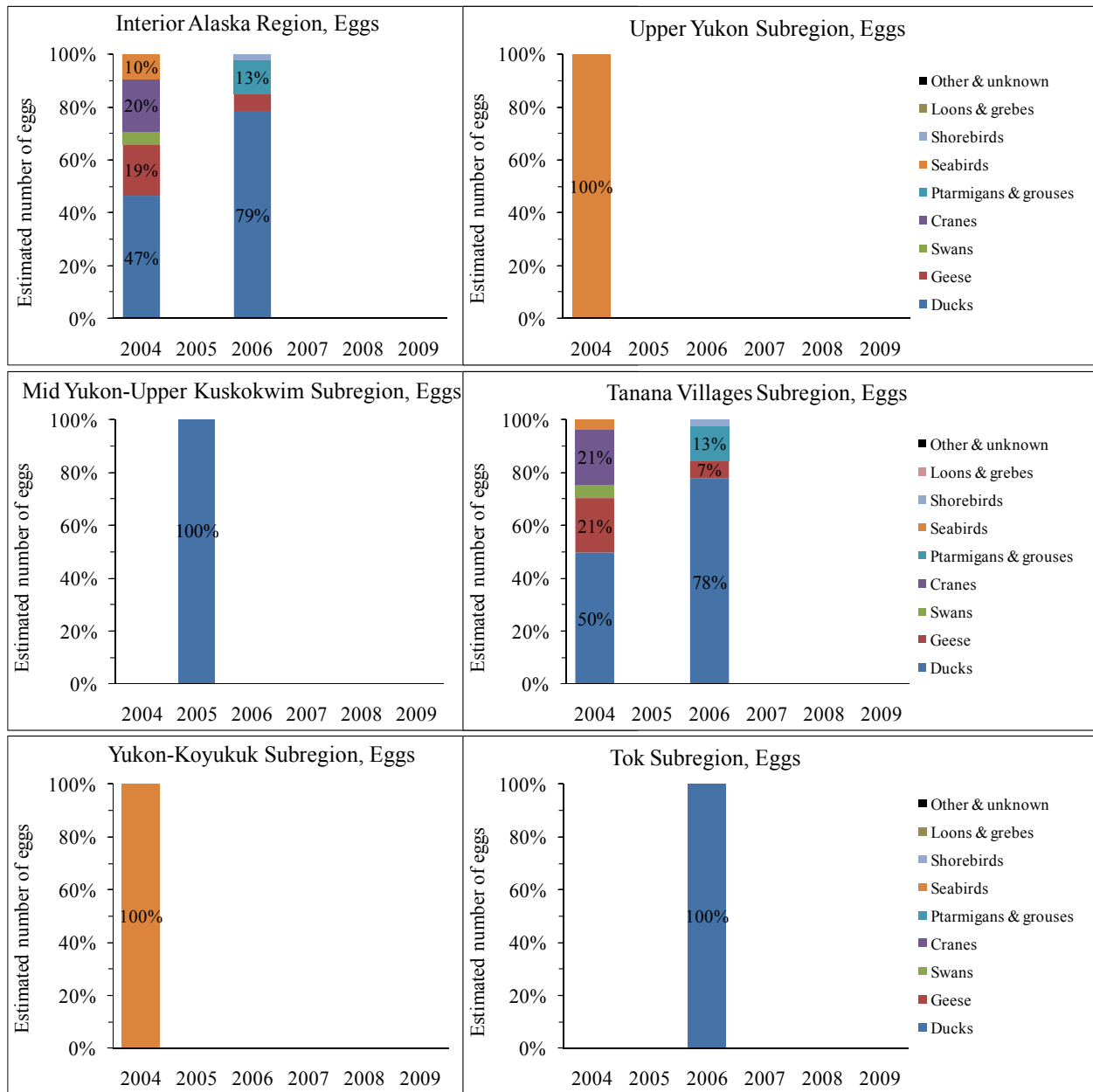
Figure 71.—Seasonality of egg harvests, Interior Alaska region, 2004–2009.



**Species composition of egg harvests**

Ducks contributed with 47–79% (average = 63%) of the regional yearly estimated egg harvest, followed by geese (range = 6–19%, average = 13%) and sandhill cranes (range = <1–20%, average = 10%) (Figure 72). In the Tanana Villages subregion, ducks accounted for 50–78% (average = 64%) of the yearly egg harvest, followed by geese (range = 7–21%, average = 14%) and sandhill cranes (range = 0–21%, average = 10%). The 4 remaining subregions (Mid Yukon-Upper Kuskokwim, Yukon-Koyukuk, Upper Yukon, and Tok) reported very low egg harvests (yearly estimated amounts of up to 40 eggs) and all of the eggs were ducks or seabirds. Although eggs of a diversity of species were harvested in the region, eggs of mallard, northern pintail, northern shoveler, and lesser Canada goose were the eggs harvested in the largest amounts (Naves 2010a, 2010b). This regional species composition reflects egg harvests mostly from the Tanana Villages subregion, where most of the harvest occurred.

Figure 72.—Composition of egg harvests (groups of birds), Interior Alaska region, 2004–2009.



## Upper Copper River

The Upper Copper River region is surveyed for spring, summer, and fall harvests using the Interior Alaska harvest report form. This region is not divided into subregions (Figure 2). Harvest estimates are available for harvest years 2004 and 2007 (Appendix A).

### *Amount, seasonality, and species composition of bird harvests*

The total yearly bird harvest estimate was 1,120 birds in 2004 and 247 birds in 2007 for the region (average = 684 birds, SD = 617.1; Figure 73). The estimated yearly per capita bird harvest was 1.7 birds per person in 2004 and 0.4 birds per person in 2007 (average = 1.0 birds per person, SD = 0.9; Figure 74). Bird and egg harvest estimates for this region were based on the Alaska Native population because sampling is only believed to address this sector of the population (Table 64).

The spring harvest accounted for 47% of the 2004 yearly bird harvest and 62% of the 2007 harvest. Fall harvests contributed 43% (2004) and 36% (2007) of the yearly harvest estimates and summer harvests contributed 11% (2004) and 2% (2007) (Figure 75).

On average, ducks contributed 60% of the estimated yearly bird harvest followed by ptarmigans and grouses (average = 29%) and geese (average = 3%) (Table 63, Figure 76). In 2004, the harvest of “other and unknown birds” represented 13% (n = 145 birds) of the total yearly bird harvest estimate (Table 63). Mallard, white-winged scoter, canvasback, and northern pintail were the duck species harvested in the largest amounts in the Upper Copper River region (Naves 2010a). Lesser Canada goose and black brant were the goose species harvested in the largest amounts. Ptarmigans and grouses also were birds commonly harvested.

Table 63.—Estimated bird harvest (groups of birds), Upper Copper River region, 2004–2009.

Bird harvest	Upper Copper River region					
	2004	2005	2006	2007	2008	2009
Ducks	576 (51%)	-	-	168 (5%)	-	-
Geese	20 (2%)	-	-	13 (5%)	-	-
Swans	4 (<1%)	-	-	3 (1%)	-	-
Cranes	0	-	-	0	-	-
Ptarmigans and grouses	362 (32%)	-	-	64 (26%)	-	-
Seabirds	0	-	-	0	-	-
Shorebirds	13 (1%)	-	-	0	-	-
Grebes and loons	0	-	-	0	-	-
Other and unknown	145 (13%)	-	-	0	-	-
<b>Total birds</b>	<b>1,120</b>	-	-	<b>247</b>	-	-

Source 2004–2008 harvest Naves (2010a, 2010b).

-: Region or subregion not surveyed.

Figure 73.—Estimated bird harvest (total birds), Upper Copper River region, 2004–2009.

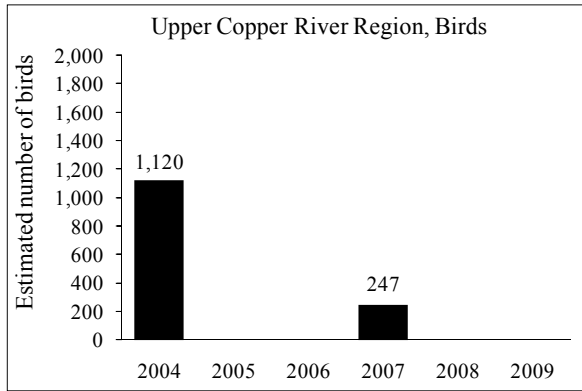


Figure 74.—Birds per capita, Upper Copper River region, 2004–2009.

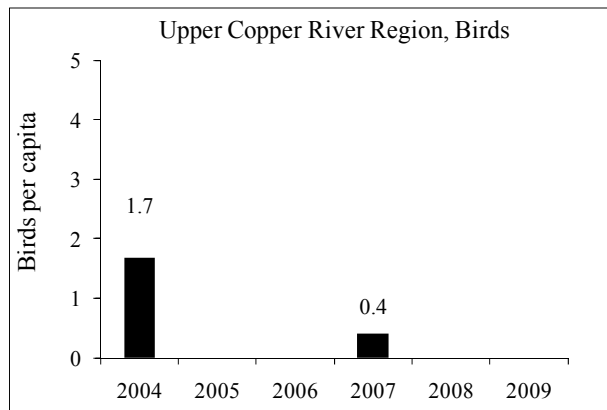


Figure 75.—Seasonality of bird harvests, Upper Copper River region, 2004–2009.

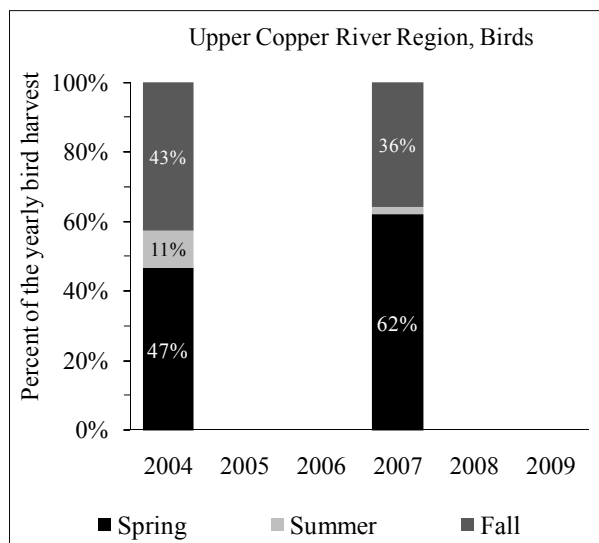
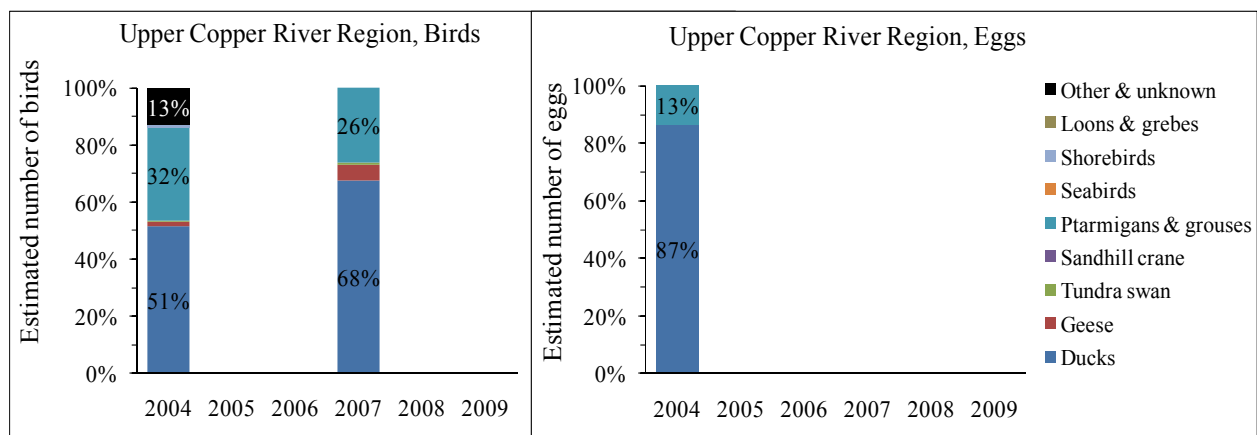


Table 64.–Estimated human population (Alaska Native only), Upper Copper River region, 2004–2009.

Year	Estimated human population
2004	664
2005	648
2006	605
2007	619
2008	591
2009	597

Source Alaska Department of Labor and Workforce Development  
<http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>

Figure 76.–Composition of bird and egg harvests, Upper Copper River region, 2004–2009.



***Amount, seasonality, and species composition of egg harvests***

In 2004, the estimated egg harvest in the Upper Copper River region was 82 eggs. No egg harvest was reported in 2007 (Figure 77, Table 65). In 2004, the estimated per capita egg harvest was 0.1 eggs per person (Figure 78). The spring harvest accounted for 100% of the 2004 egg harvest (Figure 79).

In 2004, ducks contributed 87% of the estimated egg harvest and ptarmigans and grouses contributed 13% (Table 65, Figure 76). The egg harvest was composed of eggs of northern pintail, mallard, ptarmigan, green-winged teal, and northern shoveler (Naves 2010a).

Table 65.–Estimated egg harvest (groups of birds), Upper Copper River region 2004–2009.

Egg harvest	Upper Copper River region					
	2004	2005	2006	2007	2008	2009
Ducks	71 (87%)	-	-	0	-	-
Geese	0	-	-	0	-	-
Swans	0	-	-	0	-	-
Cranes	0	-	-	0	-	-
Ptarmigans and grouses	11 (13%)	-	-	0	-	-
Seabirds	0	-	-	0	-	-
Shorebirds	0	-	-	0	-	-
Grebes and loons	0	-	-	0	-	-
Other and unknown	0	-	-	0	-	-
<b>Total eggs</b>	<b>82</b>	-	-	<b>0</b>	-	-

Source 2004–2008 harvest Naves (2010a, 2010b).

–: Region or subregion not surveyed.

Figure 77.–Estimated egg harvest (total eggs), Upper Copper River region, 2004–2009.

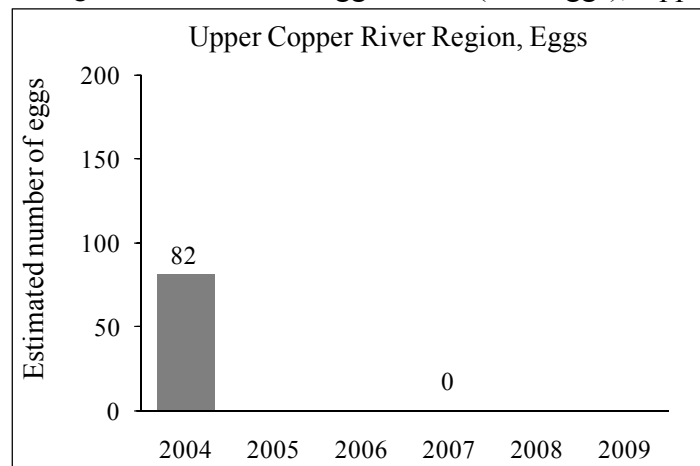


Figure 78.—Eggs per capita, Upper Copper River region, 2004–2009.

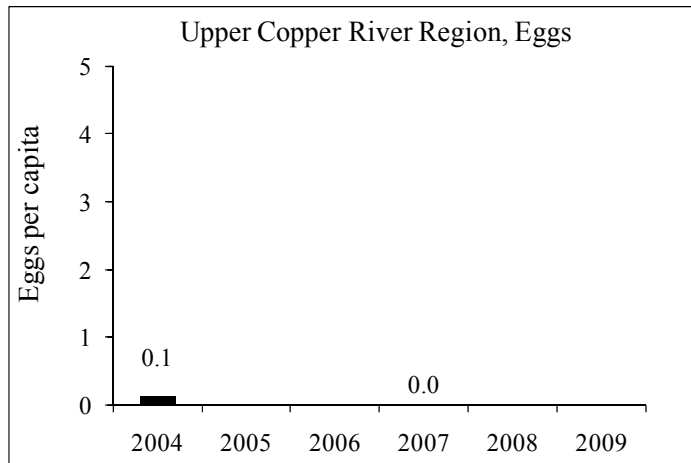
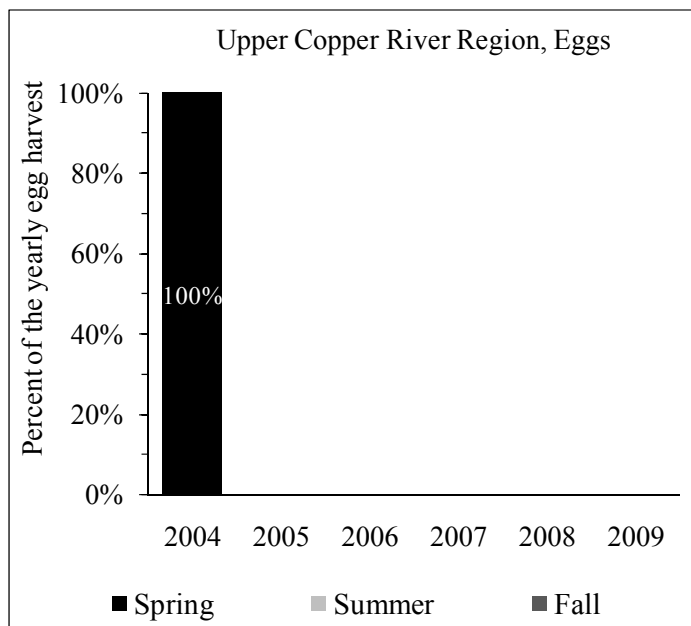


Figure 79.—Seasonality of egg harvests, Upper Copper River region, 2004–2009.





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## REFERENCES CITED

- ADLWD (Alaska Department of Labor and Workforce Development). 2009. Alaska population estimates. Alaska Department of Labor and Workforce Development, Juneau.
- Ainley, D. G., D. N. Nettleship, H. R. Carter, and A. E. Storey. 2002. Common Murre (*Uria aalge*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Ahmasuk, A. and E. Trigg. (2007). A comprehensive subsistence use study of the Bering Strait Region. Kawerak, Inc.
- Alaska Shorebird Group. 2008. Alaska shorebird conservation plan. Version II. Alaska Shorebird Group, Anchorage, AK. [http://alaska.fws.gov/mbsp/mbm/shorebirds/pdf/ascp\\_nov2008.pdf](http://alaska.fws.gov/mbsp/mbm/shorebirds/pdf/ascp_nov2008.pdf).
- AMBCC (Alaska Migratory Bird Co-Management Council). 2003. Recommendations for a statewide Alaska migratory bird subsistence harvest survey. Submitted to the Alaska Migratory Bird Co-Management Council. Subsistence Harvest Survey Ad-hoc Committee, Anchorage.
- Austin, J. E., and M. R. Miller. 1995. Northern pintail (*Anas acuta*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Bacon, J. J., T. R. Hepa, H. K. Brower, M. Pederson, T.P. Olemaun, J.C. George, and B.G. Corrigan. 2009. Estimates of subsistence harvest for villages on the North Slope of Alaska, 1993–2004. Draft Report. Barrow, North Slope Borough Department of Wildlife Conservation.
- Bales, B. D., S. L. Sheriff, J. H. Schulz, and D. A. Shipes. 2002. The impact of the Harvest Information Program on state-level survey capability and reliability. Pages 69–71 in Ver Steeg, J.M., and R.C. Elden, editors. Harvest information program: evaluation and recommendations. International Association of Fish and Wildlife Agencies, Migratory Shore and Upland Game Bird Working Group, Ad Hoc Committee on HIP: Washington, D.C.
- Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen Jr., J. D. Rising, and D. F. Stotz. 2004. Forty-fifth supplement to the American Ornithologists' Union check-list of North American birds. The Auk 121 (3):985–995.
- Bernard, D. R., A. E. Bingham, and M. Alexandersdottir. 1998. The mechanics of onsite creel surveys in Alaska. Alaska Department of Fish and Game Special Publication No. 98–1, Anchorage.
- Bowman, T. 2008. Field guide to bird nests and eggs of Alaska's coastal tundra. 2nd Edition. University of Alaska Press, Fairbanks, Alaska.
- Cochran, W.G. 1977. Sampling techniques. 3rd edition. John Wiley & Sons: New York, New York.
- Copp, J. D. and G. M Roy. 1986. Results of the 1985 survey of waterfowl hunting on the Yukon-Kuskokwim Delta, Alaska. Oregon State University.
- Denlinger, L. M. 2006. Alaska Seabird Information Series. Unpublished report, U.S. Fish and Wildlife Service, Migratory Birds Management, Nongame Program, Anchorage, AK.
- Drilling, N., R. Titman, and F. Mckinney. 2002. Mallard (*Anas platyrhynchos*). in Poole, A., editor. The birds of North American online. Cornell Lab of Ornithology: Ithaca, New York.

- Fuller, A. S. and J. C. George. 1997. Evaluation of subsistence harvest data from the North Slope Borough 1993 census for eight North Slope villages (for the calendar year 1992). Barrow, Alaska, North Slope Borough, Department of Wildlife Management.
- Fienup-Riordan, A. 1983. The Nelson Island Eskimo: social structure and ritual distribution. Anchorage, AK, Alaska Pacific University Press.
- Fienup-Riordan, A. 1996. The living traditions of the Yupi'k masks: Agayuliyararput, Our way of making prayer. University of Washington Press, Seattle, Washington.
- Gilchrist, H. G. 2001. Glaucous gull (*Larus hyperboreus*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Hatch, J. J. 2002. Arctic tern (*Sterna paradisaea*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Hayward, J. L. and N. A. Verbeek. 2008. Glaucous-winged gull (*Larus glaucescens*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Johnson, S. R., and D. R. Herter. 1989. The birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, 372pp.
- Johnson J. A., R. B. Lanctot, B. A. Andres, J. R. Bart, S. C. Brown, S. J. Kendall, and D. C. Payer. 2007. Distribution of breeding shorebirds in the Arctic coastal plain of Alaska. *Arctic* 60: 277-293.
- Kawerak Inc. 2004. 2002 Migratory bird harvest data collection project; Bering Strait/Norton Sound region. Kawerak Natural Resources Department, Subsistence Resources Division, Nome.
- Moore, M. T., K. D. Richkus, P. I. Padding, E. M. Martin, S. S. Williams, and H. L. Spriggs. 2007. Migratory bird hunting activity and harvest during the 2001 and 2002 hunting seasons - final report. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Branch of Harvest Surveys, and U.S. Department of the Interior, Washington, D.C.
- Moskoff, W. and L. R. Bevier. 2002. Mew gull (*Larus canus*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- National Geographic Society. 1999. Field Guide to the Birds of North America, National Geographic Society, Washington, D.C.
- Naves, L. C., D. Koster, M. G. See, B. Easley, and L. Olson. 2008. Alaska Migratory Bird Co-Management Council migratory bird subsistence harvest survey: assessment of the survey methods and implementation. Alaska Department of Fish and Game Division of Subsistence, Special Publication No. SP2008-005, Anchorage.
- Naves, L.C. 2010a. Alaska migratory bird subsistence harvest estimates, 2004–2007, Alaska Migratory Bird Co-Management Council. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 349, Anchorage.
- Naves, L.C. 2010b. Alaska migratory bird subsistence harvest estimates, 2008, Alaska Migratory Bird Co-Management Council. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 353, Anchorage.

- Pacific Flyway Council. 2010 [1986, revised 1999], unpublished. Pacific Flyway management plan for the cackling Canada goose. Cackling Canada Goose Subcommittee, Pacific Flyway Study Committee through U.S. Fish and Wildlife Service, Portland, Oregon.
- Padding, P. I., M. T. Moore, K. D. Richkus, E. M. Martin, S. S. Williams, and H. L. Spriggs. 2006. Migratory bird hunting activity and harvest during the 1999 and 2000 hunting seasons. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Branch of Harvest Surveys, and U.S. Department of the Interior, Washington, D.C.
- Paige, A. W., C. L. Scott, D. B. Andersen, S. Georgette, R. J. and Wolfe. 1996. Subsistence use of birds In the Bering Strait region. Alaska. Juneau, Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 239.
- Pamplin, W. L., Jr. 1986. Cooperative efforts to halt population declines of geese nesting on Alaska's Yukon-Kuskokwim Delta. Transactions of the North American Wildlife & Natural Resources Conference 51:487-506.
- Pearce, J. M., B. J. Pierson, S. L. Talbot, D. V. Derksen, D. Kraege, and K. T. Scribner. 2000. A genetic evaluation of morphology used to identify harvested Canada geese. Journal of Wildlife Management 64 (3):863-874.
- Pete, M. 1989. The universe in a mask. Alaska Fish and Game, 21(6):38-39. Alaska Department of Fish and Game, Juneau, Alaska.
- Pierotti, R. J. and T. P. Good. 1994. Herring gull (*Larus argentatus*). in Poole, A., editor. The birds of North America online. Cornell Lab of Ornithology: Ithaca, New York.
- Raftovich, R. V., K. A. Wilkins, K. D. Richkus, S. S Williams, and H. L. Spriggs. 2010. Migratory bird hunting activity and harvest during the 2008 and 2009 hunting seasons. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.
- Reynolds, J. H. 2007. Investigating the impact of sampling effort on annual migratory bird subsistence harvest survey estimates. Final report for USFWS MBM Order No. 701812M816. Solutions Statistical Consulting, Anchorage.
- Sea Duck Joint Venture. 2003-2005. Sea Duck Information Series. The Sea Duck Joint Venture. <http://www.seaduckjv.org/infoseries/toc.html>
- Seim, S. G. and C. Wentworth. 1996. Subsistence migratory bird harvest survey: Bristol Bay, 1995. U.S. Fish and Wildlife Service in cooperation with the Bristol Bay Native Association and the Alaska Peninsula-Becharof National Wildlife Refuge, Anchorage.
- Sibley Guides. 2004. Distinguishing cackling and Canada goose. Sibley Guides, <http://www.sibleyguides.com/2007/07/identification-of-cackling-and-canada-goose/> (accessed 9 June, 2010).
- Timm, D., T. Rothe, and B. Ray (illustration). 1994. Canada Geese. Alaska Department of Fish and Game, Wildlife Notebook Series. <http://www.adfg.state.ak.us/pubs/notebook/bird/canada.php> (accessed 9 June, 2010).

- U.S. Census Bureau. 2001. Profiles of general demographic characteristics, Alaska: 2000. U.S. Department of Commerce, Washington, D.C.
- Warren, K. 2006. Identification field guide to the geese of the Willamette Valley and lower Columbia River. 2nd edition. Wild Spirit Resources LLC, <http://www.wildspiritresources.com/servlet/the-208/Goose-Field-Guide/Detail>
- Wentworth, C. and S. G. Seim. 1996. Subsistence waterfowl harvest survey: Yukon-Kuskokwim Delta: comprehensive report 1985–1995; results 1995. U.S. Fish and Wildlife Service Migratory Bird Management in cooperation with the Yukon Delta National Wildlife Refuge, Anchorage.
- Wentworth, C. 1998. Subsistence waterfowl harvest survey: Yukon-Kuskokwim Delta: comprehensive report 1987–1997. U.S. Fish and Wildlife Service Migratory Bird Management in cooperation with the Yukon Delta National Wildlife Refuge, Anchorage.
- Wentworth, C. 2004. Subsistence migratory bird harvest survey: Yukon-Kuskokwim Delta, 1995–2000. U. S. Fish and Wildlife Service Migratory Birds and State Programs, in cooperation with the Yukon Delta National Wildlife Refuge, Anchorage.
- Wentworth, C. 2006. Subsistence migratory bird harvest survey handbook 2007; subsistence migratory bird harvest survey handbook for refuge information technicians and survey contractors. Alaska Migratory Bird Co-Management Council, Anchorage.
- Wentworth, C. 2007a. Subsistence migratory bird harvest survey: Bristol Bay: 2001–2005, with 1995–2005 species tables. U.S. Fish and Wildlife Service Migratory Birds and State Programs, in cooperation with Togiak National Wildlife Refuge and Bristol Bay Native Association, Anchorage.
- Wentworth, C. 2007b. Subsistence migratory bird harvest survey: Yukon-Kuskokwim Delta: 2001–2005 with 1985–2005 species tables. U.S. Fish and Wildlife Service Migratory Birds and State Programs, in cooperation with Yukon Delta National Wildlife Refuge, Anchorage.
- Westat Inc. 1989. Investigation of possible recall/reference period bias in national surveys of fishing, hunting and wildlife association recreation: final report. U.S. Fish and Wildlife Service and Westat, Inc., Rockville, Maryland.
- Zavaleta, E. 1999. The emergence of waterfowl conservation among Yup'ik hunters in the Yukon-Kuskokwim Delta, Alaska. *Human Ecology* 27(2):231–266.

## **APPENDICES**

**Appendix A.—Regions, subregions, and villages included in the 2004–2009 harvest estimates.**

<b>Region</b>							
	Subregion						
	Village	2004	2005	2006	2007	2008	2009
<b>Gulf of Alaska/Cook Inlet</b>							
Gulf of Alaska							
	Chenega Bay	-	-	x	-	-	-
	Nanwalek	x	-	-	-	-	-
	Port Graham	x	-	x	-	-	-
	Tatitlek	x	-	-	-	-	-
Cook Inlet							
	Tyonek	x	x	-	-	-	-
<b>Kodiak Archipelago</b>							
Kodiak Villages							
	Akhiok	-	-	x	-	-	-
	Karluk	-	-	x	-	-	-
	Larsen Bay	-	-	x	-	-	-
	Old Harbor	-	-	x	-	-	-
	Ouzinkie	-	-	x	-	-	-
	Port Lions	-	-	-	-	-	-
Kodiak City and Road-connected							
	Aleneva	-	-	-	-	-	-
	Chiniak	-	-	-	-	-	-
	Kodiak City	-	-	x	-	-	-
	Kodiak Station	-	-	-	-	-	-
	Kodiak at large (remainder of Kodiak Island Borough)	-	-	-	-	-	-
	Women's Bay	-	-	-	-	-	-
<b>Aleutian/Pribilof Islands</b>							
Aleutian/Pribilof Villages							
	Adak Station	-	-	-	-	-	-
	Akutan	-	x	-	x	x	-
	Atka	-	x	-	-	-	-
	Cold Bay	-	x	-	-	-	-

- continued -

<b>Region</b>							
Subregion		2004	2005	2006	2007	2008	2009
Village							
False Pass		-	-	-	-	x	-
King Cove		-	x	-	-	x	-
Nelson Lagoon		-	-	-	-	-	-
Nikolski		-	-	-	-	-	-
Sand Point		-	-	-	-	x	-
Saint George Island		-	-	-	-	-	-
Saint Paul Island		-	-	-	-	-	-
Unalaska							
Unalaska		-	-	-	-	x	-
<b>Bristol Bay</b>							
South Alaska Peninsula							
Chignik Bay		x	-	-	x	-	-
Chignik Lagoon		x	-	-	-	-	-
Chignik Lake		x	-	-	-	x	-
Ivanof Bay		-	-	-	-	-	-
Perryville		x	-	-	x	-	-
Southwest Bristol Bay							
Aleknagik		x	-	-	x	x	-
Clark's Point		x	x	-	x	x	-
Egegik		-	x	-	x	-	-
Ekwok		x	-	-	x	x	-
Igiugig		-	-	-	-	-	-
Iliamna		-	x	-	x	-	-
King Salmon		-	x	-	-	-	-
Kokhanok		x	x	-	x	x	-
Koliganek		-	x	-	x	-	-
Levelock		x	x	-	-	x	-
Manokotak		-	x	-	x	-	-
Naknek		x	-	-	x	-	-
New Stuyahok		-	x	-	x	-	-

- continued -



<b>Region</b>							
Subregion		2004	2005	2006	2007	2008	2009
Village							
Newhalen		x	x	-	-	x	-
Nondalton		x	x	-	-	-	-
Pedro Bay		-	x	-	-	-	-
Pilot Point		-	x	-	-	-	-
Port Heiden		-	x	-	-	-	-
South Naknek		-	x	-	x	-	-
Togiak		x	-	x	x	-	-
Twin Hills		x	x	-	x	-	-
Dillingham							
Dillingham		-	x	-	x	x	-
<b>Yukon-Kuskokwim Delta</b>							
Y-K Delta South Coast							
Eek		x	x	-	x	x	-
Goodnews Bay		-	-	x	-	-	-
Kipnuk		-	x	x	x	-	x
Kongiganak		-	x	x	x	x	-
Kwigillingok		-	-	-	-	-	-
Platinum		-	x	x	-	-	-
Quinhagak		x	x	x	x	-	-
Tuntutuliak		x	-	x	-	x	x
Y-K Delta Mid-Coast							
Chefornek		x	-	x	x	-	x
Chevak		x	-	-	-	-	x
Hooper Bay		x	x	-	-	x	-
Mekoryuk		-	x	-	x	x	-
Newtok		-	x	x	-	x	x
Nightmute		x	-	x	x	-	x
Scammon Bay		-	-	x	-	x	x
Toksook Bay		x	x	-	x	-	-
Tununak		x	x	-	x	x	-

- continued -

<b>Region</b>							
Subregion		2004	2005	2006	2007	2008	2009
Village							
<b>Y-K Delta North Coast</b>							
Alakanuk		x	-	x	-	-	x
Emmonak		-	x	x	x	x	x
Kotlik		x	x	-	-	-	-
Nunam Iqua (Sheldon Point)		-	x	x	-	x	x
<b>Lower Yukon</b>							
Marshall (Fortuna Lodge)		x	x	-	x	x	-
Mountain Village		-	x	-	x	x	-
Pilot Station		-	x	x	-	x	x
Pitkas Point		x	-	x	x	-	x
Russian Mission		-	x	x	-	x	x
Saint Mary's (Andreafsky)		-	x	-	x	-	x
<b>Lower Kuskokwim</b>							
Akiachak		-	-	x	-	-	x
Akiak		-	x	x	x	-	-
Aniak		x	x	-	-	x	-
Atmautluak		x	-	-	x	x	-
Kasigluk		x	-	x	x	-	x
Kwethluk		x	x	x	x	-	x
Lower Kalskag		x	-	x	x	x	x
Napakiak		-	-	-	x	-	-
Napaskiak		-	x	x	x	x	x
Nunapitchuk		x	x	-	x	x	-
Oscarville		-	-	x	x	-	x
Tuluksak		-	x	x	-	x	-
Upper Kalskag		-	x	x	-	-	-
<b>Central Kuskokwim</b>							
Chuathbaluk		x	-	-	-	-	-
Crooked Creek		x	-	x	-	-	-
Lime Village		-	-	x	-	-	-

- continued -

<b>Region</b>							
	Subregion						
	Village	2004	2005	2006	2007	2008	2009
	Red Devil	-	-	-	X	-	-
	Sleetmute	-	-	X	X	-	-
	Stony River	X	-	X	-	-	-
	Bethel						
	Bethel	X	X	X	X	X	X
	<b>Bering Strait/Norton Sound</b>						
	St. Lawrence/Diomedes Is.						
	Diomedes	-	X	-	X	-	-
	Gambell	X	X	-	X	-	X
	Savoonga	X	X	-	X	-	X
	Bering Strait Mainland Villages						
	Brevig Mission	X	-	-	X	-	-
	Elim	X	X	-	-	-	-
	Golovin	-	X	-	X	-	-
	Koyuk	-	X	-	X	-	-
	Shaktoolik	-	-	-	X	-	-
	Shishmaref	X	X	-	-	-	-
	Saint Michael	X	-	-	X	-	-
	Stebbins	-	X	-	X	-	-
	Teller	X	X	-	-	-	-
	Unalakleet	X	-	-	X	-	-
	Wales	X	X	-	-	-	-
	White Mountain	X	-	-	X	-	-
	Nome						
	Nome	X	X	-	X	-	-
	<b>Northwest Arctic</b>						
	Northwest Arctic Villages						
	Ambler	-	-	-	-	-	-
	Buckland	-	-	X	-	-	-

- continued -

<b>Region</b>							
Subregion		2004	2005	2006	2007	2008	2009
Village							
Deering		-	-	-	-	-	-
Kiana		-	-	-	-	-	-
Kivalina		-	-	-	-	-	-
Kobuk		-	-	x	-	-	-
Noatak		-	-	-	-	-	-
Noorvik		-	-	-	-	-	-
Selawik		-	-	x	-	-	-
Shungnak		-	-	x	-	-	-
Kotzebue							
Kotzebue		-	-	-	-	-	-
<b>North Slope</b>							
North Slope Villages							
Anaktuvuk Pass		-	x	-	x	-	-
Atkasuk		-	x	-	x	-	-
Kaktovik		-	x	-	x	x	x
Nuiqsut		-	-	-	-	x	x
Point Hope		-	x	-	-	x	-
Point Lay		-	x	-	-	-	-
Wainwright		-	x	-	x	x	x
Barrow							
Barrow		-	x	-	x	x	x
<b>Interior Alaska</b>							
Mid-Yukon/Upper Kuskokwim							
Anvik		x	x	x	-	-	-
Grayling		-	x	x	-	-	-
Holy Cross		x	x	x	-	-	-
Lake Minchumina		x	-	x	-	-	-
McGrath		-	-	-	-	-	-
Nikolai		x	x	x	-	-	-

- continued -

<b>Region</b>							
Subregion		2004	2005	2006	2007	2008	2009
Village							
Shageluk		-	x	-	-	-	-
Takotna		-	x	-	-	-	-
Tanana		-	-	-	-	-	-
Yukon/Koyukuk							
Alatna		x	-	x	x	x	-
Allakaket		x	-	x	x	x	-
Bettles/Evansville		-	-	x	-	-	-
Coldfoot		-	-	-	-	-	-
Galena		x	-	-	-	-	-
Hughes		x	-	-	-	-	-
Huslia		x	-	-	-	-	-
Kaltag		x	-	-	-	-	-
Koyukuk		x	x	-	-	-	-
Nulato		x	x	-	-	-	-
Ruby		x	x	-	-	-	-
Wiseman		-	-	-	-	-	-
Upper Yukon							
Arctic Village		-	-	x	-	-	-
Beaver		-	-	x	x	-	-
Birch Creek		-	-	-	x	-	-
Central		-	-	x	-	-	-
Chalkyitsik		-	-	x	x	-	-
Circle		-	-	x	x	-	-
Fort Yukon		x	-	x	x	-	-
Rampart		-	-	-	-	-	-
Stevens Village		-	-	-	-	-	-
Venetie		-	-	x	x	-	-

- continued -

<b>Region</b>						
<u>Subregion</u>						
Village	2004	2005	2006	2007	2008	2009
<b>Tanana Villages</b>						
Dot Lake	x	-	-	-	-	-
Dry Creek	-	-	-	-	-	-
Eagle City	x	-	-	-	-	-
Eagle Village	x	-	-	-	-	-
Healy Lake	-	-	-	-	-	-
Manley Hot Springs	x	-	-	-	-	-
Minto	-	-	x	-	-	-
Nenana	x	-	x	-	-	-
Northway	x	-	-	-	-	-
Tanacross	-	-	x	-	-	-
Tetlin	-	-	-	-	-	-
<b>Tok</b>						
Tok	-	-	x	-	-	-
<b>Upper Copper River</b>						
Cantwell	-	-	-	x	-	-
Cheesh'na (Chistochina)	x	-	-	x	-	-
Chitina	x	-	-	-	-	-
Copper Center	x	-	-	x	-	-
Gakona	x	-	-	x	-	-
Gulkana	x	-	-	x	-	-
Mentasta Lake	x	-	-	x	-	-
Tazlina	-	-	-	-	-	-
<b>Southeast Alaska</b>						
Craig <sup>a</sup>	-	-	-	-	-	-
Hoonah <sup>a</sup>	-	-	-	-	-	-
Hydaburg <sup>a</sup>	-	-	-	-	-	-
Yakutat <sup>a</sup>	-	-	-	-	-	-

Source Survey results for 2004–2007 were reported in Naves (2010a) and for 2008 in Naves (2010b).

a. Communities eligible only to harvest of glaucous-winged gull eggs (FR vol. 75, No. 70, pp. 18764–18773, April 13, 2010).



Appendix B.—Harvest report form (Main form, ~50% of original size).

**SUBSISTENCE HOUSEHOLD SURVEY**  
 SPRING (APRIL 1 - JUNE 30)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

Tundra Swan birds _____ eggs _____		Sandhill Crane birds _____ eggs _____		White-fronted Goose birds _____ eggs _____		Lesser Canada Goose birds _____ eggs _____	
Cackling Canada Goose birds _____ eggs _____		Lesser Snow Goose birds _____ eggs _____		Emperor Goose birds _____ eggs _____		Black Brant birds _____ eggs _____	
Pintail birds _____ eggs _____		Mallard birds _____ eggs _____		Wigeon birds _____ eggs _____		Shoveler birds _____ eggs _____	
Green-winged Teal birds _____ eggs _____		Scaup birds _____ eggs _____		Canvasback birds _____ eggs _____		Bufflehead birds _____ eggs _____	
Harlequin birds _____ eggs _____		Goldeneye birds _____ eggs _____		Long-tailed duck birds _____ eggs _____		White-winged Scoter birds _____ eggs _____	
Black Scoter birds _____ eggs _____		Surf Scoter birds _____ eggs _____		Common Merganser birds _____ eggs _____		Red-breasted Merganser birds _____ eggs _____	
Common Eider birds _____ eggs _____		King Eider birds _____ eggs _____		Spectacled Eider birds _____ eggs _____		Steller's Eider birds _____ eggs _____	

VH Code: \_\_\_\_\_

**SUBSISTENCE HOUSEHOLD SURVEY**  
 SPRING (APRIL 1 - JUNE 30)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

Yellow-billed Loon birds _____ eggs _____		Red-throated Loon birds _____ eggs _____		Common Loon birds _____ eggs _____		Pacific Loon birds _____ eggs _____	
Auilet birds _____ eggs _____		Murre birds _____ eggs _____		Comorant birds _____ eggs _____		Kittiwake birds _____ eggs _____	
Guillemot birds _____ eggs _____		Mew Gull birds _____ eggs _____		Sabine's Gull birds _____ eggs _____		Glaucous Gull birds _____ eggs _____	
Arctic Tern birds _____ eggs _____		Puffin birds _____ eggs _____		Bristle-thighed Curlew birds _____ eggs _____		Godwit birds _____ eggs _____	
Whimbrel birds _____ eggs _____		Golden Plover birds _____ eggs _____		Small Shorebird birds _____ eggs _____		Unidentified Duck birds _____ eggs _____	
Ptarmigan (non-migratory) birds _____ eggs _____		Spruce Grouse (non-migratory) birds _____ eggs _____		Other Bird birds _____ eggs _____			

Surveyor Notes \_\_\_\_\_ Date of Pick-up: \_\_\_\_\_

VH Code: \_\_\_\_\_ Comments: \_\_\_\_\_

FORM 529-102 (REV. 8/01) 148-3121 APPROVAL EXP. 03-14



**SUBSISTENCE HOUSEHOLD SURVEY**  
SUMMER (JULY 1 - AUG. 31)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

Tundra Swan birds _____ eggs _____	Sandhill Crane birds _____ eggs _____	White-fronted Goose birds _____ eggs _____	Lesser Canada Goose birds _____ eggs _____
Cackling Canada Goose birds _____ eggs _____	Lesser Snow Goose birds _____ eggs _____	Emperor Goose birds _____ eggs _____	Black Brant birds _____ eggs _____
Pintail birds _____ eggs _____	Mullard birds _____ eggs _____	Wigeon birds _____ eggs _____	Shoveler birds _____ eggs _____
Green-winged Teal birds _____ eggs _____	Scaup birds _____ eggs _____	Canvasback birds _____ eggs _____	Bufflehead birds _____ eggs _____
Harlequin birds _____ eggs _____	Goldeneye birds _____ eggs _____	Long-tailed duck birds _____ eggs _____	White-winged Scoter birds _____ eggs _____
Black Scoter birds _____ eggs _____	Surf Scoter birds _____ eggs _____	Common Merganser birds _____ eggs _____	Red-breasted Merganser birds _____ eggs _____
Common Eider birds _____ eggs _____	King Eider birds _____ eggs _____	Spectacled Eider birds _____ eggs _____	Steller's Eider birds _____ eggs _____

VH Code: \_\_\_\_\_

**SUBSISTENCE HOUSEHOLD SURVEY**  
SUMMER (JULY 1 - AUG. 31)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

Yellow-billed Loon birds _____ eggs _____	Red-throated Loon birds _____ eggs _____	Common Loon birds _____ eggs _____	Pacific Loon birds _____ eggs _____
Auklet birds _____ eggs _____	Murre birds _____ eggs _____	Cormorant birds _____ eggs _____	Kittiwake birds _____ eggs _____
Guillemot birds _____ eggs _____	Mew Gull birds _____ eggs _____	Sabine's Gull birds _____ eggs _____	Glaucous Gull birds _____ eggs _____
Arctic Tern birds _____ eggs _____	Puffin birds _____ eggs _____	Bristle-thighed Curlew birds _____ eggs _____	Godwit birds _____ eggs _____
Whimbrel birds _____ eggs _____	Golden Plover birds _____ eggs _____	Small Shorebird birds _____ eggs _____	Unidentified Duck birds _____ eggs _____
Ptarmigan (non-migratory) birds _____ eggs _____	Spruce Grouse (non-migratory) birds _____ eggs _____	Other Bird _____ birds _____ eggs _____	

Surveyor Notes \_\_\_\_\_ Date of Pick-up: \_\_\_\_\_  
VH Code: \_\_\_\_\_ Comments: \_\_\_\_\_

## SUBSISTENCE HOUSEHOLD SURVEY

FALL (SEPT. 1 - OCT. 31)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

<p>Tundra Swan birds _____ eggs _____</p> 	<p>Sandhill Crane birds _____ eggs _____</p> 	<p>White-fronted Goose birds _____ eggs _____</p> 	<p>Lesser Canada Goose birds _____ eggs _____</p> 
<p>Cackling Canada Goose birds _____ eggs _____</p> 	<p>Lesser Snow Goose birds _____ eggs _____</p> 	<p>Emperor Goose birds _____ eggs _____</p> 	<p>Black Brant birds _____ eggs _____</p> 
<p>Pintail birds _____ eggs _____</p> 	<p>Mallard birds _____ eggs _____</p> 	<p>Wigeon birds _____ eggs _____</p> 	<p>Shoveler birds _____ eggs _____</p> 
<p>Green-winged Teal birds _____ eggs _____</p> 	<p>Scaup birds _____ eggs _____</p> 	<p>Canvasback birds _____ eggs _____</p> 	<p>Dufflehead birds _____ eggs _____</p> 
<p>Harlequin birds _____ eggs _____</p> 	<p>Goldeneye birds _____ eggs _____</p> 	<p>Long-tailed duck birds _____ eggs _____</p> 	<p>White-winged Scoter birds _____ eggs _____</p> 
<p>Black Scoter birds _____ eggs _____</p> 	<p>Surf Scoter birds _____ eggs _____</p> 	<p>Common Merganser birds _____ eggs _____</p> 	<p>Red-breasted Merganser birds _____ eggs _____</p> 
<p>Common Eider birds _____ eggs _____</p> 	<p>King Eider birds _____ eggs _____</p> 	<p>Spectacled Eider birds _____ eggs _____</p> 	<p>Steller's Eider birds _____ eggs _____</p> 

VH Code: \_\_\_\_\_

## SUBSISTENCE HOUSEHOLD SURVEY

FALL (SEPT. 1 - OCT. 31)

PLEASE WRITE TOTAL NUMBER OF BIRDS CAUGHT AND EGGS GATHERED.

<p>Yellow-billed Loon birds _____ eggs _____</p> 	<p>Red-throated Loon birds _____ eggs _____</p> 	<p>Common Loon birds _____ eggs _____</p> 	<p>Pacific Loon birds _____ eggs _____</p> 
<p>Auklet birds _____ eggs _____</p> 	<p>Murre birds _____ eggs _____</p> 	<p>Cormorant birds _____ eggs _____</p> 	<p>Kittiwake birds _____ eggs _____</p> 
<p>Guillemot birds _____ eggs _____</p> 	<p>Mew Gull birds _____ eggs _____</p> 	<p>Sabine's Gull birds _____ eggs _____</p> 	<p>Glaucous Gull birds _____ eggs _____</p> 
<p>Arctic Tern birds _____ eggs _____</p> 	<p>Puffin birds _____ eggs _____</p> 	<p>Bristle-thighed Curlew birds _____ eggs _____</p> 	<p>Godwit birds _____ eggs _____</p> 
<p>Whimbrel birds _____ eggs _____</p> 	<p>Golden Plover birds _____ eggs _____</p> 	<p>Small Shorebird birds _____ eggs _____</p> 	<p>Unidentified Duck birds _____ eggs _____</p> 
<p>Ptarmigan (non-migratory) birds _____ eggs _____</p> 	<p>Spruce Grouse (non-migratory) birds _____ eggs _____</p> 	<p>Other Bird birds _____ eggs _____</p> 	

Surveyor Notes \_\_\_\_\_      Comments: \_\_\_\_\_  
 Date of Pick-up: \_\_\_\_\_  
 VH Code: \_\_\_\_\_

FORM 129 (REVISED 08/10) OFFICIAL USE ONLY

**Appendix C.—Species represented in the 3 versions of the harvest report forms and their distribution range in Alaska.**

Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
<b>Ducks</b>											
American wigeon <i>Anas americana</i>	x	x	x	x	x	x	x	x	x	x	x
Green-winged teal <i>A. crecca</i> (1), Blue-winged teal <i>A. discors</i> (2)	(1, 2)	(1, 2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1, 2)	(1, 2)
Mallard <i>A. platyrhynchos</i>	x	x	x	x	x	x	x	x	x	x	x
Northern pintail <i>A. acuta</i>	x	x	x	x	x	x	x	x	x	x	x
Northern shoveler <i>A. clypeata</i>	x	x	x	x	x	x	x	x	x	x	x
Black scoter <i>Melanitta nigra</i>	x	x	x	x	x	x	x	x	x	x	x
Surf scoter <i>M. perspicillata</i>	x	x	x	x	x	x	x	x	x	x	x
White-winged scoter <i>M. fusca</i>	x	x	x	x	x	x	x	x	x	x	x
Bufflehead <i>Bucephala albeola</i>	x	x	x	x	x	x	x	x	x (-)	x	x
Goldeneye Common goldeneye <i>B. clangula</i> (1), Barrow's goldeneye <i>B. islandica</i> (2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1)	(1)	x (-)	x	x
Canvasback <i>Aythya valisineria</i>	x	x	x	x	x	x	x	x	x (-)	x	x
Scaup Greater scaup <i>A. marila</i> (1), Lesser scaup <i>A. affinis</i> (2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1)	(1, 2)	(1, 2)
Common eider <i>Somateria mollissima</i>	x	x	x	x	x	x	x	x	x	-	-
King eider <i>S. spectabilis</i>	x	x	x	x	x	x	x	x	x	-	-
Spectacled eider <i>S. fischeri</i> *	x (-)	x (-)	x (-)	x (-)	x	x	x	x	x	-	-

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Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
Steller's eider <i>Polysticta stelleri</i> *	x	x	x	x	x	x	x	x	x	-	-
Harlequin duck <i>Histrionicus histrionicus</i>	x	x	x	x	x	x	x	x	x (-)	x	x
Long-tailed duck <i>Clangula hyemalis</i>	x	x	x	x	x	x	x	x	x	x	x
Common merganser <i>Mergus merganser</i>	x	x	x	x	x	x	x	x	x (-)	x	x
Red-breasted merganser <i>M. serrator</i>	x	x	x	x	x	x	x	x	x	x	x
Duck (unidentified)	x	x	x	x	x	x	x	x	x	x	x
<b>Geese</b>											
Black brant <i>Branta bernicla</i>	x	x	x	x	x	x	x	x	x	x (-)	x (-)
Cackling Canada goose Cackling goose <i>Branta hutchinsii minima</i> (1), Aleutian cackling goose <i>B. h. leucopareia</i> (2), Taverner's cackling goose <i>B. h. taverneri</i> (3)	x (1, 2, 3)	x (2)	x (2)	x (1?, 3)	x (1, 2)	x (1, 3)	x (3)	x (3)	x (3)	- (3)	-
Lesser Canada goose <i>Branta canadensis parvipes</i> (1), Dusky Canada goose <i>B. c. occidentalis</i> (2)	x (1, 2)	x (-)	x (-)	x (1?)	x (-)	x (1)	x (-)	x (-)	x (-)	x (1)	x (1)
White-fronted goose <i>Anser albifrons</i>	x	x	x	x	x	x	x	x	x	x	x
Emperor goose <i>Chen canagica</i> *	x	x	x	x	x	x	x	x	x (-)	-	-
Lesser snow goose <i>C. caerulescens</i>	x	x	x	x	x	x	x	x	x	x	x
<b>Swans</b>											
Tundra swan <i>Cygnus columbianus</i> (1), Trumpeter swan <i>C. buccinator</i> * (2)	x (1, 2)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1, 2)	x (1, 2)

- continued -

Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
<b>Cranes</b>											
Sandhill crane <i>Grus canadensis</i>	x	x	x	x	x	x	x	x	x	x	x
<b>Ptarmigans and grouses</b>											
Spruce grouse <i>Falcapennis canadensis</i>	-	-	-	-	x	x	x	x	x	-	-
Grouse (unidentified)	-	-	-	-	-	-	-	-	-	x	x
Spruce grouse <i>F. canadensis</i> (1), Ruffed grouse <i>Bonasa umbellus</i> (2), Sharp-tailed grouse <i>Tympanuchus phasianellus</i> (3)	(1, 2)									(1, 2, 3)	(1, 2, 3)
Ptarmigan	x	x	x	x	x	x	x	x	x	x	x
Willow ptarmigan <i>Lagopus lagopus</i> (1), Rock ptarmigan <i>L. muta</i> (2), White-tailed ptarmigan <i>L. leucura</i> (3)	(1, 2, 3)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2, 3)	(1, 2, 3)
<b>Seabirds</b>											
Cormorant	x	x	x	x	x	x	x	x	x	-	-
Pelagic cormorant <i>Phalacrocorax pelagicus</i> (1), Double-crested cormorant <i>P. auritus</i> (2), Red-faced cormorant <i>P. urile*</i> (3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 3)	(1)	(1)	(-)		
Arctic tern <i>Sterna paradisaea</i> (1), Aleutian tern <i>S. aleutica</i> (2)	x (1)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1)	x (1)	x (1)
Black-legged kittiwake <i>Rissa tridactyla</i>	x	x	x	x	-	-	-	-	-	-	-
Kittiwake <i>R. tridactyla</i>	-	-	-	-	x	x	x	x	x (-)	-	-
Red-legged kittiwake <i>R. brevirostris</i>	x	x	x	x	-	-	-	-	-	-	-

- continued -

Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
Sabine's gull <i>Xema sabini</i> (1), Bonaparte's gull <i>Larus philadelphia</i> (2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1)	x (1)	x (1)	- (2)	- (2)
Mew gull <i>Larus canus</i>	- (x)	- (x)	-	-	x	x	x	x	x (-)	x	x
Glaucous-winged gull <i>L. glaucescens</i>	x	x	x	x	- (x)	-	-	-	-	-	-
Glaucous gull <i>L. hyperboreus</i>	-	-	-	-	x	x	x	x	x	x (-)	x (-)
Herring gull <i>L. argentatus</i>	x	x	x	x	-	-	- (x)	-	-	x	x
Auklet Cassin's auklet <i>Ptychoramphus aleuticus</i> (1), Crested auklet <i>Aethia cristatella</i> (2), Least auklet <i>A. pusilla</i> (3), Parakeet auklet <i>A. psittacula</i> (4), Whiskered auklet <i>A. pygmaea</i> (5), Rhinceros auklet <i>Cerorhinca monocerata</i> (6)	x (1, 2, 3, 4, 6)	x (1, 2, 3, 4, 6)	x (1, 2, 3, 4, 5, 6)	x (1, 2, 3, 4, 5, 6)	x (1, 2, 3, 4, 6)	x (2, 3, 4, 6)	x (2, 3, 4, 6)	x (2, 3, 4, 6)	x (-)	-	-
Murre Common murre <i>Uria aalge</i> (1), Thick-billed murre <i>U. lomvia</i> (2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	-	-
Guillemot Pigeon guillemot <i>Cephus Columba</i> (1), Black guillemot <i>C. grille</i> (2)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1)	x (1, 2)	x (2)	-	-
Puffin Tufted puffin <i>F. cirrhata</i> (1), Horned puffin <i>Fratercula corniculata</i> (2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (1, 2)	x (-)	-	-
<b>Shorebirds</b>											
Black oystercatcher <i>Haematopus bachmani</i>	x	x	x	x	-	-	-	-	-	-	-
Whimbrel <i>Numenius phaeopus</i> *	- (x)	-	-	- (x)	x	x	x	x	x	x	x

- continued -

Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
Bristle-thighed curlew <i>N. tahitiensis</i> *	x (-)	x	x (-)	x (-)	x (-)	x	x	x (-)	x (-)	-	-
Godwit	x	x (-)	x (-)	x	x	x	x	x	x	x	x
Bar-tailed godwit <i>Limosa lapponica</i> (1), Hudsonian godwit <i>L. haemastica</i> * (2), Marbled godwit <i>L. fedoa</i> * (3)	(2)			(1)	(1, 2, 3)	(1, 2)	(1, 2)	(1, 2)	(1)	(2)	(-)
Golden plover	x	x	x	x	x	x	x	x	x	x	x
American golden plover <i>Pluvialis dominica</i> * (1), Pacific golden plover <i>P. squatarola</i> * (2), Black-bellied plover <i>P. fulva</i> (3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 3)	(1, 2, 3)	(1, 2, 3)
Small shorebird	x	x	x	x	x	x	x	x	x	x	x
Dunlin <i>Calidris alpina</i> (1), Pectoral sandpiper <i>C. melanotos</i> * (2), Rock sandpiper <i>C. pillocnemis</i> * (3), Western sandpiper <i>C. mauri</i> (4), Semipalmated sandpiper <i>C. pusilla</i> (5), Least sandpiper <i>C. minutilla</i> (6), Baird's sandpiper <i>C. bairdii</i> (7), White-rumped sandpiper <i>C. fuscicollis</i> * (8), Stilt sandpiper <i>C. himantopus</i> * (9), Red-necked stint <i>C. ruficollis</i> * (10), Sanderling <i>C. alba</i> * (11), Sharp-tailed sandpiper <i>C. acuminata</i> (12), Semipalmated plover <i>Charadrius semipalmatus</i> * (13), Lesser yellowlegs <i>Tringa flavipes</i> (14), Greater yellowlegs <i>T. melanoleuca</i> (15), Solitary sandpiper <i>T. solitaria</i> * (16), Spotted sandpiper <i>Actitis macularia</i> (17), Ruddy turnstone <i>Arenaria interpres</i> (18), Black turnstone <i>A. melanocephala</i> * (20),	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 20, 21, 22, 25, 26, 27, 28)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 25, 26, 27, 28, 29)	(1, 3, 4, 6, 7, 11, 13, 17, 18, 22, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 25, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 25, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 18, 20, 21, 25, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 17, 18, 21, 22, 25, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 15, 16, 17, 18, 20, 21, 21, 22, 22, 25, 23, 24, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 21, 22, 23, 25, 26, 27, 28, 29)	(1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 21, 22, 23, 25, 26, 27, 28, 29)	

(continued next page)

Species category Species <sup>a</sup>	Southern Coastal Alaska form				Main form					Interior Alaska form	
	Gulf of Alaska- Cook Inlet	Kodiak Archipelago	Aleutian- Pribilof Islands	South Alaska Peninsula <sup>b</sup>	Bristol Bay	Yukon- Kuskokwim Delta	Bering Strait- Norton Sound	North- west Arctic	North Slope	Interior Alaska	Upper Copper River
<i>(continued from previous)</i>	x	x	x	x	x	x	x	x	x	x	x
<b>Small shorebird</b>	(1, 2, 3,	(1, 2, 3, 4, 5,	(1, 3, 4,	(1, 2, 3, 4,	(1, 2, 3,	(1, 2, 3, 4, 5,	(1, 2, 3,	(1, 2,	(1, 2,	(1, 2, 3,	(1, 2, 3, 4,
Surfbird <i>Aphirza virgata</i> * (21),	4, 5, 6,	6, 7, 11, 13,	6, 7, 11,	5, 6, 7, 11,	4, 5, 6,	6, 7, 11, 12,	4, 5, 6,	3, 4, 5,	4, 5, 6,	4, 5, 6,	5, 6, 7, 11,
Wandering tatter <i>Heteroscelus incanus</i> * (22),	7, 11,	14, 15, 16,	13, 17,	13, 14, 15,	7, 11,	13, 14, 15,	7, 11,	6, 7,	7, 8, 9,	7, 11,	13, 14, 15,
Upland sandpiper <i>Bartramia longicauda</i> * (23),	13, 14,	17, 18, 20,	18, 22,	16, 17, 18,	13, 14,	16, 17, 18,	12, 13,	11, 12,	10, 11,	13, 14,	16, 17, 21,
Buff-breasted sandpiper	15, 16,	21, 22, 25,	26, 27,	20, 21, 22,	15, 16,	20, 21, 22,	14, 15,	13, 14,	12, 13,	15, 16,	22, 23, 25,
<i>Tryngites subruficolis</i> * (24),	17, 20,	26, 27, 28,	28, 29)	25, 26, 27,	17, 18,	25, 26, 27,	16, 17,	15, 16,	14, 17,	17, 21,	26, 27, 28,
Short-billed dowitcher <i>Limnodromus driseus</i> * (25)	21, 22,	29)		28, 29)	20, 21,	28, 29)	18, 20,	17, 18,	18, 20,	22, 23,	29)
Long-billed dowitcher <i>L. scolopaceus</i> (26),	25, 26,				22, 25,		21, 22,	20, 21,	21, 22,	25, 26,	
Wilson's snipe <i>Gallinago delicata</i> (27),	27, 28)				26, 27,		25, 26,	22, 25,	23, 24,	27, 28,	
Red-necked phalarope <i>Phalaropus lobatus</i> (28),					28, 29)		27, 28,	26, 27,	26, 27,	29)	
Red phalarope <i>P. fulicaria</i> (29)							29)	28, 29)	28, 29)		
<b>Loons and grebes</b>											
Common loon <i>Gavia immer</i>	x	x	x	x	x	x	x	x	x (-)	x	x
Pacific loon <i>G. pacifica</i> (1),	x	x	x	x	x	x	x	x	x	x	x
Arctic loon <i>G. arctica</i> (2)	(1)	(1)	(1)	(1)	(1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1)	(1)
Red-throated loon <i>G. stellata</i>	x	x	x	x	x	x	x	x	x	x	x
Yellow-billed loon <i>G. adamsii</i> *	x	x	x	x	x	x	x	x	x	-	-
Red-necked grebe <i>Podiceps griseana</i> (1),	-	-	-	-	-	-	-	-	-	x	x
Horned grebe <i>P. auritus</i> (2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)	(1, 2)		(1, 2)	(1, 2)
<b>Other and unknown bird</b>	x	x	x	x	x	x	x	x	x	x	x



Appendix C.–Page 7 of 7.

- Sources* For information on distribution range of species: Banks et al. (2004), Johnson and Herter (1989), National Geographic Society (1999), The Birds of North America Series, Sea Duck Joint Venture (2003-2005), Denlinger (2006), Johnson et al. (2007), Alaska Shorebird Group (2008), Bowman (2008), Pearce et al. (2000), Sibley Guides (2004), Timm et al. (1994), Warren (2006), Pacific Flyway Council (2010 *unpublished*), Richard Lanctot (USFWS, Pers. Communication), Eric Taylor (USFWS, Pers. Communication), Donna Dewhurst (USFWS, Pers. Communication), David Irons (USFWS, Pers. Communication), Chris Dau (USFWS, Pers. Communication), Daniel Rosenberg (ADF&G, Pers. Communication).
- a. If more than one species is listed, the first name is the one used on the harvest survey form.
  - b. South Alaska Peninsula is a subregion of the Bristol Bay region; most of the Bristol Bay region is surveyed with the Main Form, but the South Alaska Peninsula is surveyed with the Southern Coastal Alaska form.
  - x The species is represented in the harvest report form used in the region. Numbers in parenthesis indicate the species or the composition of species likely to occur in each region.
    - The species is not represented in the harvest report form used in the region.
  - x (-) The species is represented in the harvest report form but it is unlike to occur in the region.
  - (x) The species is not represented in the harvest report form but likely occurs in the region.
    - \* Species closed to harvest of birds or eggs, at least in certain management units.

**Appendix D.–Formulas to calculate subregion estimated harvests, variances, and confidence intervals (3-stage stratified cluster sampling).**

$$X_s = \frac{N_{1s}}{n_{1s}} \left[ \sum_{i=1}^h \frac{N_{2si}}{n_{2si}} \left[ \sum_{j=1}^{h_i} \frac{N_{3sij}}{n_{3sij}} \left[ \sum_{k=1}^{n_{3sij}} x_{sijk} \right] \right] \right]$$

This formula accounts for missing strata, but it does not account for missing seasons. If a whole season is missing for any village, analytical procedures are necessary to fill out missing data with average harvests.

$$\text{Var}(X_s) = N_{1s}^2 \left(1 - \frac{n_{1s}}{N_{1s}}\right) \frac{s_{1s}^2}{n_{1s}} + \frac{N_{1s}}{n_{1s}} \left[ \sum_{i=1}^h N_{2si}^2 \left(1 - \frac{n_{2si}}{N_{2si}}\right) \frac{s_{2si}^2}{n_{2si}} \right] + \frac{N_{1s}}{n_s} \left[ \sum_{i=1}^h \frac{N_{2si}}{n_{2si}} \left[ \sum_{j=1}^{h_i} N_{3sij}^2 \left(1 - \frac{n_{3sij}}{N_{3sij}}\right) \frac{s_{3sij}^2}{n_{3sij}} \right] \right]$$

$$CI(X_s) = t_{1/\alpha} \times \sqrt{\text{var}(X_s)}$$

$$CIP(X_s) = t_{1/\alpha} \times \sqrt{\text{var}(X_s)} \frac{1}{X_s}$$

Where:

$$s_{1s}^2 = \frac{\sum_{i=1}^h \left[ \sum_{j=1}^{h_i} \left[ \sum_{k=1}^{n_{3sij}} (x_{sijk} - \bar{x}_s)^2 \right] + (\bar{x}_{sij} - \bar{x}_s)^2 p_{3sij} \right]}{n_{1s}}$$

$$p_{3sij} = N_{3sij} - n_{3sij}$$

$$s_{2si}^2 = \frac{\sum_{j=1}^{h_i} \left[ \sum_{k=1}^{n_{3sij}} (x_{sijk} - \bar{x}_{si})^2 \right] + (\bar{x}_{sij} - \bar{x}_{si})^2 p_{3sij}}{n_{2si}}$$

$$s_{3sij}^2 = \frac{\sum_{k=1}^{n_{3sij}} (x_{sijk} - \bar{x}_{sij})^2}{n_{3sij}}$$

$$\bar{x}_s = \frac{N_{1s}}{n_{1s}} \left[ \sum_{i=1}^h \frac{N_{2si}}{n_{2si}} \left[ \sum_{j=1}^{h_i} \frac{N_{3sij}}{n_{3sij}} \left[ \sum_{k=1}^{n_{3sij}} x_{sijk} \right] \right] \right]$$

$$\bar{x}_{si} = \frac{N_{2si}}{n_{2si}} \left[ \sum_{j=1}^{h_i} \frac{N_{3sij}}{n_{3sij}} \left[ \sum_{k=1}^{n_{3sij}} x_{sijk} \right] \right]$$

$$\bar{x}_{sij} = \frac{N_{3sij}}{n_{3sij}} \left[ \sum_{k=1}^{n_{3sij}} x_{sijk} \right]$$

$X_s$  = Subregion estimated harvest.

$\text{Var}(X_s)$  = Variance of subregional harvest estimate.

CI = Confidence interval.

CIP = Confidence interval percentile.

$s$  = Subscript that denotes first-stage units (subregion).

$i$  = Subscript that denotes second-stage units (sampled strata, or harvest level).

$j$  = Subscript that denotes third-stage unit (sampled strata).

$k$  = Subscript that denotes households.

$h$  = Total number of villages sampled in a subregion.

$h_i$  = Total number of strata sampled in the village.

$N_{1s}$  = Total number of households in subregion  $s$ .

$n_{1s}$  = Total number of households in sampled villages in subregion  $s$ .

$N_{2si}$  = Total number of households in all strata of a village in subregion  $s$ .

$n_{2si}$  = Total number of households in sampled strata of a village in subregion  $s$ .

$N_{3sij}$  = Total number of households in each stratum of a village in subregion  $s$ .

$n_{3sij}$  = Number of households sampled in each stratum of a village in subregion  $s$ .

$x_{sijk}$  = Individual household reported harvest.

$s_1^2$  = First-stage sample variance.

$s_2^2$  = Second-stage sample variance.

$s_3^2$  = Third-stage sample variance.

$\bar{x}$  = Weighted household harvest average.

$\bar{x}_s$  = average household harvest at subregional level.

$\bar{x}_{si}$  = average household harvest at village level.

–

$\bar{x}_{sij}$  = average household harvest at harvest level.

$P_{3sij}$  = Factor to account for variance of non-sampled households for which a average harvest was applied.

$t_{1/\alpha}$  = Student's  $t$  distribution value with tail area probability  $\alpha$ .

Note: The term " $N_{2si}/n_{2s}$ " accounts for missing stratum at the village level; this term equals 1 if all strata in the village have been surveyed. For instance:

	None	Low	High	
Total households	20	40	20	$N_{2si} = 80$
Sampled households	0	20	20	$n_{2si} = 60$

**Appendix E.–Formulas to calculate region estimated harvests, variances, and confidence intervals (4-stage stratified sampling)**

$$X_r = \frac{N_{1r}}{n_{1r}} \left[ \sum_{s=1}^h \frac{N_{2rs}}{n_{2rs}} \left[ \sum_{i=1}^{h_s} \frac{N_{3rsi}}{n_{3rsi}} \left[ \sum_{j=1}^{h_{si}} \frac{N_{4rsij}}{n_{4rsij}} \left[ \sum_{k=1}^{n_{4rsij}} x_{rsijk} \right] \right] \right] \right] \right]$$

This formula accounts for missing strata, but it does not account for missing seasons. If a whole season is missing for any village, analytical procedures are necessary to fill out missing data with average harvests.

$$\begin{aligned} \text{Var}(X_r) = & N_{1r}^2 \left(1 - \frac{n_{1r}}{N_{1r}}\right) \frac{s_{1r}^2}{n_{1r}} + \frac{N_{1r}}{n_{1r}} \left[ \sum_{s=1}^h N_{2rs}^2 \left(1 - \frac{n_{2rs}}{N_{2rs}}\right) \frac{s_{2rs}^2}{n_{2rs}} \right] + \frac{N_{1r}}{n_{1r}} \left[ \sum_{s=1}^h \frac{N_{2rs}}{n_{2rs}} \left[ \sum_{i=1}^{h_s} N_{3rsi}^2 \left(1 - \frac{n_{3rsi}}{N_{3rsi}}\right) \frac{s_{3rsi}^2}{n_{3rsi}} \right] \right] \\ & + \frac{N_{1r}}{n_{1r}} \left[ \sum_{s=1}^h \frac{N_{2rs}}{n_{2rs}} \left[ \sum_{i=1}^{h_s} \frac{N_{3rsi}}{n_{3rsi}} \left[ \sum_{j=1}^{h_{si}} N_{4rsij}^2 \left(1 - \frac{n_{4rsij}}{N_{4rsij}}\right) \frac{s_{4rsij}^2}{n_{4rsij}} \right] \right] \right] \end{aligned}$$

$$CI(X_r) = t_{1/\alpha} \times \sqrt{\text{var}(X)}$$

$$CIP(X_r) = t_{1/\alpha} \times \sqrt{\text{var}(X)} \frac{1}{X_r}$$

Where:

$$s_{1r}^2 = \frac{\sum_{s=1}^h \left[ \sum_{i=1}^{h_s} \left[ \sum_{j=1}^{h_{si}} \left[ \sum_{k=1}^{n_{4rsij}} (x_{rsijk} - \bar{x}_r)^2 \right] + (\bar{x}_{rsij} - \bar{x}_r)^2 p_{4rsij} \right] \right] \right]}{n_{1r}}$$

$$p_{4rsij} = N_{4rsij} - n_{4rsij}$$

$$s_{2rs}^2 = \frac{\sum_{i=1}^{h_s} \left[ \sum_{j=1}^{h_{si}} \left[ \sum_{k=1}^{n_{4rsij}} (x_{rsijk} - \bar{x}_{rs})^2 \right] + (\bar{x}_{rsij} - \bar{x}_{rs})^2 p_{4rsij} \right] \right]}{n_{2rs}}$$

$$s_{3rsi}^2 = \frac{\sum_{j=1}^{h_{si}} \left[ \sum_{k=1}^{n_{4rsij}} (x_{rsijk} - \bar{x}_{rsi})^2 \right] + (\bar{x}_{rsij} - \bar{x}_{rsi})^2 p_{4rsij}}{n_{3rsi}}$$

$$s_{4rsij}^2 = \frac{\sum_{k=1}^{n_{4rsij}} (x_{rsijk} - \bar{x}_{rsij})^2}{n_{4rsij}}$$

$$\bar{x}_r = \frac{N_{1r}}{n_{1r}} \left[ \sum_{s=1}^h \frac{N_{2rs}}{n_{2rs}} \left[ \sum_{i=1}^{h_s} \frac{N_{3rsi}}{n_{3rsi}} \left[ \sum_{j=1}^{h_{si}} \frac{N_{4rsij}}{n_{4rsij}} \left[ \sum_{k=1}^{n_{4rsij}} x_{rsijk} \right] \right] \right] \right] \right]$$

$$\bar{x}_{rs} = \frac{N_{2rs}}{n_{2rs}} \left[ \sum_{i=1}^{h_s} \frac{N_{3rsi}}{n_{3rsi}} \left[ \sum_{j=1}^{h_{si}} \frac{N_{4rsij}}{n_{4rsij}} \left[ \sum_{k=1}^{n_{4rsij}} x_{rsijk} \right] \right] \right] \right]$$

$$\bar{x}_{rsi} = \frac{N_{3rsi}}{n_{3rsi}} \left[ \sum_{j=1}^{h_{si}} \frac{N_{4rsij}}{n_{4rsij}} \left[ \sum_{k=1}^{n_{4rsij}} x_{rsijk} \right] \right] \right]$$

$$\bar{x}_{rsij} = \frac{N_{4rsij}}{n_{4rsij}} \left[ \sum_{k=1}^{n_{4rsij}} x_{rsijk} \right]$$

Appendix E.–Page 2 of 2.

$X_r$  = Region estimated harvest.

$\text{Var}(X_r)$  = Variance of region harvest estimate.

$r$  = Subscript denoting first-stage units (region).

$s$  = Subscript denoting second-stage units (subregion).

$i$  = Subscript denoting third-stage units (sampled strata, or harvest level).

$j$  = Subscript denoting fourth-stage unit (strata).

$k$  = Subscript denoting individual households.

$h$  = Total sampled subregions in region  $r$ .

$h_s$  = total sampled villages in subregion  $s$ .

$h_{si}$  = Total sample strata in the village.

$N_{1r}$  = Total number of households in region  $r$ .

$n_{1r}$  = Total number of households in sampled subregions in region  $r$ .

$N_{2rs}$  = Total number of households in subregion  $s$ .

$n_{2rs}$  = Total number of households in sampled villages in subregion  $s$ .

$N_{3rsi}$  = Total number of households in all strata of a village.

$n_{3rsi}$  = Total number of households in sampled strata of a village.

$N_{4rsij}$  = Total number of households in each stratum of a village.

$n_{4rsij}$  = Number of households sampled in each stratum of a village.

$x_{rsijk}$  = Individual household reported harvest.

$s_1^2$  = First-stage sample variance.

$s_2^2$  = Second-stage sample variance.

$s_3^2$  = Third-stage sample variance.

$s_4^2$  = Fourth-stage sample variance.

$\bar{x}$  = Weighted household harvest average.

$\bar{x}_r$  = average household harvest at region level.

$\bar{x}_{rs}$  = average household harvest at subregion level.

$\bar{x}_{rsi}$  = average household harvest at village level.

$\bar{x}_{rsij}$  = average household harvest at harvest level.

$P_{4rsij}$  = Factor to account for variance of non-sampled households for which a average harvest was applied.

CI = Confidence interval.

CIP = Confidence interval percentile.

$t_{1/\alpha}$  = Student's  $t$  distribution value with tail area probability  $\alpha$ .

Note: The term “ $N_{3rsi}/n_{3rsi}$ ” accounts for missing stratum at the village level; this term equals 1 if all strata in the village have been surveyed. For instance:

	<i>None Low High</i>			
Total households	20	40	20	$N_{3rsi} = 80$
Sampled households	0	20	20	$n_{3rsi} = 60$

## Appendix F.—Estimated harvest of birds, Yukon-Kuskokwim Delta Region, 2007.

Species	Annual estimated bird harvest			Estimated bird harvest by season					
	Number <sup>a</sup>	Confidence Interval		Spring		Summer		Fall	
		95% CI	Low – High	Number	95% CI	Number	95% CI	Number <sup>a</sup>	95% CI
<b>Ducks</b>									
Wigeon	3,699	17%	3,059 – 4,339	647	24%	650	33%	2,401	29%
Green-winged teal	2,277	21%	1,805 – 2,749	612	44%	761	43%	904	39%
Mallard	8,408	15%	7,110 – 9,705	1,531	27%	1,492	33%	5,384	17%
Pintail	11,656	14%	10,076 – 13,237	1,226	19%	2,874	28%	7,557	14%
Shoveler	2,551	15%	2,179 – 2,923	637	24%	554	27%	1,360	26%
Black scoter	8,655	12%	7,631 – 9,678	6,724	14%	1,191	26%	740	31%
Surf scoter	1,391	25%	1,043 – 1,738	1,269	28%	15	86%	107	80%
White-winged scoter	1,700	23%	1,301 – 2,098	1,297	27%	67	79%	335	44%
Bufflehead	409	51%	201 – 617	117	79%	104	68%	188	100%
Goldeneye	1,110	41%	658 – 1,563	551	43%	48	62%	511	82%
Canvasback	605	29%	428 – 782	402	37%	136	90%	67	62%
Scaup	15,714	11%	14,041 – 17,387	7,296	14%	5,237	16%	3,182	26%
Common eider	175	51%	85 – 265	145	52%	0	-	30	88%
King eider	9,995	28%	7,150 – 12,840	6,908	19%	2,737	78%	350	57%
Spectacled eider	37	86%	5 – 69	37	91%	0	-	0	-
Steller's eider	88	62%	33 – 143	88	84%	0	-	0	-
Harlequin duck	28	64%	10 – 46	28	68%	0	-	0	-
Long-tailed duck	3,676	21%	2,904 – 4,447	1,089	40%	120	77%	2,467	29%
Common merganser	239	44%	134 – 343	120	64%	0	-	119	66%
Red-breasted merganser	370	50%	183 – 556	77	56%	0	-	293	66%
Duck (unidentified)	29	96%	7 – 57	29	98%	0	-	0	-
<b>Total ducks</b>	<b>72,810</b>	<b>8%</b>	<b>66,658 – 78,962</b>	<b>30,831</b>	<b>9%</b>	<b>15,986</b>	<b>18%</b>	<b>25,993</b>	<b>14%</b>
<b>Geese</b>									
Black brant	5,278	18%	4,353 – 6,203	4,882	18%	177	87%	220	53%
Cackling Canada goose	18,213	9%	16,630 – 19,795	8,809	11%	593	48%	8,811	15%
Lesser Canada goose	9,422	27%	6,878 – 11,965	5,400	20%	2,592	58%	1,430	26%
White-fronted goose	24,472	11%	21,749 – 27,194	16,550	12%	3,441	31%	4,480	17%
Emperor goose	1,608	29%	1,147 – 2,069	1,017	22%	480	66%	111	127%
Lesser snow goose	151	53%	72 – 231	114	67%	21	102%	16	69%
<b>Total geese</b>	<b>59,143</b>	<b>10%</b>	<b>53,063 – 65,222</b>	<b>36,771</b>	<b>10%</b>	<b>7,304</b>	<b>38%</b>	<b>15,068</b>	<b>13%</b>
<b>Swans</b>									
Tundra swan	3,364	15%	2,870 – 3,859	2,065	17%	291	29%	1,008	34%
<b>Cranes</b>									
Sandhill crane	2,499	17%	2,065 – 2,933	1,752	21%	339	48%	408	41%
<b>Ptarmigans and grouses</b>									
Spruce grouse	334	62%	127 – 542	10	132%	0	-	324	72%
Ptarmigan	5,196	20%	4,144 – 6,248	4,742	23%	93	74%	360	112%
<b>Total ptarmigans and grouses</b>	<b>5,530</b>	<b>20%</b>	<b>4,429 – 6,631</b>	<b>4,753</b>	<b>23%</b>	<b>93</b>	<b>74%</b>	<b>685</b>	<b>86%</b>
<b>Seabirds</b>									
Cormorant	0	-	-	0	-	0	-	0	-
Arctic tern	0	-	-	0	-	0	-	0	-
Kittiwake	0	-	-	0	-	0	-	0	-
Sabine's gull	0	-	-	0	-	0	-	0	-
Mew gull	387	126%	101 – 877	5	132%	0	-	382	128%
Glaucous gull	363	90%	35 – 692	363	92%	0	-	0	-
Auklet	0	-	-	0	-	0	-	0	-
Murre	0	-	-	0	-	0	-	0	-
Guillemot	0	-	-	0	-	0	-	0	-
Puffin	0	-	-	0	-	0	-	0	-
<b>Total seabirds</b>	<b>751</b>	<b>79%</b>	<b>161 – 1,340</b>	<b>368</b>	<b>90%</b>	<b>0</b>	<b>-</b>	<b>382</b>	<b>128%</b>
<b>Shorebirds</b>									
Whimbrel	12	121%	5 – 26	0	-	0	-	12	121%
Bristle-thighed curlew	14	125%	3 – 32	14	127%	0	-	0	-
Godwit	4,308	25%	3,226 – 5,390	0	-	883	46%	3,425	25%
Golden plover	0	-	-	0	-	0	-	0	-
Small shorebird	64	108%	4 – 133	0	-	32	146%	32	146%
<b>Total shorebirds</b>	<b>4,398</b>	<b>25%</b>	<b>3,314 – 5,483</b>	<b>14</b>	<b>127%</b>	<b>915</b>	<b>45%</b>	<b>3,469</b>	<b>24%</b>
<b>Loons</b>									
Common loon	122	43%	69 – 175	71	60%	11	95%	40	102%
Pacific loon	20	56%	9 – 32	20	64%	0	-	0	-
Red-throated loon	12	99%	3 – 23	12	109%	0	-	0	-
Yellow-billed loon	0	-	-	0	-	0	-	0	-
<b>Total loons</b>	<b>154</b>	<b>37%</b>	<b>96 – 212</b>	<b>103</b>	<b>45%</b>	<b>11</b>	<b>95%</b>	<b>40</b>	<b>102%</b>
<b>Other/unknown bird</b>	<b>66</b>	<b>93%</b>	<b>5 – 127</b>	<b>0</b>	<b>-</b>	<b>38</b>	<b>143%</b>	<b>28</b>	<b>103%</b>
<b>Total birds</b>	<b>148,715</b>	<b>8%</b>	<b>136,179 – 161,252</b>	<b>76,657</b>	<b>8%</b>	<b>24,978</b>	<b>20%</b>	<b>47,080</b>	<b>13%</b>

Sampling effort (Yukon-Kuskokwim Delta, 2007): 26 out of 47 villages in the region were surveyed; 7 out of 7 subregions were represented in the sample. "-": No reported harvest.

a: Does not include Bethel fall bird harvest.



## A NOTE ON THE AMBCC LOGO

Indigenous Yup'ik peoples live in Western, Southwestern, and Southcentral Alaska, as well as in the Russian Far East. In the traditional Yup'ik universe, each animal species has its own world, where they live in communities, like people, and which shamans can visit. Historically, artists carved masks to represent the shaman's spirit helpers and the spirits of fish and wildlife. The different levels of the universe inhabited by the spirits of the animals were represented by rings around a mask. Masks were used during a winter ceremony called *Kelek*, or "Inviting-In Feast." The host community invited people of other communities, as well as the spirits of people who had died and the spirits of the animals, to participate in the ceremony. During *Kelek*, people sang, drummed, and danced with masks to ask for plentiful harvests in the coming year, to appease animal spirits that may have been offended, and to avoid misfortune in the relationship between people and animals. The masks also could be funny, abstract, fearsome, representations of human faces, and very small or very large. Most *Kelek* masks were destroyed after the ceremony. Today, masks are important items in Native art and economies and are designed to be displayed rather than worn. Yup'ik animal masks are beautiful materializations of the Yup'ik appreciation and respect for the natural resources they depend upon. To learn more about *Kelek* and Yup'ik masks see Fienup-Riordan (1983, 1996) and Pete (1989).

The logo of the Alaska Migratory Bird Co-Management Council (AMBCC) incorporates the drawing of a Yup'ik mask by artist Katie Curtis from Toksook Bay, Alaska. Some people refer to this drawing as "The Goose Mask." The U.S. Fish and Wildlife Service commissioned this drawing in the late 1990s during the process of creating the AMBCC. An actual mask was not carved. The original drawing is black and white; the colors used here were added in 2009 when new outreach materials were produced for the AMBCC subsistence harvest survey. The choice of colors was based on historical and current Yup'ik artwork. Katie Curtis was consulted during this process and agreed with the use of the colors. The mask depicts a Canada goose surrounded by 8 feathers. The feathers represent the 8 steps to implement a legal, regulated spring subsistence bird hunt: 1) Notify people of the intent to form management bodies; 2) Meet to share ideas; 3) Send out ideas and listen; 4) Choose the form of management bodies; 5) Start rule-making; 6) Recommend rules for Alaska; 7) Link with management in other U.S. flyways; and 8) Link with the nation. Since its inception, this new regulatory framework has been designed to promote true collaboration among a diversity of stakeholders as cultures intermingle in the history of wildlife management and conservation in Alaska.

